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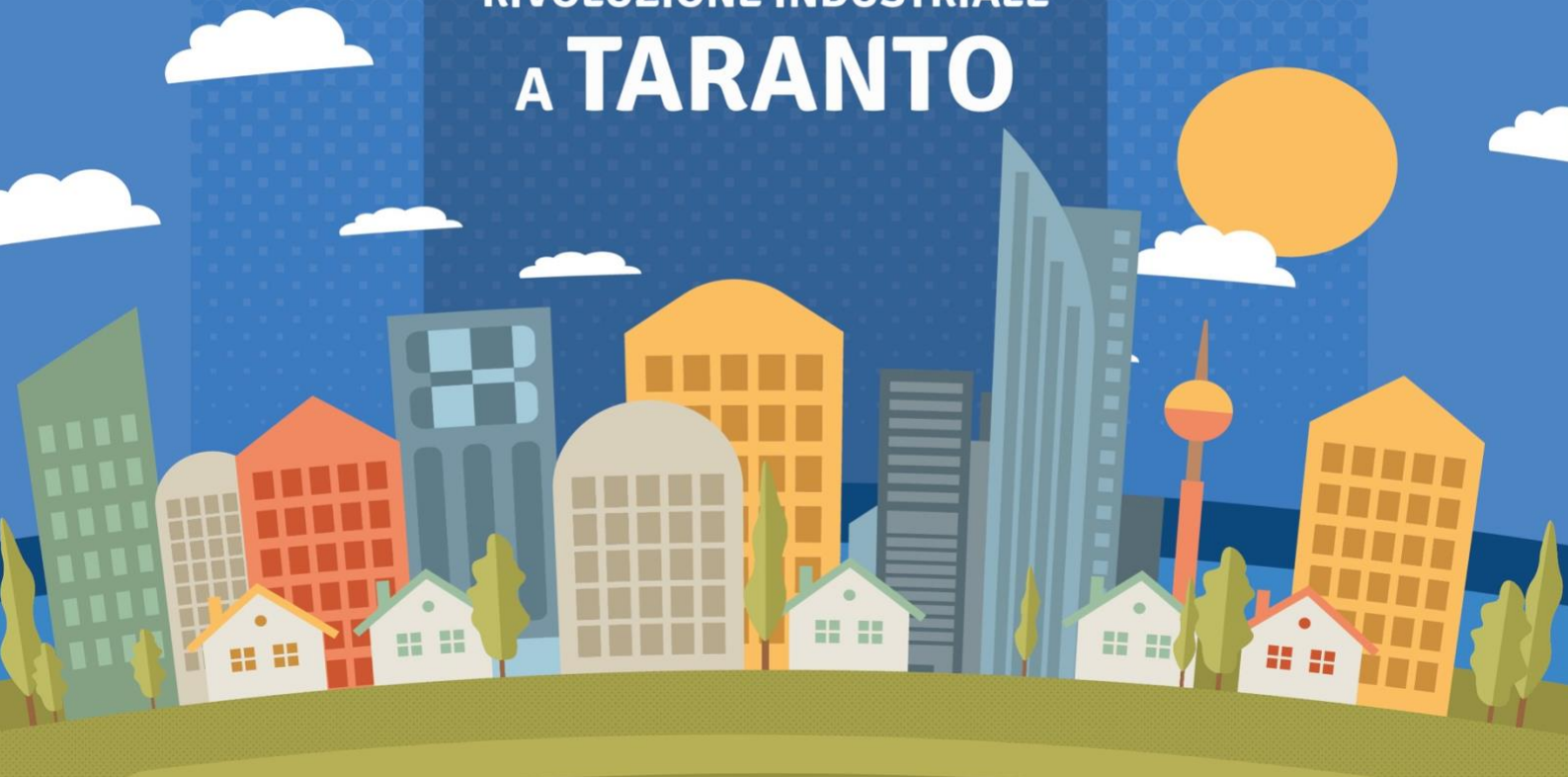
TARANTO
IL FUTURO È ADESSO

TRi.Ø

LA 3^ RIVOLUZIONE INDUSTRIALE A TARANTO



TARANTO

TRI.0

FUTURE IS NOW

The Transition from the Second to the Third Industrial Revolution:
with a focus on Taranto

Study commissioned by

ROSA D'AMATO

MEP

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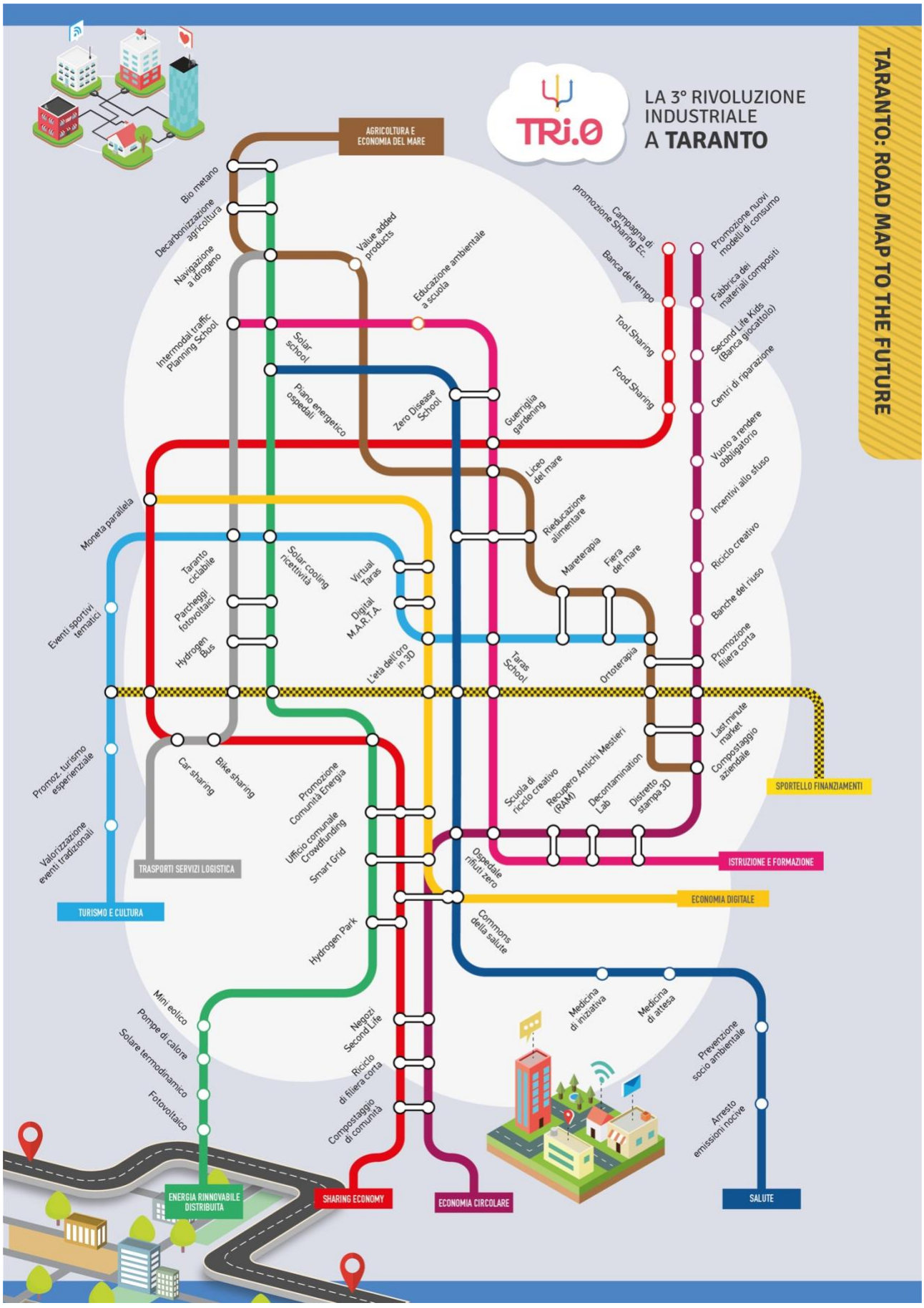
TRi.0
LA 3° RIVOLUZIONE INDUSTRIALE A TARANTO
TARANTO: ROAD MAP TO THE FUTURE
AGRICOLTURA E ECONOMIA DEL MARE
Bio metano
Decarbonizzazione agricoltura
Navigazione a idrogeno
Value added products
Educazione ambientale a scuola
Intermodal traffic Planning School
Solar school
Piano energetico ospedali
Zero Disease School
Guerriglia gardening
Liceo del mare
Rieducazione alimentare
Mareterapia
Fiera del mare
Ortoterapia
Taras School
L'età dell'oro in 3D
Virtual Taras
Digital M.A.R.T.A.
Solar cooling ricettività
Taranto ciclabile
Parcheggi fotovoltaici
Hydrogen Bus
Moneta parallela
Eventi sportivi tematici
Promoz. turismo esperienziale
Valorizzazione eventi tradizionali
Car sharing
Bike sharing
TRASPORTI SERVIZI LOGISTICA
TURISMO E CULTURA
Promozione Comunità Energia
Ufficio comunale Crowdfunding
Smart Grid
Hydrogen Park
Mini eolico
Pompe di calore
Solare termodinamico
Fotovoltaico
ENERGIA RINNOVABILE DISTRIBUITA
Negozi Second Life
Riciclo di filiera corta
Compostaggio di comunità
SHARING ECONOMY
Ospedale rifiuti zero
Commons della salute
ECONOMIA CIRCOLARE
Medicina di iniziativa
Medicina di attesa
Prevenzione socio ambientale
Arresto emissioni nocive
SALUTE
Campagna di promozione Sharing Ec.
Banca del tempo
Tool Sharing
Food Sharing
Promozione nuovi modelli di consumo
Fabbrica dei materiali compositi
Second Life Kids (Banca giocattolo)
Centri di riparazione
Vuoto a rendere obbligatorio
Incentivi allo sfuso
Riciclo creativo
Banche del riuso
Promozione filiera corta
Last minute market
Compostaggio aziendale
SPORTELLO FINANZIAMENTI
Scuola di riciclo creativo
Recupero Antichi Mestieri (RAM)
Decontamination Lab
Distretto stampa 3D
ISTRUZIONE E FORMAZIONE
ECONOMIA DIGITALE

Summary

FOREWORD

by ROSA D'AMATO
Representative of M5S at the European Parliament
from Taranto

I'm writing while it's raining outside and the sky of my city will be less polluted for a few minutes.
The rain is what Taranto needs. And the South needs...
A rain of ideas. Constant, with a beating rhythm. A waterfall of the future that floods the mind of the generation of young people from Taranto who have decided to overtake, not before demolishing it, the steel curtain that over the decades has separated Taranto from the world that meanwhile was looking beyond heavy industry. Water, to water the dry roots of the past.
This text does not claim to be a beacon. Yet a light on things to be done, yes, it is.
It is a matter of opening up the debate on the future of Taranto, which then is the future of a Southern Italy that is measured every day in the European context, leveraging on an essential premise: **GOING BEYOND STEEL.** Overcoming the nineteenth-century vision of the Ionian province of the South with hat in hand. Recovering the territory to its natural state, relocating the City and the province to the world of tomorrow, dragging them out of the industrial quagmire where the hopes of the free, conscious, aware, productive, capable, honest people have lost their breath.
Taranto as a European city, no longer servant of the state. Taranto capable of attracting, designing and realising itself by enhancing the available European funds, showing itself capable of capitalising on opportunities, reclaiming the present, opening up to the future with an impetus too often considered improbable, impossible.
Looking at tomorrow, then, describing it to build it together. I think this is the only way to go.
The industrial revolution is a phase that history presents cyclically. This is the third train to be seized. While the Government sells Ilva, and I put my fingers on this keyboard with the impetus of those who do not want to give up, the only doubt seems to be how to fire and re-hire, starve families poisoned by smoke and social conflict that this story has been recording for years, stressing the idea that nothing new is really possible.
NO. I say NO to this vision of Taranto closed with double key and imprisoned by a myopic and deaf State.
This text is the beginning of a new story to be written. People from Taranto can do it together. We will do it.
It is an articulated study, full of ideas, founded on having to do, leavened on the concepts of possible and necessary, fed step by step by the desire to set up a new horizon.
Is there life AFTER Ilva? There is only one answer to this question: **there is life WITHOUT Ilva.**
Taranto TRI.0 is the synthesis of this concrete perspective, it is the analysis and proposal of how to do.
The steel industry, as we know it and suffer it, is the past that still looms but whose structural crisis is objective, beyond the damage to health and the environment that production logic imposes every day.
Taranto TRI.0 recognises the symptoms of an irreversible socio-economic pathology. We have to look beyond those fumes, the following proposal is not an open eye dream. It is the horizon to be set in one's political and social viewfinder.
Never as in this case, the metaphor of the long breath is appropriate and adherent to the proposal that the text details as in a long journey **towards tomorrow**, stop after stop.
Nowadays we are experiencing the crisis of the second industrial revolution, an economic model based on fossil energy. The pillars of this thought have collapsed in Taranto before any other industrial area in crisis. **Growth is not endless.** The prevalence of industry over other sectors is the past. The progress that requires the sacrifice of the environment and health in the name of economic activities is a postulate put on trial.
In Taranto, the second industrial revolution has dropped its load of false promises. The hopes it carried have expired. The fossil cycle is closing, leaving on the coasts, in the air, in the seas and in the aquifer, the slow and subtle decay of a life which is normal elsewhere, accompanied by social disintegration - fuelled by the local economic crisis - in a national scenario that does not guarantee any parachutes and in a non-comforting world scenario.
Going beyond Ilva smoke is a generational, political, economic and social duty. The Taranto TRI.0 Road Map is drawn. It must be travelled, lived, propped up, enlarged, extended to the future.
Enjoy the reading.

PREMISE

Management Summary

Taranto crisis is not only the crisis of the steel industry and an economic model based on it. Taranto crisis is the crisis of the second industrial revolution. That is, of an economic model based on fossil energy and thought. In Taranto, before any other industrial area in crisis, all the myths of the second industrial revolution have collapsed: the one of infinite growth, of the prevalence of industry over other sectors, of a progress that requires the sacrifice of the environment to economic activities.
In Taranto the second industrial revolution landed full of promises and hopes for everyone. Now it goes away after a devastating fossil cycle has ended and not only leaves destruction, death and disease, but it also leaves unemployment, economic desertification, and social disintegration.
With this work we will analyse how the world economy and that of Taranto has evolved, in particular from the first to the second industrial revolution at an economic, social and energy level, and how Taranto can be reborn without Ilva, without steel and without fossils. This is not science fiction or unrealistic hypotheses, but, as the study shows, the only realistic and viable concrete possibility to get out of the structural and now endemic crisis that grips the second industrial revolution and those cities that have sacrificed their natural and human resources more than others. Just like Taranto.

Work processing methodology

As working method, we have chosen to adopt an inductive perspective, setting the goal we want to achieve from the beginning of the study: the Third Industrial Revolution, that is, the new distributed economic model at higher labour intensity and at lower intensity of capital compared to the fossil model of the second industrial revolution. The aspect of high occupational intensity is extremely interesting in the case of Taranto where employment needs were used from the outset as a justification for making the worst environmental havoc, and still today as a pretext for keeping an economic model that has reached the limits of its efficiency (not to mention ethics, social justice and environmental respect) alive. This new economic model based on renewable energies has inspired European strategies towards sustainability and compliance with the laws of thermodynamics since 2007, and today finds its maximum expression in the application on the territories through special Master Plans developed by Jeremy Rifkin. In particular, in the northern French region of Pas de Calais, a very interesting experiment is underway to create a Master Plan developed by Rifkin which envisages the transition to a totally post-carbon economic scenario for the whole region including its three coal basins and its seven steel mills (another analogy with the case of Taranto). In the awareness that the current situation is no longer sustainable at environmental, social, human, and (least of all) economic level, the study begins with an introduction by Jeremy Rifkin, written in collaboration with Angelo Consoli, which illustrates the direction that the post- carbon, digital, sharing, ecological and circular world economy is taking. In a word, the economy of the third industrial revolution. Nord Pas de Calais as a region no longer exists as it has undergone an administrative reform which provided for the merger of the region with the neighbouring Picardy region and the establishment of a new administrative entity of doubled size, called the Region de Haute-de-France. Even in the new region the Third Industrial Revolution remains a very high priority, so much so that what in the Nord Pas de Calais Region was the Department for the Third Industrial Revolution, in the new Haute-de-France region has become the appointment of a Vice President of the Region, mirroring the evolution of energy policy at European level where the European Commission has a Vice President for the Energy Union (Maros Sefkovic) and therefore has become one of the priority strategies of the Juncker Commission.
The decarbonisation strategies inspired by Jeremy Rifkin's vision went beyond the regional context in France and entered the activities of the Ministry for Ecology directed by Ségolene Royale who created a special working group entrusted to the former Minister for Ecology Corinne Lepage, to transfer in a regional framework some of the TRI strategies developed at regional level, and they have also crossed the borders of France. In fact in recent months we have witnessed the preparation of Master Plans in Luxembourg and in the southern region of Holland, that of Rotterdam The Hague, a region where the activities of the fossil economy and the port ones are predominant, and yet has decided an ambitious decarbonisation plan which represents an evolution of the one originally designed for the Nord Pas de Calais in France. Negotiations are currently underway with the Belgian region of Flanders for the elaboration of a TRI Master Plan in Belgium, in perfect synergy with that of the neighbouring Regions Haute-de-France and Rotterdam-The Hague.
After seeing the "new world" that awaits us (and which has already begun to be a reality in Germany, France, the Netherlands and many other countries including China), the study will lead us to retrace the path that has brought to this point with a dip in the second industrial revolution and an analysis of the capitalist model applied both on a large scale and on a local scale in Taranto, to conclude with the application of economic models of the Third Industrial Revolution to the economy and society of Taranto, and hypothesize a series of proposals that, despite all the precautions due to the limited time and means available,

can accelerate the exit of Taranto from the steel industry of the second industrial revolution and its transition towards a digital economy fully integrated with the territory of the third industrial revolution. The Critical Success Factors to achieve the result will be determined with a participatory process from below that will involve citizens, communities, entrepreneurship organised in its associative forms and organised civil society, through a series of meetings and appointments in the form of workshops and interactive conferences and also in the form of consultations on online digital platforms, to allow the widest participation of citizens, stakeholders and values representatives

CSF Critical Success Factors

Since the transition from the second to the Third Industrial Revolution implies a change of cultural paradigm and not only the replacement of old polluting plants with less polluting plants, the first critical success factor for the transition of Taranto to the third Industrial Revolution lies in the spread of awareness of the new way of thinking and doing economy in accordance with the principles of thermodynamics and respectful of natural resources. To achieve this, it will be necessary to engage all citizens and communities of the Taranto area in a real [ ] with communication campaigns aimed at both students and consumers, the business community and civil society organisations.
Contributions and ideas from below from civil society organisations, environmental associations and from simple citizens will be solicited in view of the creation of a driving force for the third Industrial Revolution in Taranto, the Taranto TRI.0 Observatory which will be charged not only to gather ideas and proposals but also to carry out projects by participating in tenders and calls for proposals at local, national and European level.

INTRODUCTION

by Angelo Consoli e Jeremy Rifkin

The second industrial revolution entered an irreversible crisis, at environmental, economic and social level. The global fossil-based economy is slowing down, productivity is falling, and unemployment remains stubbornly high in every country. At the same time, the inequality between the rich and the poor is at its historic peak. In 2010 the cumulative wealth of the 388 richest people on earth was equal to the cumulative income of the poorest half of the human race. In 2014, the number of people whose combined wealth was equivalent to the poorest half of the human race had fallen to 80.
This dramatic economic reality is now worsening due to the rapid acceleration of climate change generated by growing greenhouse gas emissions from industrial activities. The most disastrous effects of this climate change are felt especially in developing countries. At least for now.
Climatologists explain that on the eve of the industrial era, the overall concentration of carbon in the atmosphere, which in the previous 650,000 years was between 180 and 300 parts per million (ppm), rose to 280 ppm, and then reached 400 ppm in 2013. The atmospheric concentration of methane and nitrogen oxide, the other two main greenhouse gases, is showing similar trends.
At the international climate summit held in Copenhagen in December 2009, the European Union proposed to the countries of the world the goal to contain carbon dioxide (CO_2) emissions below 450 ppm by 2050, in the hope that succeeding in this endeavour it would have been possible to limit the earth's temperature rise to 2°C. However, such an increase would be enough to bring the planet's temperature back millions of years to that of the Pliocene, with devastating consequences for ecosystems and human life.
The EU proposal, however, remained unheeded. Today, four years later, the increased use of carbon-based fuels has pushed CO_2 levels far above what the old models had predicted. This suggests that in 2100 the increase in temperature on earth will have far exceeded 2°C and perhaps even 4.5°C and beyond, leading to temperatures that have not been seen for millions of years (let's not forget that human beings as we understand them are the youngest species, present on earth for just about 175,000 years). What makes these substantial increases in earth's temperature so dangerous is the fact that the increase in heat radically alters the planet's hydrogeological cycle. Heart is a planet rich in water. During the geological eras, the various terrestrial ecosystems have developed in direct relationship with the trend of precipitation. Each 1°C increase in temperature produces a 7% increase in the ability of the atmosphere to absorb humidity. This causes a radical change in the way water is distributed: rainfall becomes more intense, but its duration and frequency are reduced.
World ecosystems are already experiencing the consequences. We are facing more intense snowfalls, more violent storms and spring floods, more protracted drought episodes, more frequent fire phenomena, more devastating hurricanes (category 3, 4 or 5), the melting of glaciers in large mountain ranges, rising of the sea level. Terrestrial ecosystems cannot adapt to this upsetting alteration of the planet's water cycle in such a short time and experience a growing situation of stress, already touching collapse in some cases. The destabilisation of terrestrial ecosystems dynamics has now directed the biosphere towards the sixth episode of extinction of life on earth of the last 450 million years. In each of the five previous episodes, the planet's climate has reached a critical point beyond which ecosystems have entered a positive feedback cycle, with a sudden reduction in biodiversity. To recover from the loss of biodiversity it took, on average, 10 million years. Biologists warn us that by the end of this century, we could witness the extinction of half the terrestrial species and the beginning of a new unfavourable era of life, which could last millions of years. James Hansen, former director of the Goddard Institute for Space Studies by NASA and the US government's main climatological consultant, predicts that the temperature of the earth will rise by 6°C by the end of the century and human civilisation as we have known it will come to an end. The only way to try to avoid it, says Hansen, is to reduce the current carbon concentration in the atmosphere from 385 ppm to 350 ppm or less, a perspective that no government is currently contemplating.
In the era of the second industrial revolution, the concentration of CO_2 in the atmosphere rose from 180 to 280 PPM (Parts Per Million), and in 2013, it exceeded 400 PPM.
The IPCC has set a limit of 450 PPM by 2050 in hopes of containing the average earth temperature rise under 2°C. But on the basis of empirical studies and not simple computerised projections experts like James Hansen, (former head of NASA's Goddard Institute for Space Studies) predict that between now and the end of the century the temperature of the earth will increase by 6°, bringing the planet to temperatures that have not been seen for millions of years with disastrous consequences for humans and all living species, sea level rise of over 7 metres, mass extinctions, climatic migrations and the "end of civilisation as we know it".
At the same time, the inequality between the rich and the poor is at its historic peak. In 2010 the cumulative wealth of the 388 richest people on earth was equal to the cumulative income of the poorest half of the human race. In 2014, the number of

people whose combined wealth was equivalent to the poorest half of the human race had fallen to 80. Such an income disparity is unsustainable from all points of view, including for environment and health.
In fact, while millions of Westerners suffer from diseases due to hyper-nutrition and meat consumption, in underdeveloped countries 8 million children die each year from malnutrition and hundreds of thousands of humans flee (and often die) in an attempt to escape poverty and conflicts for the hoarding of natural resources. That's why Pope Francis refers to this economy as "A killer". [1]
We have to understand that this "Killer Economy" is the direct consequence of the energy model based on the combustion of fossil energy sources, a process with very high physical and social entropy and also with a very high capital intensity that has concentrated wealth and economic and political power in the hands of very few global financial and energy groups. In parallel, this fossil oligarchy has implemented strategies to control resources belonging to weak countries through financial expedients such as scientifically planned debt and ultra-liberal logic inspired by the Chicago economic school (headed by prof. Milton Friedman), passed off as absolute truths and which instead are simple opinions. The only incontrovertible truths, even in the economic field, are the laws of thermodynamics and the biosphere, laws that reveal that solar energy is not only the cleanest, but the most powerful, source: the sun radiates 470 exajoules of energy on Earth every 88 minutes, equal to the amount of energy that humans use in a year. If we could exploit the 0.1 percent of the solar energy that reaches Earth, we would have six times more energy than all the energy used today in the global economy. In violation of these laws the entire fossil economy of the second industrial revolution flourished.
Yet a new economic paradigm is emerging that is about to radically change the way we organise economic life on the planet. The European Union is embarking on a bold new course which between 2015 and 2020 aims to create an integrated high-tech single market for the 21st century, capable of bringing together its 500 million citizens and 28 Member States, potentially making Europe the most productive commercial space in the world. The plan is called Digital Europe. The European vision of a green digital economy has also been embraced by China and other developing nations worldwide. Making Europe digital involves much more than providing universal broadband, free Wi-Fi, and a Big Data stream. The digital economy will revolutionise every commercial sector, will bring about changes in the functioning of almost all sectors, will bring with it new economic opportunities never seen in the past, will restore work to millions of people, and will create a more sustainable low carbon society to mitigate the climate change.
More importantly, this new economic narrative is accompanied by a new biosphere consciousness, as the human race begins to perceive Earth as an undivided community. We are beginning to take on our responsibilities as protectors of the planetary ecosystems that support life.
To catch the enormous extent of the economic change taking place, we need to understand the technological forces that have always given rise to new economic systems throughout history. Each new major economic paradigm requires the simultaneous convergence of three elements, each interacting with the others to allow the system to operate as a whole: new communication technologies to manage economic activities more efficiently; new sources of energy to feed economic activities more efficiently; and new modes of transport to make economic activities move more efficiently.
In the 19th century, steam powered printing, the telegraph, the abundance of coal, and locomotives on national rail systems gave rise to the first industrial revolution. In the 20th century, centralised electricity, the telephone, radio and television, cheap oil, petrol engine vehicles, and large national road networks converged to create an infrastructure for the second industrial revolution.

1 (cit. http://www.edizpiemme.it/libri/papa-francesco-questa-economia-uccide).

THE THIRD INDUSTRIAL REVOLUTION

Today Europe and the world are laying the foundations for the Third Industrial Revolution. Digital and interactive Internet communication is converging with a digitised renewable energy Internet, a GPS-guided automated transport and logistics Internet, for the creation of the infrastructure of a super Internet of Things (IoT). In the Internet of Things, there will be sensors integrated into all devices, allowing them to communicate with each other and with the Internet users, providing moment data on management, power supply, and the movement of economic activities in a Smart digital Europe. Currently, 14 billion sensors are connected to resource flows, warehouses, road systems, factory production lines, electricity transmission networks, offices, houses, shops, and vehicles, and keep their conditions, their performance and the feeding of "Big Data" into the Internet of Communication, Energy and Transport and Logistics under control. It is estimated that by 2030, there will be more than 100,000 billion sensors that will connect the human and natural environment in a distributed global smart grid. For the first time in history, the entire human race will be able to collaborate directly, in an interaction capable of democratizing economic life.

The digitalisation of communication, energy, and transport also entails risks and challenges, not least those relating to web neutrality, the prevention of the creation of new private monopolies, the protection of personal privacy, guaranteeing data security and []against cybercrime of cyber-terrorism. The European Commission has already started to address these problems, establishing the general principle that " ***privacy, data protection and information security are free requirements for Internet of Things*** services."

In this enlarged digital economy, private entrepreneurs connected in the Internet of Things can use Big Data and advanced analysis systems to develop algorithms to accelerate efficiency, increase productivity and drastically reduce the marginal cost of production and distribution of goods and services, making European companies more competitive in an emerging global post-carbon market. (The marginal cost is the production cost of an additional unit of a good or service, after the fixed plant costs have been amortised.)

The marginal cost of some goods and services in a digital Europe could even go to zero, allowing millions of prosumers connected in the Internet of Things to produce and exchange goods with each other, almost free of charge. The digital generation is already producing and sharing music, videos, blog news, social information, free e-books, open online university courses, and other virtual goods at near-zero marginal costs. The near zero marginal cost phenomenon brought the music industry to its knees, shook the television industry, threw newspapers and magazines out of the market, and crippled the book publishing market.

But if there are those who suffer in the traditional industry, with the zero marginal cost phenomenon myriads of new commercial companies have been created, including Google, Facebook, Twitter, and YouTube, and thousands of other Internet companies, which manage to make profits by creating new applications and building the networks that allow the Sharing Economy to thrive.

Economists acknowledged that zero marginal cost had a strong impact on the information industry but, until recently, the have argued that the productivity increase of the digital economy would remain confined to the virtual world never being able to overcome the insurmountable wall of the real economy, and therefore extend to the sectors of energy and the production of physical goods and services. This impassable wall has now been crossed. The Internet of Things, which is constantly evolving, will allow conventional companies, as well as millions of ***prosumers*** , to generate and distribute their energy from renewable sources, to use driverless electric and hydrogen vehicles, in automated ***car sharing*** services, and produce an increasing quantity of physical products printed in 3D with very low marginal cost in the market economy or almost zero marginal cost in the ***Sharing Economy***, just as it already happens in the information sector.

Renewable energy Internet

Most of the energy we use to heat our homes and use our appliances, power our businesses, drive our vehicles, and manage every part of the global economy will be generated at almost zero marginal cost and be almost zero in the next decades. This is already happening for several million pioneers in the EU who have transformed their homes and businesses into distributed micro-energy plants to produce renewable energy on site.

The dizzying acceleration of the installation of renewable energies is largely due to the vertical collapse of the cost of these technologies. Fixed costs of solar and wind energy production have plummeted according to exponential curves for more than 20 years, not unlike IT products. In 1977, the cost to generate a single watt of solar energy was $ 76. In 2015, the cost plummeted to $ 0.36. After the fixed costs for the installation of solar and wind plants have been covered, (which occurs in a period ranging from just 2 to 8 years) the marginal cost of the generated energy is almost free. Unlike fossil fuels and uranium for nuclear energy, which are expensive goods listed on international markets, the sun beating on the roofs and the wind that caresses the

buildings are free. In some regions of Europe and America, solar and wind energy have already achieved costs equal to or lower than those of fossil fuel or nuclear energy.
The impact on society of solar and wind energy at near zero marginal cost is all the more evident when one considers the enormous potential of these energy sources. The sun radiates 470 exajoules of energy on Earth every 88 minutes, equal to the amount of energy humans use in a year. If we could exploit 0.1 percent of the solar energy that reaches Earth, we would have six times more energy than all the energy used today in the global economy. Like solar radiation, wind is omnipresent and blowing everywhere in the world, although its strength and frequency vary. A ***Stanford University*** study of global wind capacity concluded that if we could harness 20 percent of the available wind power, we could generate seven times more electricity than is currently consumed by the entire global economy. The Internet of Things will allow businesses and prosumers to monitor their electricity consumption in buildings, optimise energy efficiency, and share surpluses of green electricity produced locally on a national and continental scale.
The Internet of Energy is based on five fundamental pillars, which must be introduced simultaneously if we want the system to operate efficiently.
Firstly, the introduction of favourable tariffs and other incentives to encourage pioneers to transform buildings and sites they own into distributed micro-generation power plants. The incentive rates guarantee an income higher than the market value for the renewable energy generated locally and fed into the grid.
Secondly, the renovation of buildings and all other infrastructures according to energy efficiency criteria to make them more efficient, and the installation of renewable energy plants, (solar, wind, etc.) to generate energy for immediate consumption or for introduction into the electricity grid with relative compensation.
Third, the installation of energy storage technologies, such as hydrogen, fuel cells, batteries, water re-pumping, etc., both in local production plants and along electricity grids in order to give continuity to intermittent green electricity flows and stabilise their peaks.
Fourth, the installation of advanced meters in each building, and the introduction of other digital technologies to transform the electrical network from the servo-mechanical to the digital connection capable of managing a multiplicity of small renewable energy plants generated locally in a distributed way.
Fifth, in the car parks it is necessary to provide for the installation of charging stations for electric and hydrogen vehicles powered by the internet of renewable energy that not only can buy but also supply electricity to the electricity grid.
The progressive introduction and integration of the aforementioned five pillars transforms the electricity grid from a centralised system powered by fossil and nuclear sources to a distributed system powered by renewable energy. In this new system, every company, every neighbourhood, every home, become producers and consumers of electricity, sharing their surplus with everyone else on the Internet of energy in an intelligent network that is beginning to spread across countries and continents.
The democratisation of energy is forcing electricity companies to rethink their business practices. A decade ago, almost all German electricity was produced by four giant vertically integrated electricity companies, (E.ON, RWE, EnBW and Vattenfall). Today, these companies are no longer the exclusive arbiters of energy production. In recent years, citizens in the countryside as well as in cities, and small and medium-sized enterprises (SMEs), have set up electricity cooperatives across the whole Germany. Nearly all electricity cooperatives have managed to secure financing from banks through low interest rate loans for the installation of plants for the production of solar, wind and other renewable energy produced locally. The banks were more than happy to provide the loans, with the guarantee that they would be repaid thanks to the extra charge that the cooperatives receive through the energy bill which allows them to sell green electricity to the electricity grid. Today, the majority of the green electricity that feeds Germany is generated by small producers associated in electrical cooperatives. The country's four major electricity companies produce less than 7 percent of the green electricity that is bringing Germany into the Third Industrial Revolution.
While these vertically integrated traditional electricity companies have proven very effective in generating cheap electricity from traditional fossil and nuclear fuels, they have not been able to compete effectively with local electricity cooperatives whose activities have been able to create economies of scale in a "lateral" rather than centralised way and have therefore proved more suitable for managing the energy produced by thousands of small producers in large collaborative networks. Peter Terium, President of the German energy company RWE, acknowledges the massive transition taking place in Germany from centralised energy to distributed energy and says that large electricity and energy companies "***must adapt to the fact that, in the long term, the gains in conventional electricity production will be significantly lower than what we have seen in recent years*** ".
An increasing number of energy companies are grappling with the new reality in which energy production is democratising and they are being forced to change their business model to accommodate the new Internet of Energy. In the future, their income will increasingly depend on managing energy consumption for their customers. Electricity companies will aim to accumulate large amounts of data across all their customers' high added-value supply chains and will use analytical systems to create algorithms and applications designed to increase their aggregate energy efficiency and productivity and reduce their marginal costs. Their customers, in turn, will share the cost savings achieved through increased efficiency and productivity with electricity companies through what they call " ***Performance Contracts*** "

In other words, electricity companies will benefit from virtuous management of energy consumption, and therefore from selling less instead of more electricity, contrary to what happens today.

The internet of automated GPS-guided transport and logistics

The convergence between the Internet of Communication and the Internet of Energy makes it possible to build and gradually introduce the Internet of Automated Transport and Logistics. The combination of these three Internet represents the heart of the Internet of Things platform for the management, energy and movement of goods in a Third Industrial Revolution economy. The Internet of Logistics and Automated Transport is based on four fundamental pillars which, as for the Internet of Energy, must be introduced simultaneously to allow the system to operate efficiently. First, as mentioned above, charging stations will have to be installed everywhere and allow cars, buses and trucks to refuel everywhere and also to feed electricity into the grid. Secondly, sensors must be inserted in all devices through the logistics networks to allow factories, warehouses, wholesalers, retailers and end users to have the most updated data possible, about the logistic flows concerning the production chains. Third, the storage and transit of all physical goods must be standardised so that they can travel and pass any point of passage without impediments and delays, similarly to the flows of information, which are transmitted simply and efficiently through the World Wide Web. Fourthly, all operators along the logistics corridors must join together in collaborative networks to bring all their activities into a shared logistics space to optimise the shipment of goods, exploiting the lateral economies of scale. For example, thousands of warehouses and distribution centres can create cooperatives to share unused spaces, allowing carriers to pick up, transport and deliver according to the most efficient routes.

The Internet of Things platform will provide real-time logistic data on withdrawals and delivery times, weather conditions, traffic flows, and updated information on the storage capacities of deposits on the chosen route. Big Data and advanced analytical systems will be used to create algorithms and applications to guarantee the optimisation of the aggregate energy efficiency along the logistical paths and this will significantly increase productivity while reducing the marginal cost of each shipment.

By 2025, at least a part of shipments by rail and waterways will probably be carried out by electric and hydrogen vehicles, (*driverless*) automated guided vehicles and drones, powered by renewable energy at almost zero marginal cost, and managed by increasingly sophisticated analytical systems and algorithms. Driverless and drone transport will decrease marginal labour costs and accelerate productivity by reducing the marginal cost of labour for freight transport in the Internet of Intelligent Logistics and Intelligent Automated Transport and Internet logistics to almost zero.

The Internet of Automated Transport and Logistics also radically transforms the very idea we have of mobility. Today's young people are beginning to use mobile communication technology and the nascent GPS guide for automated transport and the Internet of logistics to find drivers available to offer rides for any destination in vehicle sharing services. Young people prefer mobility access to vehicle ownership. Future generations will likely never own a vehicle again in the age of automated and intelligent mobility. For each shared vehicle, however, the production of 15 vehicles is prevented. Larry Burns, the former executive vice president of General Motors, and now a professor at the University of Michigan, conducted a study of mobility patterns in Ann Harbor, a medium-sized American city, and found that car sharing services are able to eliminate 80% of the vehicles currently on the road, and provide the same or even better mobility services at a lower cost.

There are currently a billion cars, buses and trucks circulating in traffic in dense urban areas around the world. Petrol-powered vehicles were the pivot of the second industrial revolution. The mass production of these vehicles has devoured huge quantities of the Earth's natural resources. Cars, buses and trucks also burn huge quantities of oil and are the third major contributor to greenhouse gas emissions, after the construction sector and the beef production sector with related zootechnical practices. Burns' study concludes that 80% of the vehicles currently in circulation could be eliminated with the widespread adoption of car sharing services in the next generation's life span. The remaining 200 million vehicles will be electric and hydrogen from renewable sources with no marginal cost. Shared vehicles, in turn, will be driverless and will travel on automated and intelligent road networks.

The long-term transition from *ownership* of vehicles to *access* to mobility services with driverless vehicles on intelligent road systems will radically transform the commercial model of the transport industry. The major car manufacturers around the world will produce fewer vehicles over the next 30 years, but will be able to compensate for the losses by repositioning themselves as aggregators in the Internet of Global Automated Transport and Logistics and in the management of advanced mobility and logistics services.

The convergence of the Internet of Communication, that of Renewable Energy, and that of Automated Transport and Logistics in a single operating system becomes the global brain for the cognitive infrastructure of the Internet of Things. This new digital platform radically changes our way to manage, give energy, and provide for the mobility of economic activity through the different added-value chains and the networks that make up the global economy. The digitalised platform of the Internet of Things is the heart of the Third Industrial Revolution.

The widespread factory

Virtually every sector will be revolutionised by the Internet of Things platform and the transition to the Third Industrial Revolution.
For example, a new generation of micro producers is beginning to connect to the nascent Internet of Things, significantly increasing productivity, reducing marginal costs, and achieving the ability to be competitive with those global manufacturing firms, organised around vertically integrated economies of scale which once seemed invincible. I'm talking about 3D printing, the manufacturing production model that accompanies the Internet of Things economy.
In 3D printing, a computer program instructs an arm connected to fusion material in cartridge or filament, to build, inside a printer, a physical product, layer by layer, creating a complete object, even equipped with moving parts, which at the end is extracted from the printer. Like the "replicator" in the Star Trek television series, the printer can be programmed to produce an infinite variety of products. Printers are already producing jewellery products [and planes] and spare parts for human prostheses, and also parts of cars and buildings. And cheap printers are purchased from amateur manufacturers interested in printing their own components and products. The consumer begins to give way to the ***prosumer*** while an increasing number of people are starting to become producers / consumers of their products.
Three-dimensional printing differs from conventional centralised production in many relevant ways. To begin with, there is little human involvement other than computer programming. The software does all the work, and therefore it is more appropriate to define the whole process as " ***info-factoring*** " or "digital manufacturing" rather than simple "manufacture".
The first who practiced 3D printing made progress to ensure that the software used to program and print physical products remains ***open source***, allowing the ***prosumer*** to share new ideas with each other in amateur DIY networks. The concept of open design conceives the production of goods as a dynamic process in which thousands, even millions of actors, learn from each other to do things together. The elimination of intellectual property protection significantly reduces the cost of producing printed objects, giving the 3D printing company a significant competitive advantage over traditional manufacturing companies, which must take into account the need to pay a myriad of patents. The ***open source*** production model has encouraged exponential growth.
The 3D printing production process is organised completely differently than the production process of the first and second industrial revolution. The traditional manufacturing process is a ***subtractive process***. The raw materials are cut, ground and then assembled to manufacture the final product. In this process, a considerable amount of material is wasted and cannot be found in the final product. The three-dimensional printing process, on the contrary, is ***additive*** digital manufacturing. The software instructs the printer arm to enter the molten material to build the piece by adding layer by layer, and the product is created as a whole. Additive digital manufacturing uses one tenth of the raw material used in subtractive manufacturing, giving 3D printing an absolute supremacy in terms of efficiency and productivity. 3D printing is destined to grow at a staggering annual rate of 106% between 2012 and 2018.
3D printers can print their spare parts, without investing in expensive conversions and without the connected delays. And this means that in the very near future devoted to the circular economy in which matter is not thrown away but repaired and reused, 3D printers will help overcome that detestable practice called "planned obsolescence" for which when parts of a product (for example the handles of a suitcase or the handles of the pots) break, the unfortunate owner is forced to give up to(= throw) the entire product. With digital manufacturing it will be possible to manufacture and replace the pieces created in a voluntarily defective way and avoid waste and proliferation of waste.
With 3D printers, products can also be customised to create a single product or small batches designed on order, at minimal cost. The current centralised industry, with its capital-intensive economies of scale and its expensive fixed production lines intended for mass production, does not have the agility needed to compete with a 3D production process that allows to create a single customised product at practically the same unit cost as 100,000 pieces of the same item.
To make 3D printing a truly local and self-sufficient economic activity, the raw material used to create the filament must be abundant and locally available. The office supply company Staples has introduced a 3D printer, produced by Mcor Technologies at its plant in Almere, the Netherlands, which uses recycled paper as a raw material. The process, called selective deposition lamination (SDL), prints coloured hard 3D objects with the consistency of wood. 3D printers are used for the info-factoring (or digital manufacturing) of handicraft products, architectural models and even surgical prostheses for limbs and for facial reconstruction. The paper charge costs a mere 5 percent of the previous raw materials. Other 3D printers use recycled plastic, paper and metal objects as a second raw material with marginal cost close to zero.
A local 3D printer can also feed its manufacturing laboratory with green electricity from renewable sources, generated locally by cooperatives of local producers. Small and medium-sized enterprises in Europe and elsewhere are already beginning to work with regional green electricity cooperatives to take advantage of the side economies of scale. Despite a steadily increasing cost of centralised fossil fuels and nuclear energy, small and medium-sized enterprises are able to power their factories with renewable energy whose marginal cost is almost free.
Promotion and marketing costs collapse too in an Internet of Things economy. The high cost of centralised communications in both the first and second Industrial Revolution (represented by advertising in magazines, newspapers, radio and television),

made only the largest manufacturing companies with nationwide, vertically integrated activities able to afford the advertising on national and global markets, significantly limiting the market reach of small manufacturing companies. In the Third Industrial Revolution, a small 3D printing operation anywhere in the world can advertise digitally made products (in the sense of no artefacts), on a number of Internet sites worldwide with marginal marketing costs reduced to almost zero.
Integration into an infrastructure of the Internet of Things at the local level will give small info constructors (or digital producers) a further definitive advantage towards vertically integrated centralised businesses of the 19th and 20th century: they will be able to supply their vehicles with renewable energy whose marginal cost is almost zero, significantly reducing logistics costs along the supply chain and delivery costs of their finished products to users.
The new 3D printing revolution is an example of "extreme productivity". The distributed nature of production means that in the end everyone can access the means of production, making the question of who should own and control them more and more irrelevant to an ever-increasing quantity of goods.
Many of the global manufacturing companies will continue to thrive, but there will be a radical transformation and democratisation of production, which will encourage a high-tech revival of small and medium-sized enterprises. European manufacturing giants will increasingly collaborate with a new generation of 3D printers and small and medium-sized enterprises in collaborative networks. While a large part of the production will be carried out by SMEs, which can take advantage of the increase in energy efficiency and productivity increases in the side economies of scale, large companies will reposition themselves in the sector of aggregation, integration and management of the marketing and distribution of products.
The parity nature (*peer to peer*) of the Internet of Things platform allows millions of very different small subjects (small enterprises, medium enterprises, social enterprises, individuals) to collaborate in the production and exchange of goods and services directly to each other, eliminating the intermediaries that determined the high marginal cost of the second industrial revolution. This fundamental technological transformation in the way the economic activity is organised and the economies of scale are achieved, necessarily implies an inversion in the flow of economic power from the few to the multitudes and the consequent democratisation of economic life.
It is important to emphasize that the transition from the Second to the Third Industrial Revolution will not be an instantaneous process, but will take thirty to forty years. Many of today's multinationals will successfully manage the transition with the adoption of the new distributed and collaborative business model of the Third Industrial Revolution, while continuing their traditional commercial practices of the second industrial revolution. In the coming years, capitalist firms are likely to find greater value in the aggregation and management of networks and side economies of scale than in the sale of traditional products and services in vertically integrated markets.

Developing nations can jump directly to the third industrial revolution

The distributed characteristics of the new economic paradigm also allow less developed regions, which have been largely excluded from the First and Second Industrial Revolution to "jump" directly to the Third Industrial Revolution. The lack of infrastructure is an advantage and a disadvantage at the same time. Building infrastructure from scratch is often cheaper and faster than reconfiguring the existing infrastructure. We are already witnessing an increase in activity in some of the poorest regions of the world with the introduction of solar, wind, geothermal, biomass energy and with the installation of distributed micro energy networks.
Electricity is now in remote African regions where it had never arrived before. The introduction of mobile phones has accelerated the creation of the initial phase of a third industrial revolution infrastructure. From one day to the next, in a daring way, perhaps selling animals or surplus grains, millions of families have put together the money necessary to buy a cell phone, then used both for the management of commercial operations, and for personal reasons. In rural areas far from bank financing centres, the mobile phone is increasingly used for small monetary transfers. The problem is that without electricity, cell phone owners often have to walk to the nearest electrified city to recharge their phones. But now with a single solar panel on the roof of a rural hut, it is possible to recharge telephones and even have lighting for the entire hut.
Even though statistical data are still scarce, it would seem that the number of families that are acquiring solar panels is growing all over Africa and insiders are predicting a rapid escalation of access to the technologies of the Third Industrial Revolution. What is happening in Africa anticipates a historical transformation in which families jump directly to the Third Industrial Revolution without going through the second.
In addition to solar technologies, other technologies are also spreading such as small biogas plants, to make electricity and fuel from zootechnical residues and rice husks, and small hydroelectric power on local waterways.
Side energy is changing the face of the under developed world. This process represents the democratisation of energy in the poorest communities in the world. Electrification will undergo a foreseeable acceleration in the future, originating exponential curves and a qualitative leap in the third Industrial Revolution in regions of the world that seemed condemned to underdevelopment.

For example, the electrification of developing countries makes it possible to power 3D printers and therefore the proliferation of distributed production activities. In poor suburbs, isolated cities, and local communities, where the infrastructure is sporadic, access to capital episodic (if any) and technical equipment and machinery are virtually non-existent, 3D printing provides an extremely necessary opportunity to build a distributed infrastructure of the Third Industrial Revolution. Today, with the emergence of the infrastructure of the Internet of Things (IoT) new opportunities arise that offer hope for the income and life of millions of individuals below the threshold of extreme poverty, towards a sustainable quality of life.
The universal electrification of developing countries also entails the benefit of a dizzying increase in communications and connectivity between the rural and urban world. This connectivity favours the proliferation of "*Commons*" shared between farmers and consumers. A new generation of farmers shares their crops with urban consumers through the Solidarity Purchase Groups (G.A.S.) which began softly in Europe and Japan in the sixties and suffered a sharp acceleration in America and other countries in the nineties thanks to the spread of the internet. And now, while electrification is universalising, and the Internet is spreading in developing countries, G.A.S. are beginning to transform the relationship between urban families and rural communities in those countries too. Urban consumers confer an amount conventionally fixed in advance to farmers, who can thus meet the initial costs of cultivation, and when the harvest is ready it is delivered to customers. The consumer thus becomes a "shareholder" of the crop in all respects. In return, consumers receive top quality fresh products directly at home or in agreed distribution centres. Throughout the harvest season. If the harvest is abundant, the "shareholders" also receive an additional dose. On the contrary, in the case of a poor harvest, the loss is also shared. However, also in this case there is a net gain for the consumer and the producer due to the elimination of the intermediary typical of vertically integrated agro-commercial operations.
The sharing of risk between producer and consumer creates bonds of mutual trust and favours the creation of social capital. The G.A.S. products are all from ecological and organic agriculture and eliminate the high costs and significant damage caused by fertilisers, pesticides and chemical herbicides of fossil origin.
Furthermore, the elimination of plastic packaging and long-distance transport helps to reduce the costs and the energy and environmental impact of G.A.S. products.
The Internet has favoured the G.A.S. economy by making contacts between farmers and consumers easier in non-hierarchical networks. The local G.A.S. sites allow to stay in permanent contact by sharing updated information on the state of ripeness of the harvest and delivery dates. G.A.S. replace the dichotomy "producer / consumer" with a new reality of suppliers and users who share products in the social *Commons*. In a sense, consumers become " *prosumers* " with popular shareholding to finance land production directly delivered to the end user.
There are thousands of G.A.S. in the world and they are growing rapidly thanks to the involvement of the young generations totally at ease with the social commercial practices of the Commons of the Land. Solidarity Purchase Groups could grow even faster in poor regions of the world where farmers often find it difficult to find the money to prepare the harvest year by year. The electrification and convergence between the Internet of communication and the Internet of renewable energy and digital transport and logistics can be expected to favour the acceleration of the spread of G.A.S. in the poorest regions of the world.
UNIDO (United Nations Industrial Development Agency) is committed to building a Third Industrial Revolution (TRI) infrastructure for the emancipation of local populations helping them to bring green electricity to 1.5 billion of poor people in the world. In 2011, I attended a global conference to support the construction of a TRI infrastructure in developing countries together with Dr. Kandeh Yumkella, UNIDO General Director. On that occasion, by introducing my report Yumkella declared "since we are at the beginning of the third industrial revolution, I wanted all UNIDO member countries to be able to listen and possibly *find the answer to the key question: how can we be part of this revolution*?" The goal is to make electricity universally available across the planet by 2030. The electrification of every community on the planet will provide the right impulse to bring humanity out of poverty and in a more comfortable condition to guarantee a decent standard of living for every human being.

Rethinking economy in the ecological era

The transition to the infrastructure of the Internet of things and to the new paradigm of the Third Industrial Revolution obliges us to rethink economic theories and their practice completely. The affirmation of extreme productivity caused by the digitalisation of communication, energy and transport is leading to a redefinition of the very concept of productivity and the emergence of a new sensitivity towards ecological sustainability. Traditional economists have failed to understand that the laws of thermodynamics govern every economic activity.
The first and second principles of thermodynamics state that "the total energy content of the universe is constant and the total entropy is continuously increasing." The first law, the conservation law, postulates that energy can neither be created nor destroyed, that the amount of energy in the universe has remained the same since the beginning of time and will remain so until the end of time. But while the energy remains unchanged as a quantity, it continuously changes shape and only in one direction, from *usable* to *not usable*. And here comes the second law of thermodynamics, according to which energy always flows from heat to cold, from concentration to dispersion, from order to disorder. For example, if a piece of coal is burned, the total sum

of the energy remains constant, but it is dispersed into the atmosphere in the form of carbon dioxide, sulphur dioxide and other gases. While no energy is lost, the dispersed energy is no longer able to do useful work. Physicists define this situation of no longer usable energy as ***entropy***.

All economic activity is based on the exploitation of the energy available in nature in whatever form (solid, liquid or gaseous) by converting it into goods and services. At each stage of the production, storage and distribution process, energy is used to transform natural resources into finished goods and services. Energy is incorporated into the product or service and moved along the economic value chain, with the consequent dispersion and loss which represent the entropic bill to be paid. In the end, the goods we produce are consumed, discarded, or recycled in nature, with an increase in entropy. Engineers and chemists stress that there is never a net gain of energy in economic activity, and that there is always a loss of available energy in the process of converting nature's resources into economic value. The real question remains: when are we going to pay the bill?

The entropy bill for the First and Second Industrial Revolution has now arrived. The accumulation of carbon dioxide emissions in the atmosphere from the combustion of huge quantities of carbon energy and the systematic destruction of the Earth's biosphere has given rise to climate change putting the current economic model in crisis. Despite all this, the science of traditional economics still fails to deal with the simple truth that economic activity is conditioned by the laws of thermodynamics.

Until recently, economists have been content with measuring productivity on the basis of only two factors: capital needed to purchase machines and the performance of the labour factor. But when Robert Solow -which won the Nobel Prize for Economics in 1987 for his growth theory- examined the industrial age, he found that capital and labour only affected economic growth by about 14%, which left the question of what affected the remaining 86 percent unresolved. This mystery led economist Moses Abramovitz, former president of the American Economic Association, to admit what other economists were afraid to recognise, namely that "*the other 86 percent is a measure of our ignorance.*"

Over the past 25 years, a number of analysts, including physicist Reiner Kümmel of the University of Würzburg, Germany, and economist Robert Ayres at INSEAD Business School in Fontainebleau, France, have returned to the issue of the economic growth in the industrial period using a three-factor -rather than two- analytical system, namely capital, labour, and thermodynamic efficiency of energy consumption. They found that it is " ***the growing thermodynamic efficiency with which energy and raw materials are converted into useful work",*** that determines most of the productivity and growth returns in industrial economies. In other words, the missing factor is "energy".

A deeper look in fact reveals that in the First and Second Industrial Revolution the leaps forward in terms of productivity and growth occurred when the communication / energy / transport and infrastructure matrix with the related general technological platform to which companies are connected, evolved. For example, Henry Ford could not have achieved the phenomenal progress in efficiency and productivity generated by the power tools used by his workers if a power grid had not been available on the factory floor. Nor could companies have ever been able to reap the productivity benefits provided by economic activities based on strong vertical integration, without the aid of the telegraph and, later, the telephone which allowed immediate communication, both upstream of the production process with suppliers and downstream with the entire distribution circuit, as well as immediate access to the chain of command for their internal and external operations. Nor logistics costs could have been reduced significantly without a fully integrated road system in all national markets. The same applies to the electricity grid, telecommunications networks, and vehicles (cars and trucks) in transit on the national road network, all fuelled by fossil fuels, which required a vertically integrated energy infrastructure to move energy resources from extraction wells to refineries and filling stations.

The overall technological infrastructure of the Second Industrial Revolution provided the productive potential for a phenomenal increase in growth in the 20th century. Between 1900 and 1929, the United States built the initial part of the infrastructure of the Second Industrial Revolution - electricity networks, telecommunications networks, roads, oil and gas pipelines, water and sewage systems and public-school systems. The depression and the Second World War slowed down this effort, but after the war the construction of the federal highway system, and the completion of the electricity and telecommunications networks provided a mature and fully integrated infrastructure at national level. The infrastructure of the Second Industrial Revolution increased productivity in every sector, from automobile production to peripheral and commercial residential construction, along the main state roads.

In the period 1900-1980 in the United States, aggregate energy efficiency (i.e. the amount of useful physical work that can be extracted from materials through the application of energy), has been steadily increasing thanks to the development of the infrastructures of the Second Industrial Revolution going from a paltry 2.48 percent to 12.3 percent in the 1990s. Since then, aggregate energy efficiency has steadily stood at around 13 percent, while the infrastructure of the Second Industrial Revolution has matured. Despite this significant increase in efficiency, which led to a rushing productivity growth in the United States, nearly 87 percent of the energy we used in the Second Industrial Revolution has been wasted.

And the situation is not destined to change if we continue to invest in upgrading the infrastructure of the Second Industrial Revolution, indeed it is highly probable that we will not see any significant effect on efficiency, productivity and growth. Fossil energies are now mature and their commercial exploitation is becoming increasingly expensive. And the technologies designed and built to exploit these energies, (such as the internal combustion engine and the centralised electricity network), have now almost completely exhausted their production potential.

Warning: nobody here suggests that you can get a thermodynamic efficiency of 100% because physics tells us that this is impossible. However, new studies, including one conducted by my global advisory team, show that with the move to a Third Industrial Revolution infrastructure it is conceivable to increase aggregate energy efficiency by at least 40 percent in the next 40 years, resulting in an exponential increase productivity beyond any level hitherto known in the economy of the twentieth century.
Cisco Systems predicts that by 2022, the Internet of Things will generate $ 14.400 billion in revenue, both in the form of lower costs and actual additional earnings. A General Electric study published in November 2012 concludes that efficiency and productivity gains induced by an intelligent industrial Internet could interest almost all economic sectors by 2025, impacting "about half of the global economy."

The rise of the sharing economy

While the nascent digital infrastructure is making the traditional capitalist market more productive and competitive, it is also stimulating the lightning-fast growth of the sharing economy. In the sharing economy, social capital has the same weight as financial capital, access is as important as property, sustainability replaces consumerism, cooperation and competition are equal, and the "exchange value" typical of the capitalist market is gradually being replaced by the "sharing value" in the collaborative Commons. Millions of people are already transferring whole pieces of their economic life to the sharing economy.
We not only see ***Prosumers*** who produce and share information, news, knowledge, entertainment, green energy, transportation and 3D printed products in the Sharing Economy at near zero marginal cost, but forty percent of the population of United States is actively engaged in sharing homes, vehicles, toys, tools and countless other objects.
For example, millions of citizens and homeowners are already sharing their home with millions of travellers, at a near-zero marginal cost, using online services such as Airbnb and Couchsurfing. In New York City alone, services such as Airbnb provided hospitality for 416,000 people who stayed in homes and apartments between 2012 and 2013, taking away one million overnight stays from the hotel sector.
Recent research highlights the broad economic potential of the Sharing Economy. A very detailed study has shown that 62 percent of the X and Millennium generation are more attracted by the idea of sharing services and experiences in Collaborative Commons than owning them. These two generations differ significantly from the economic boom generation and the WWII generation with regard to access to property. When asked to classify the benefits of the sharing economy, economic savings were placed at the top of the list, followed by less environmental impact, lifestyle flexibility, greater practicality, and easier access to goods and services. As for the intangible benefits, the respondents classified generosity first, followed by belonging to a community, intelligence, greater responsibility, and finally participation in a movement.
How likely is it that the Sharing Economy will play an increasing role in the economic life of society in the coming decades? According to a survey conducted by Latitude Research, "75% of respondents predict that the sharing of physical objects and spaces will increase in the next five years." Many industry analysts agree with these optimistic predictions. Time magazine declared collaborative consumption one of the "10 ideas that will change the world."

Tackling climate change and restoring biosphere

The COP 21 Climate Conference held in Paris in December 2015 saw unanimous support for statements of principle (e.g. on the anthropic nature of climate-changing emissions) but continued to set targets around a series of chemical and quantitative benchmarks (such as increasing energy efficiency, reducing CO_2 and other gases responsible for global warming, and increasing renewable energy) while the global climate discussion is still far from the proposal to adopt totally new economic models inspired by the solar paradigm rather than by the fossil one.
Unfortunately, without an economic vision and a development plan for the transition of participating nations into a post-carbon era, governments are reluctant to commit their countries to these benchmarks at a time when GDP is slowing down, productivity is falling, and unemployment remains high. Under these conditions it is very likely that these benchmarks are perceived as punishments that will only serve to further narrow their economies. The nations of the world would be much more likely to make commitments according to the objectives proposed by the UN Climate Conference if these commitments were related to a new economic paradigm that can increase productivity, create new economic and employment opportunities, and guarantee a society more lively and sustainable, allowing the transition of their economies from carbon-based fossil energy to renewable energies. This vision is now gaining momentum in Germany and other developed countries in North-western Europe.
In a fully digitalised economy, extreme productivity, triggered by the optimisation of aggregate energy efficiency in the management of economic activities, in their energy supply and in their handling, requires less information, energy, material resources, manpower and necessary logistical efforts to produce, store, distribute, consume and recycle economic goods and

services at almost zero marginal cost. The progressive shift from ownership to access in a growing Sharing Economy also means that more people share fewer products - the basis of the circular economy - and this will help to significantly reduce the number of new products sold, with a consequent reduction in the resources used and in the release into the Earth's atmosphere of gases responsible for global warming. In other words, the driving force towards an almost zero marginal cost society and the sharing of almost free green energy and recycled products and services redistributed in the Sharing Economy allows us to achieve the most ecologically efficient economy possible.
The drive towards zero marginal cost is the fundamental point of reference for the creation of a sustainable future for the human race on earth.
The paradigm of the Third Industrial Revolution transforms the objectives of the UN climate conference in Paris (COP 21) from measures perceived as punitive to a virtuous path towards a more prosperous and more sustainable post-carbon economic era because it is high labour and low capital intensive.
A new intelligent infrastructure, consisting of an Internet of interactive communication, Energy and Transport, is beginning to spread network-like, like Wi-Fi, from region to region, crossing continents and connecting companies in a vast global neural network.
The connection of each person with everything (the internet of things) is an event that entails radical transformations in human history, allowing our species to empathise and socialise as in a single large family for the first time in history.
A new generation now studies in virtual global classes thanks to Skype; socialises with peers around the world on Facebook; gossips with hundreds of millions of peers on Twitter; shares homes, clothes, and almost everything else online on the Internet; produces and shares green energy globally thanks to the Internet of energy; shares cars, motorbikes and public transport through the constantly evolving internet of transport and logistics; and at the same time it is shifting the human path from an unshakeable loyalty in unlimited growth and unbridled materialism towards a commitment of the whole human species for sustainable economic development. This transformation is accompanied by a change in the human psyche: that is, we are going towards a new consciousness and a new era: the biosphere consciousness and the era of collaboration.
The biosphere is the integrated life support system and that includes the peripheral layer of the planet Earth with its surrounding atmosphere. From the depths of the sea to atmospheric heights wherever life forms exist, there is the biosphere. It is a sheath that extends only about 40 miles from the ocean floor, inhabited by more primitive life forms, to the stratosphere. Within this narrow sphere, the biological and geochemical processes of the Earth continually interact in a complex choreography that determines the evolutionary path of life on the planet.
We are beginning to realise that the biosphere of the Earth works in a way very similar to that of a living organism that regulates itself and that human activity is undermining the biochemical balance of the planet and is likely to lead to the catastrophic destabilisation of the whole system, re-introducing huge quantities of carbon dioxide, methane and nitrous oxide into the atmosphere during the first and second industrial revolution. The rise in temperature due to the industrial gas emissions responsible for global warming has now dramatically altered the Earth's hydrological cycle, precipitating ecosystems in a rapid decline and inaugurating the sixth mass extinction in the last 450 million years, with incalculable consequences both for human civilisation and the future health of the planet.
Humanity is rapidly becoming aware of the fact that the biosphere is the indivisible global community to which we all belong and whose well-being is indispensable for ensuring our well-being and survival. This nascent awareness is accompanied by a new sense of responsibility that allows us to live our individual and collective life in our homes, businesses and communities in ways that promote the health of the biosphere in a broad sense. Children all over the world are learning about their "ecological footprint". They are understanding that everything humans do, like any other creature, leaves an ecological footprint that affects the well-being of another human being or creature somewhere else in the Earth's biosphere. They are learning to connect the dots and to realise that each creature is integrated into a myriad of symbiotic and synergistic relationships in ecosystems through the biosphere and that the correct functioning of the whole system depends on the lasting relationships of each of the parts. New generations are learning that the biosphere is our planetary community, whose health and well-being determine our health and well-being.
This newfound mental openness is helping to break down the walls that have long divided people by gender, class, race, ethnicity, and sexual orientation. The lateral expansion of this empathetic sensitivity is just as rapid as the interconnection of everyone with everyone in global communication networks. Hundreds of millions of human beings - perhaps billions - are beginning to experience "the other" as a "him/herself", while empathy becomes the decisive litmus test of a truly democratic society. Millions of people, especially young people, are beginning to extend their empathetic spirit to our animal friends, from penguins and polar bears drifting on the poles to other endangered species that inhabit the few unspoiled and wild ecosystems. Young people are just beginning to glimpse the possibility of forging an empathic civilisation that peeps within a biosphere community. At this stage, there is more hope than a concrete expectation. However, there is an unmistakable sensation in the air.

Stimulating new economic opportunities and mass employment in the emerging digital economy

European Union is potentially the largest single market in the world, with 500 million consumers from its Member States, and other 500 million consumers in associated countries in the Mediterranean and North Africa partnership regions. The creation of an Internet of Things platform for a Third Industrial Revolution, which connects Europe and its partnership regions in a single integrated economic space, will allow traditional businesses as well as prosumers to produce and distribute information, renewable energies, 3D printed products, and a wide range of other low marginal cost products and services in the traditional market, and with near zero marginal cost in the Sharing Economy, with enormous economic benefits for society.

The creation of the infrastructure for the Internet of Things and a digital economy of the Third Industrial Revolution will require a significant investment of public and private funds, as happened in the First and Second Industrial Revolution. European investments in infrastructure projects in 2012 exceeded 650 billion Euros, and were largely used for the maintenance of the obsolete technological platform of the second industrial revolution, which has already reached the limits of its production potential for some time. If only twenty-five percent of these funds were redirected to the creation of the Internet of Things infrastructure in every single region of the European Union, the Digital Union would become reality by 2040.

The EU communication network needs to be updated with the inclusion of universal broadband and free Wi-Fi. The energy infrastructure needs to be transformed from that prepared for hydrocarbons and nuclear energy to that for renewable energies. Millions of buildings have to be made energy efficient and converted into mini renewable energy plants equipped with specific systems. Hydrogen and other energy storage technologies must be built at every level of the infrastructure to ensure continuity of the renewable energy flow due to its discontinuous nature. The electricity grid of the European Union needs to be transformed into the Internet of intelligent digital energy capable of managing the flow of energy produced by millions of micro energy "*green*" plants. The transport and logistics sector need to be digitised and transformed into an automated GPS-guided network without drivers on "*smart* " roads and rail systems. The introduction of hydrogen and electric transport will require the installation of millions of charging stations. And intelligent roads, equipped with millions of sensors, need to be built to provide real-time information on traffic flows and freight transport.

Creating the Internet of Things infrastructure for the Third Industrial Revolution will require the active engagement of almost all business sectors, will stimulate commercial innovation, promote small and medium-sized enterprises (SMEs), and employ millions of people for the next 40 years. Electricity production and distribution companies, the telecommunications industry, construction, the IT sector, the electronics industry, the transport and logistics industry, the manufacturing sector, the medical and biological industry, wholesale distribution as well as retailers, everyone must be involved. Many of today's leading companies, as well as new business entities, will help create and manage the Internet of Things platform, enabling millions of other small, medium and large businesses, non-profits, and *prosumers,* to produce and use renewable energy, transport and logistics, and an incalculable number of other low marginal cost goods and services in the traditional economy as in the Sharing Economy with low or no marginal cost.

General and skilled workers, professionals and knowledge workers must be employed in every region of Europe for the construction and management of the three Internet that make up the digital platform of a Third Industrial Revolution economy. Transforming the European energy regime from fossil and nuclear fuels to renewable energies is a very labour-intensive operation and therefore requires millions of workers whose professional profiles are still to be trained, and will generate thousands of new businesses. The energy conversion of hundreds of millions of existing buildings into micro green energy plants and the construction of millions of new positive energy buildings will be an enterprise that will also require tens of millions of workers and will open up new business opportunities for energy saving companies (such as ESCO), "*smart*" construction companies and manufacturers of low-consumption green appliances. Equally numerous jobs and new businesses will be needed for the installation of hydrogen and other storage technologies in the entire economic infrastructure to manage the discontinuous flow of green electricity. The reconfiguration of the European electricity grid in an Energy Internet will generate millions of installers jobs and create thousands of clean energy and production start-ups. And finally, reorienting the transport sector from the internal combustion engine towards electric and hydrogen mobility will require the rebuilding of the continental road network country by country, and related refuelling infrastructure. The installation of millions of charging stations along the roads and in each parking is a labour-intensive activity which requires a considerable and skilled workforce.

The massive construction of the Internet of Things infrastructure for a Third Industrial Revolution in all locations and regions of Europe will stimulate an increase in mass wage labour that will last for at least 40 years and span two generations. However, in the long run, building a digital and intelligent European economy will lead by the middle of the century to a highly automated market economy managed by a highly skilled workforce that will control the infrastructure using advanced analytical systems, algorithms and artificial intelligence. At this point (but we are talking about decades) the work will have to migrate from this now mature and increasingly automated intelligent capitalist market infrastructure towards an ever-expanding social economy. In this way the work of human beings will gradually be replaced by machines for the production of goods and services in the market economy. But it is clear that this will not be the case in the emerging non-profit social economy for the obvious reason

that deep social commitment and the creation of social capital are intrinsically human matters that cannot be carried out by machines.

The social economy is a very vast field that extends from education, to charity, to health care, to the care of children and the elderly, to the protection of the environment, to cultural and artistic activities, to sports and entertainment, all activities that require human commitment and contact.

In economic terms, the non-profit world is a powerful force. Revenues from the non-profit sector grew at a dizzying rate of 41 percent (net of inflation) for the period 2000-2010, which is more than twice the growth rate of the gross domestic product, which in the same period increased by 16.4%. In 2012, the non-profit sector in the United States represented 5.5 percent of GDP

The world of non-profit activities is already the fastest growing sector in many of the world's most advanced industrial economies. Aside from the millions of volunteers who freely offer their time, millions of others are actively employed. In the 42 countries surveyed by the Civil and Social Studies Centre of the Johns Hopkins University, 56 million full-time workers are currently employed in the non-profit sector. In some countries, employment in the non-profit field makes up more than 10 percent of the workforce. In the Netherlands, non-profit accounts for 15.9 percent of subordinate work. In Belgium, 13.1 percent of the workforce is in the non-profit sector. In the UK, non-profit employment represents 11 percent of the workforce, while in Ireland it represents 10.9 percent. In the United States, non-profit employment reaches 9.2 percent of the workforce, and in Canada 12.3 percent. These rates are likely to increase steadily in the coming decades as a consequence of the transfer of employment from a highly automated market economy to a labour-intensive social economy.

Despite the impetuous growth in employment in the social economy, many economists look to it with suspicion, in the belief that the non-profit sector is not an independent economic force, but depends largely on government contracts or on private philanthropy. Now, first of all, exactly the same could be said for the subsidies, incentives and huge contracts that the government gives to the private sector. In addition, the Johns Hopkins University study reveals that in the 42 countries surveyed, contrary to the opinion of many economists, about 50 percent of the total income of the non-profit sector already comes from the remuneration for the services provided, while government support only affects for 36 percent of revenue, and private philanthropy for only 14 percent. I expect that by the middle of the century, if not before, most of the employed worldwide will be in the non-profit sector, actively engaged in promoting the social economy, and only marginally with access to goods and services of a highly automated capitalist market.

In a futurist essay written more than 80 years ago for his grandchildren, John Maynard Keynes imagined a world in which machines would free man from the effort of producing goods and services for the capitalist market and allow him to dedicate himself in depth to really important things in life, affections, cultural activities in the social economy and the pursuit of higher and more transcendent goals.

This could prove to be his most appropriate economic forecast.

At this point it will be necessary to engage humanity in a colossal effort to redevelop the existing workforce and to develop professional profiles and new production categories and commercial opportunities necessary to facilitate the construction of the global Internet of Things platform. At the same time, students will have to be trained for the new professional skills necessary to cover the job opportunities that will open up in the social economy. It is a Herculean effort, but the human race has already shown itself capable of similar efforts in the past, particularly in the rapid transition from an agricultural economy to an industrial way of life between 1890 and 1940.

In summary, the construction of an intelligent and digitised Internet of Things infrastructure across the European Union, and in the Mediterranean partnership regions, and globally, will generate new business opportunities both for the traditional market economy and for Sharing Economy, will dramatically increase productivity, employ millions of people, and create an ecologically oriented post-carbon society. The employment of millions of workers will also stimulate purchasing power and generate new economic opportunities and additional new jobs to respond to rising consumer demand. Infrastructure investments always create a multiplier effect that reverberates throughout the economy as a whole.

The alternative of being trapped in the twilight of the second industrial revolution, with fewer economic opportunities, a slowdown in GDP, a decrease in productivity, an increase in unemployment, and an increasingly polluted environment is totally impossible, and would put the world on a path of economic stagnation and decline in the quality of life of its citizens.

The new silk road: a green and smart euro-Asian economic sector

In spite of sceptics who think that the transition to a smart, green and digital Third Industrial Revolution across the European Union is a problematic and unachievable prospect, China is already making a similar economic paradigm shift in Asia. Premier Li Keqiang and the new Chinese leadership have embraced the Internet of Things platform (which many Chinese call "Internet Plus") and the economic vision of the Third Industrial Revolution. Chinese Internet companies are now among the global market leaders in the smart emerging digital age. The Chinese social media giant, ***Tencent*** stands up to ***Facebook*** while ***Alibaba***,

the great Chinese e-commerce company, is playing au pair with *Amazon*, revealing China's unmistakable dominant presence in the Third Industrial Revolution.

In September 2013, the Xinhua News Agency reported that Premier Li Keqiang had read the Third Industrial Revolution book with great interest and instructed the National Commission for Development and Reforms and the State Council Centre for Research and Development to read the book and develop an in-depth study of the ideas and themes it offers. I then went to China for an official two-week visit in September 2013, where I met Deputy Prime Minister Wang Yang and other government officials to discuss the Chinese transition to a Third Industrial Revolution economy. Following the meetings held in September 2013, the Chinese government announced an initial $ 82 billion plan in four years to design a digital energy Internet across China, so that millions of citizens and thousands of Chinese companies are enabled to produce their green electricity from solar and wind energy and share surpluses. Plans are also provided to establish a pan-Asian Internet of Things platform that will span across the continent, allowing 2.7 billion people, that is nearly forty percent of the human race, to produce and share information, products, renewable energies, and transport and logistics in a digitalised single market.[2]

The European Union's plan to establish an Internet of Things platform for a digital economy and a Circular Economy Directive opens the prospect of collaboration with China to create a digitalised integrated economic space for the whole Eurasian continent to encourage the transition to a Third Industrial Revolution and a post-carbon green civilisation.

In recent months, President Xi and Premier Li of China have proposed the creation of a new Eurasian Silk Road as a sort of new high-tech economic belt to connect the Eurasian territory in a seamless integrated market from Shanghai to the Irish Sea. Building a digitalised infrastructure for the Internet of Things across Eurasia could lead to a new era of profound collaboration, bringing together much of the human family for the first time in history.

We are at the dawn of a promising new economic era, with far-reaching benefits for humanity. A global commitment is now needed for the gradual introduction of the Internet of Things platform and to facilitate the transition to a digitalised society at zero marginal cost if we are to ward off catastrophic climate change and create a more prosperous, more humane and ecologically sustainable society, in which the citizen and the human being return to the centre of economic action in accordance with the teaching of the Encyclical Laudato Si' with a gradual process of "ecological conversion" towards a new biosphere consciousness.[3]

[2] *http://www.huffingtonpost.com/nathan-gardels/china-third-industrial-revolution_b_8478954.html*

[3] *Pope Francis, Encyclical "Laudato Si'" page 157 verses 216-221*

PART 1 - ANALYSIS

1 Economic analysis

1.1 The history of capitalism and the market economy

The historical origins and interpretations of "Capitalism" are often controversial and with disparate interpretations. Some scholars state that the roots of the capitalist economy are to be found in the exchanges over long stretches and within the medieval and Renaissance financial centres that guided the same to the emblem of a dominant system since the sixteenth century. Other exegeses headed by classical economists link the emergence of the capitalist system to the Industrial Revolution of the eighteenth century. By contrast, established doctrines place their origins during the era of the rebirth of the cities and the 16th century, when the season of great world trade began to take off. In addition to the active role of the new bourgeois business classes, the processes of formation of the modern state and the mercantilist policies of the great states, which began to finance industries and commercial companies, were in fact decisive. The theme of institutions has always been precious for sociology[131]. They are defined as "all the beliefs and ways of conduct established by the community" and carry out the task of maintaining social cohesion insofar as they are internalised by the community[132].
Between 1700 and 1800 the history of capitalism entered a phase of great acceleration with the Industrial Revolution which, starting from Great Britain, struck western Europe and the United States. In the common sense, it is interpreted as an economic system in which capital belongs to private individuals[133]. Adam Smith, precursor and father of the classical school, never used the term "capitalism" but understood well the mechanisms of constant growth, based on the pillars of the market and technological development. In his vision he affirmed the existence of two types of economic organisation: one based on production for direct consumption [134] and one based on the specialisation of work [135]. Ultimately, this vision affirmed the superiority of mechanised worker collectivism of mass production, to praise the owner of the means of production to be used[136].
The original meaning of capitalism, however, was formulated with intense critical sense by intellectuals belonging to the philosophy of socialist thought, then strengthened in the Marxist theories with which its definition was based on three axioms:

- large accumulation of capital,
- split private property and means of production from work,
  wage labour exploited to make profit.

Karl Marx used the expression "capitalist mode of production" to designate this system as a legacy of private individuals where workers were excluded from ownership and the organisation of the production process was based exclusively on the exploitation of the waged workforce.
According to the German philosopher, this mode of production would have accomplished the enormous development of the productive forces, yet passing through the impoverishment of wage earners and the accumulation of capital without corresponding growth in consumption, crisis of overproduction, growing class conflict[137].
Colonial trade, on the one hand, made available the huge capitals necessary for the birth of industry, while the expropriation of the peasants and the removal from their lands saw the labour force sell off.
Most classical and neoclassical economists consider profits to be the quite right reward for capitalists for risking capital. Socialist economists, on the other hand, would agree with the young Karl Marx, according to which the part of the worker's contribution that is subtracted from their wages and retained as profit - the surplus value - is an unfair dispossession and a fairer agreement would be to socialise production and leave the workers with the entire income from their work.
Without denying the fundamental contribution that capitalism brought to the development of the economy, Marx maintained that its birth occurred mainly with violence and exploitation of the proletarian class, contrary to the Smithian thesis that praised

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131 *Durkheim: " the science of institutions, their genesis and their functioning " (1895: XXII).*
132 *Mariadele Di Fabbio – "Path dependence and traces of change in Taranto. A socio-economic analysis" (Empateya editions). Chap. "The role of institutions in economics and sociology" (page 16).*
133 *Free market economy: the so-called liberalism. In a broad sense, a system based on market freedom, in which the State limits itself to guaranteeing economic freedom with legal norms and to providing only for the needs of the community which cannot be satisfied on the initiative of individuals.*
134 *Self-consumption*
135 *With subsequent exchange through the market of specialist work products.*
136 *A. Smith, The wealth of nations, Mondadori, Milan 1974, p. 174.*
137 *In the first book of Capital (chap. XXIV, 7) Marx contrasts capitalism with "private property based on one's work", since capitalism is private property based on the work of others, and states that socialism should be social property consciously based on the collective work of worker-owners. "The Capital" – K. Marx.*

individual initiative.

The term "Capitalism" coined by Marx's thesis was later adopted also by authors of modern schools of thought, in particular by Max Weber who indicated its peculiarity in the rational calculation of profit. According to the scholar, the origins of capitalism are to be attributed to the spread of a new ethics born from Protestant religious currents.

In particular, Weber dealt with the concept of institutionalisation for a long time, considered as the process by which every social action, contextualised and repeated over time, leads to the consolidation of the uses and the rules that underlie it. Social institutions were born when the community internalised beliefs and legitimised collective uses and customs, giving them an evident and almost obvious character. Economic action is a type of social action and, as such, is influenced by culturally shaped ideal representations. For this reason, economic action changes historically and in accordance with the institutional configuration of a given historical period in a given context (Weber, 1961) [138].

A market system, in fact, does not necessarily coincide with capitalism. According to some analyses, the history of capitalism in the world economy distinguishes 3 phases[139]:

- material economy, linked to the reproduction of society, with self-production, self-consumption and exchanges on a local scale;
- market economy, in which independent producers exchange their goods in competitive markets;
- world-wide capitalist economy, which has as its protagonists' large enterprises that rely on the political power of the States.

Continuing with other ideologies, we believe it is right to dwell on the technological innovation underlying the capitalist expansion. According to J. Schumpeter, technological change and the spread of innovations capable of consolidating the power of the protagonists of the economy are at the root of the productive expansions of capitalism. The technological advantages ensure high profits in markets characterised by temporary oligopolies or monopolies.

According to C. Freeman, capitalism is characterised by a succession of techno-economic paradigms which includes: the mechanisation of the textile industry in the first English industrial revolution; the spread of the steam engine and railways; the age of electricity and steel in the first half of the 20th century; the post-war mass production Fordism; the emergence of information and communication technologies and robotics that replace wage labour.

The approaches considered recognise that capitalism is unstable and has a cyclical trend with expansion phases fuelled by high investments, and phases of crisis that may be due to overproduction. Starting from the work of J.M. Keynes macroeconomics has addressed the problem of economic cycles, demand and growth in advanced capitalism countries, suggesting the stabilisation policies that national governments can implement.

Within the same theoretical framework of conciliation, we also find the work of the historian and Nobel laureate in economics Douglass North. According to the scholar, inefficient institutions do not stimulate a balanced and stable economic development, leading to the birth of groups and organisations interested in exploiting existing constraints only for themselves, for example by establishing party rules that lead to the control of a few groups over civil society and market, outlining unproductive development paths, which do not permeate the spread of well-being throughout the community. An economic system immersed in an institutional structure that does not rely on impersonal and socially profitable exchanges and "does not sufficiently reward the increase and dissemination of economically useful knowledge", will produce distortions in the economic system [140].

In the capitalist system, the commodity character of goods produced by labour and market relations are also extended to money, land, environment, time out of production, care and social activities, outlining the conflict between the extension of the capitalism and the protection of society and nature.

There is a widespread belief that the democratic-social state constitutes a further evolution, not only in a chronological sense, but also for the quality and quantity of public intervention in the field of citizens' well-being, compared to the democratic-parliamentary State. In reality, in the 1920s and 1930s, after the war and post-war upheavals, also following the crisis of the idea of progress and democracy and, at the same time, the spread of violent and illiberal cultures and mentalities, another variant presents itself, in many respects not foreseen: the welfare state with an authoritarian or totalitarian connotation. A state that deals with modern mass society, while using efficient tools of domination and consensus; who takes charge of social rights but mortifies civil and political rights, up to the death of those who continue to testify and defend them.

Karl Polanyi's interpretation of the authoritarian solution to the impasse of capitalism is concise and effective: "a reform of the market economy achieved at the price of the eradication of all democratic institutions. The economic system that was in danger of decay was thus revitalised while the peoples themselves underwent a re-education intended to denaturalise the individual and make him unable to function as a responsible unit of the political body"[141]. Furthermore, free market and private property are

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138 Max Weber – "Economy and Society" page 80, 81.

139 Giovanni Arrighi - " Braudel, capitalism, and the New economic Sociology", Fernand Braudel Centre review from page 107 to page 122.

140 Mariadele di Fabbio – "Path dependence and traces of change in Taranto. A ' socio-economic analysis " (Empateya editions) - The theory of rational choice and the new economic institutionalism page 27.

141 K. Polanyi, The great transformation. The economic and political origins of our time, Einaudi, Turin 1974, p. 297.

considered as the foundation of the freedom of individuals and as key elements of the political systems of liberal democracy [142].

Next to the competitive markets, where companies cannot influence prices, there are oligopolistic and monopolistic markets - linked to the importance of economies of scale in production, industrial concentration strategies or interventions of political power [143] - in which the power of a few large companies allows to control resources and obtain above-average profits.

In recent decades, globalisation has represented the unbridled exaltation of this concept, now released from any political-state constraint. This new evolutionary phase has in many respects deepened the traditional gap between developed and developing countries, in the context of a growing interdependence generating new and very serious social and political tensions. Plausible solutions reside in the role of institutions which have always represented the frame in which every form of human exchange takes place, be it political, social or economic. The most important role of the institutions, the one for which they have historically emerged in society, is in fact to reduce uncertainty and make relations as stable as possible.

An excellent contribution in this regard is offered by the study by Dr. Mariadele di Fabbio: "Path dependence and traces of change in Taranto. A socio-economic analysis" (Empateya editions). Here are excerpts from the first chapter.

Sociological neo-institutionalism presupposes that the behaviour of the actors is "caged" within the institutional norms and that these guide the action according to the logic of appropriateness and consistency with institutional frames.

On the contrary, for economic neo-institutionalism, the ultimate goal of human action remains the maximisation of personal profit, but the individual understands that it can be more efficiently achieved by moving within institutional rules.

Then there is historical institutionalism, a comparative historical study method, which studies the evolution of institutions with the aim of tracing political, social and economic sequences. It draws attention to the fact that today's institutions are the result of a specific historical path, which must therefore be identified and analysed to understand the current institutional situation.

According to the culturalist approach, however, human behaviour depends on individual preferences which in turn are influenced by primary and secondary socialisation. Therefore, institutions, made up of symbols, routines and rules, are a filter to interpret both the situation and identity and personal preferences (March and Olsen, 1989).

Historical institutionalist scholars use the same starting point to direct attention to the power structures within institutions, which give some interest groups more power than others for the purposes of institutional creation (Schattschneider, 1960).

1.2 Capitalism and vertical integration

There are particular important considerations contained in Jeremy Rifkin's work "The society with zero marginal cost", of which we note down some extracts with relevant references in the footnotes.

The economy of feudal Europe can certainly be conceived as a communication-energy complex oriented towards subsistence. The bulk of the energy matrix was the workforce of servants, oxen and horses. European forests produced abundant thermal energy, used both for heating purposes and to fuel small-scale metallurgical activities. With the exception of the clergy and a small number of landowners who controlled the feudal lands, the population was illiterate and economic life was tied to the space-time constraints of oral culture. After the ancient Roman roads had been neglected, trade between the seventh and twelfth centuries practically disappeared and economic life shrank into a myriad of isolated locations, where a primitive life was conducted, based almost exclusively on subsistence agriculture.

Almost all economic production was aimed at immediate use and only a few miserable surpluses were exchanged at local fairs, thus integrating the daily life of the manor estates and small villages scattered in the countryside.

In England, as in other parts of Europe, agricultural life was organised around the Commons. The feudal lords gave their land to the peasants in different ways. While those who had full titles of ownership were guaranteed possession from generation to generation and could not be expelled from the family home, those who had land for rent had to be considered less fortunate: their right of occupation had a limited duration, which rarely exceeded three generations, after which the owners could impose new rental agreements or completely withdraw the concession. In fact, ordinary tenants had no tenancy rights and occupied the land at the owner's sole discretion.

The lease agreements provided that the peasants delivered part of the harvest to the lord or worked the fields, in addition to those entrusted to them, for the duration of the whole year.

In the late Middle Ages, when a monetary economy began to develop tentatively, the landowners conditioned the rent to pay a lease sum or to pay some taxes.

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[142] *Rational Choice Theory: economic action can be explained by observing the economic behaviour of the individual, always considered rational, that is, aimed at maximizing personal profit.*

[143] *Mariadele Di Fabbio – "Path dependence and traces of change in Taranto. A socio-economic analysis" (Empateya editions) - The theory of rational choice and the new economic institutionalism page 30. The evolution of institutions can be influenced by what Arthur calls increasing returns that are applied in four mechanisms that help keep inefficient institutions alive:*
1) large fixed installation costs, 2) learning effects, 3) coordination effects, 4) adaptive expectations.

Feudal agriculture was structured on a community basis. The farmers united their lots in open fields and common pastures, where they were cultivated and bred collectively. The Commons thus became the first rudimentary exercise of democratic decision-making in Europe. The supervision of the economic activity, which included the sowing and harvesting, the rotation of the crops, the use of water and forest resources and the control of the number of animals admitted to the common pastures, was entrusted to peasant councils.
The feudal conception of property relations was completely different from that of today. For us, ownership is an exclusive personal possession, which can be kept or exchanged on the market. In the feudal economy, however, everything existing on earth was part of the creation of God, who was therefore the only true master. The divine creation, then, was thought of as the "Great Chain of Being", a rigid hierarchy of ascending responsibilities, from the lowest creatures to the angels in heaven. At the various levels of this spiritual scale, each creature had to serve the creatures above and below it, according to a strict code of obligations, so as to ensure the proper functioning of creation as a whole. In this theological framework, the property was conceived as a series of fiduciary assignments administered according to a pyramid scheme, from the heavenly throne to slope down to the peasants who cultivated the community fields. Ownership was never exclusive, but a reality divided into spheres of responsibilities compliant to a fixed code of specific obligations. When, for example, the king granted territory to a lord, a vassal, "his rights to those lands remained intact, except for the specific interest to which he had renounced". Harvard historian Richard Schlatter explains that "nobody could say they owned land; everyone, from the king down, to the tenant farmers and the farmers who cultivated it, had a certain power over it, but no one could claim absolute possession of it. "
The feudal economy lasted, substantially unchanged, for over seven hundred years. In the sixteenth century, however, new economic forces, which from Tudor England spread to the rest of Europe, began to unhinge the feudal order. Closed by fences, the common land became private property, subject to exchange on the market, in some cases with the consent of the king or by laws of the Parliament and in others by mutual agreement of the Commons of the village.
The movement for the fence of the common land, seen by many historians as "a revolution of the rich against the poor", developed in England between the 16th and early 19th century, and ended up profoundly altering the economic and political landscape.
Millions of peasants were uprooted from the lands where they had lived for generations and forced to offer their workforce as autonomous laborers on the nascent late medieval market.
The first wave of fences in the common land was triggered by two related phenomena, which combined to dissolve the feudal order. In the initial stages, the growing demand for food, determined by a rapidly growing urban population, triggered an inflationary spiral that put feudal lords in ever greater difficulty, since the rental prices of their land had been set before inflation. The dawn of the textile industry, meanwhile, pushed up the price of wool, making it more economically profitable for landowners to fence common lands and allocate them to sheep breeding. Hundreds of thousands of peasant families chased away watched helplessly the flocks grazing in the fields that only a few years earlier had grown rye and oats to feed their children. Everywhere people were starved, while the sheep were fattened and shorn to procure wool for the textile factories that were springing up in England and on the continent.
It is generally recognised that the private property regime gives modern markets an efficient vitality. Not less important, however, is to realise that an anonymous market in which foreign subjects exchange goods and services would not be possible without a code of laws that enjoys full force. In order for a privately owned regime to operate fully in a market context, there must be a legal system supported by police checks and courts that require both sellers and buyers to comply with their contractual obligations. The English juridical corpus, developed in parallel with the transition from the peculiar obligations on the Commons of the feudal age to the property rights of the modern market, was crucial in ensuring the transition from the old order to the new era.
The synergy that occurred in the late Middle Ages between the printing revolution and the exploitation of the driving force of water and wind stimulated the transition from feudal economy to market economy, changing the economic paradigm and social structure of Europe. What many historians and many economics theorists often overlook is that the capitalist economy took shape starting from the market economy of the Light Proto-Industrial Revolution, which established itself in most of Europe (and then America), and not from the ancient feudal economy.
In their writings, both Adam Smith and Karl Marx paid attention to hydraulic and wind energy. Smith evokes the new energy sources as an example of division of labour, while Marx cites them to contrast their intermittent character with the reliable continuity of steam energy, which has made the production cycle safe and perpetual.
Like the intellectuals coeval with him, however, Marx neglected to distinguish the feudal economy from the medieval economy which was its consequence, as evidenced by his famous and erroneous observation that "the arm mill will give you the feudal lord, the steam mill will create the society with industrial capitalist».
In the seventeenth century the dissolution of the feudal Commons and the sudden availability of low-cost wage labour, combined with the new productivity potential opened up by the synergy of the press and the hydraulic and wind power force, were sufficient to set aside the corporate system. Merchants began to step over the guilds, distributing work to the cheaper labour force in rural areas - a phenomenon called the "homeworking system" - and thus gradually eroding the firm control of guilds over commercial life. The homeworking system paved the way for a fully operational market economy. While the traders

were engaged in their struggle with the craft guilds, a new team of small manufacturing producers, many of which fed their micro companies with new hydraulic and wind energy, attacked the guilds from the opposite side, that of production, in an attempt to open up internal markets to their cheaper products.
The new producers joined forces with traders to achieve the liberalisation of national markets and joined forces to advocate internal free trade, the elimination of restrictions on labour mobility, the statutory application of commercial contracts and a series of improvements in transport, so as to expand the markets. However, they took different positions on the issue of exports aimed at fuelling foreign trade. The merchants sided with the monarchies, which pursued colonial policies designed to favour foreign trade over domestic trade.
The logic of mercantilism was to heavily regulate domestic production, in order to guarantee high quality products at cheap prices, and then sell those same products at inflated prices, to be paid in precious metals.
Furthermore, overseas colonies were forbidden to produce finished products and only raw materials were allowed, to be exported cheaply to the motherland, so that to buy finished products they depended on the motherland, which could therefore charge high prices.
Therefore, mercantilist policies favoured exporting merchants, while harming both the domestic producers of the colonising country and those of the colonies. Limiting the volume of production for the domestic market in order to artificially keep export prices high penalised not only domestic producers, but also the emerging middle class and poor urban workers, forced to suffer, higher prices for domestic products[144].
Free trade of goods in markets and capitalism are often thought to be the same. It is not so. If capitalism operates through the free market, capitalism is not indispensable for the free market.
The light proto-industrial revolution of the late Middle Ages created the free market, but capitalism as we conceive it today only came to light at the end of the eighteenth century, with the introduction of the steam engine. The first manufacturing entrepreneurs led small, home-run businesses, where work was typically done by family members, with the help of a few day labourers. Businesses moved in a market context, but capitalism had not yet entered the scene. The transition to capitalism started from the textile sector. In the previous chapter we saw how the merchants, determined to bypass the guilds, relied on home work (a first form of subcontracting), focusing on the low-cost labour of the countryside. While in the urban centres the guild artisans were wealthy enough to buy their looms, for workers in rural areas, reduced in conditions of poverty, the purchase of a loom was prohibitive. So, the merchants supplied them with the looms, usually for hire. The rent was often so high that the workers could barely earn the necessary to honour the rental contract, being able to keep very little to sustain themselves. With the acquisition of the means of production by the merchants, a model took shape destined to change the course of economic history.
At the end of the 16th century, a new generation of small manufacturing producers began to bring together workers under one roof, to exploit economies of scale in the use of water and windmills. These small producers were also owners of the machinery used by the workers, so that the craftsmen, once masters of their own equipment, found themselves deprived of the tools of work and reduced to wage-workers of a new master figure: the capitalist.
The textile sector therefore ended up in the hands of the capitalists, soon followed by other sectors.
In the view of Weber and other thinkers, in order for there to be mature capitalism, companies must be vertically integrated, so as to create economies of scale, and commercial activity must be organized by an extremely rationalised corporate bureaucracy (centralised management and hierarchical structure leading and control mechanisms). For Weber, the ideal capitalist enterprise is a bureaucratic organisation capable of rationalising every aspect of commercial life within a single structure. The drainage of investment capital through the sale of shares, the mobilization of labour, the development of processes for mass production, the promotion of competitive exchange in the markets, accompanied by formal legal codes, each of these aspects is fit for calculation as well as rational bureaucratic management designed to facilitate the centralisation of decision-making power in a hierarchical command structure. Weber was right, but he neglected to add that the same centralised and hierarchical command and control mechanisms are also necessary in a socialist economic system[145].

[144] *J. Rifkin: "A society with zero marginal cost" - Chapter II: "The enclosure of public lands in Europe and the birth of the market economy" page 43 et seq.*
[145] *Jeremy Rifkin: "A society with zero marginal cost" - Chapter III: The union between capitalism and vertical integration - page 56 and seq.*

1.3 The first and the second industrial revolution

The First Industrial Revolution began in England in the mid-18th century and then spread to the rest of Europe and the United States of America in the following century. The term "Revolution" recalls a radical change in the production methods of the artefacts and important changes in economic and social life. It was thanks to the introduction of technological innovations that a new production system developed. A new extension came thanks to the ingenuity of the Steam Machine by James Watt which discontinued the previous technology based on wood, leather and low-quality metals.
The engines driven by water, wind and the force provided by animals and man were replaced by energy based on the steam engine, in fact, steel and fossil carbon.

	Previous period and beginning of the First Industrial Revolution	**First Industrial Revolution**
Building materials	Wood (timber), leather and poor-quality metals	Iron alloys (steels and cast iron) and brass.
Energy sources	Water, wind, muscle strength (from animals and men) as driving forces (to move the operating machines); wood and vegetable coal, as fuel.	Steam, as a driving force and purified fossil coal (Coke) as a fuel.
Engines	(Water and wind) mills	Steam Engine
Work tools and machines	Tools and hand tools, typical of the craft shop and machine tools moved by animals and mills in manufacturing and factories.	Machine tools, inserted in "chains", in the factory system and driven by a "centralised force", supplied by the steam machine.

In the early forms of industrialisation from the 16th to the 17th century, manufacturing activities were practically scattered in the countryside where the energy of running water was used. Dislocation caused a fairly complex mechanism of product preparation and distribution. These were in fact prepared by women in the farms and withdrawn by the "industrialists" who moved from one farm to another both to collect the finished product and to distribute the raw material.
The new industrial system, on the other hand, provided for the use of workers inside the factories that speeded up the work thanks to the help of machinery and allowed economies of scale with subsequent production of low-cost products.
According to Jeremy Rifkin:
The cotton industry was the first to apply the new technology, achieving impressive productivity gains: between 1787 and 1840, English cotton production "jumped from 22 million to 366 million pounds", while production costs plummeted. In 1850 coal-powered steam engines were widespread throughout Europe and America. Yet in 1848, the year of the great European uprisings, hydraulic energy in France" still counted for two and a half times more than steam engines". In French factories, hydraulic energy continued to have far wider use than steam technology. Out of 784 companies in the French steel sector, for example, 672 met their energy needs by using water mills. The energy mix changed rapidly in the second half of the nineteenth century: the energy produced with steam went from 4 million horsepower in 1850 to about 18 and a half million in 1870. Steam energy first spread to countries with large coal reserves. The first European country to make the transition from water and wind to coal was England, followed by Germany. The United States, with their abundance of coal deposits, were quick to follow the European example. At the outbreak of the First World War, the First Industrial Revolution was led by these three nations[146].
The First Industrial Revolution had significant social repercussions such as the demographic increase that allowed the birth of the "industrial" city characterised by the population of artisans and peasants transferred from the countryside to work in the factories and which therefore gave rise to the phenomenon of urbanisation.
The phenomenon brought problems with it. Among the major criticisms was the emergence of suburbs characterised by often dilapidated houses and in the total absence of hygienic services. Working underwent an important transformation due to the metamorphosis of the type of activity requested. The chain processing of the factory forced the worker to perform repetitive and stressful acts for 12/14 hours a day in factories which were damp due to the accumulated water vapour and insufficiently ventilated.
The society was clearly divided into two classes which were the capitalists (in most cases the owners of the factories), and the proletarians with low wages and unprotected workers.
Child labour also spread as a plague, particularly in factories where, due to their minute constitution, the little ones could slip into narrow spaces (e.g. cleaning of tunnels, cleaning of internal parts of machinery or to keep the looms operating even for small breaks because it was cheaper to pay for a child than to turn the machines off and on again).

[146] *Jeremy Rifkin: "A society with zero marginal cost" Chapter III: The combination of capitalism and vertical integration - A coal-powered steam infrastructure page 59.*

Other important changes are attributable to the transport and communications sector. The steam locomotive and the iron rails in fact left a mark more than any other technological innovation. Thanks to the railways, the problem of unsuitable transport structures that inhibited the development of industrialisation was overcome. The first railway section to be inaugurated was the Liverpool-Manchester line in 1830 and then experienced a real boom going from 2,000 km of railways in 1840 to over 32,000 on the eve of the First World War.

A new model based on the division of labour is being imposed. As just said, industrialisation initially involved the production of material goods such as textiles and energy such as the steam engine, and then interested transport and communications, increasingly stimulating technology in the search for new solutions. The new market therefore saw the growing circulation of money that started the banking system. In this new economic landscape, a new figure of entrepreneur was appearing, characterised by the willingness to invest and risk his capital in order to obtain greater profit from the sale of goods.

However, in a short time the new system also showed the downside with decidedly different crises compared to those of the past, mainly linked to imbalances between food resources and the population. The first industrial revolution created the first difficulties related to the imbalance between supply and demand (excess production compared to the absorption capacity of the market).

The first industrial revolution which was therefore characterised by three main elements (the division of labour, technological development, competition among companies) reached its peak in the last two decades of the nineteenth century, a period in which a Second Industrial Revolution began to arise in America and in Europe.

The transition to the new revolution was determined by the change in the specialisation of the work and the introduction of the assembly line. The further division of the work took place, no longer according to the processing stages, but based on the repetitiveness of the procedures. In this way times and costs were halved, increasing production and earnings and thus paving the way for mass society and consumer goods.

The process was facilitated by the use of the new energy source: oil.

The essential point to understand about oil is that its management requires more financial capital than any other resource in the global economy. Furthermore, the recovery of the investment required by the various steps necessary to bring oil and its derivatives to end users is possible only if the entire process - research, drilling, transport, refining and marketing - is organised through vertically integrated companies controlled by a highly centralised management.

Today, discovering new oil fields and start production is a long and expensive process, and very often unsuccessful. The activation index, the parameter that measures the total investment necessary to reach the discovery of new deposits, is sufficient to dissuade those who have some doubts. It is not uncommon for large energy companies to invest multi-billion dollars in new oil projects.

When, in the first decade of this century, Iraq announced that it wanted to triple its crude production, the cost of the investment was calculated in 30 billion dollars. Between 2000 and 2011, the volume of investment capital used worldwide for the research and production of oil and natural gas was close to 2400 billion dollars[147].

Being based on sources whose exploitation required very high financial investments, the economic expansion of the second industrial revolution gradually made the real economy closely linked to the international finance system. In the virtual financial economy, a process of extraction of value has progressively affirmed (not of value creation as in the past), based on the rapid movement of capital on the financial markets and on the reversal of the labour factor from value to negative value.

At the same time certainties that have turned out to be false have been promoted such as:

- infinite and continuous growth;
- the eternal availability of natural and energy resources which are instead finite by their nature (= not infinite);
- the concept of the environment and nature as *liability*.

After World War II this close, but still relatively balanced relationship was altered within thirty years with the release of the dollar from the gold-based guarantee (1975) and was overturn in 1981 with financial deregulation reforms, launched by Reagan and Thatcher.

These changes paved the way for the transition from a product-based business management logic to one focused on financial profit. The consequences were the immediate conditioning of the real economic paradigms and gradually of the political ones, arriving at the seizure of the dynamics of political choice in the name of a consensus on the growth of consumption.

Simultaneously, a powerful global oligopoly of financial companies was established, characterised by very strong concentrations of capital and strong financial levers; an oligopoly capable of driving the so-called international markets by focusing power and decisions at the expense of families.

The new industrial model also had serious repercussions on human work and therefore on society. While agricultural work was born from the need to draw sustenance for one's family, the foundation of this new revolution was the application of science to industry. As regards work and its organisation, everything turned into a direct consequence of the application of new technologies in order to produce with a very rigid division of labour.

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[147] *Jeremy Rifkin: "A society with zero marginal cost" Chapter III: The union between capitalism and vertical integration - The second industrial revolution page 68.*

The logistical transformations resulted in adapting human work to the rhythms of the machine, with the inevitable increasing fragmentation of operations into minimal tasks that each individual worker would repeat continuously. Symmetrically, the need to use a workforce having control functions on the technological machinery used, what we would call today highly qualified technicians, and staff responsible for the repair and assistance of the equipment and the control of more or less large sections of the productive process developed.
"Simple" workers, technicians or "elite workers", increasingly made up professional figures to supplement the machine, which had become the real protagonist. There was nothing left for humans but mechanical and elementary operations whose rhythms were dictated by the same machine in a perverse process that slowly led to the alienation of human being.
Since the beginning of the oil era, some entrepreneurs understood that to make profitable the complicated multi-level process necessary to get oil to end users it was essential to consolidate control over the entire sequence of operations. Only in this way would companies be able to exploit the rationalisation practices of centralised management making the most of it. With that goal in mind, in 1868 John D. Rockefeller founded the Standard Oil Company. Rockefeller bought oil wells and refineries across the country and entered into special agreements with the railways to ensure the delivery of its oil was the top priority. With the advent of the car era, in the first decade of the twentieth century, Standard Oil became the first company to build petrol stations in the United States, creating a complex operational reality with vertical integration that took care of production and distribution, from the well to the final user.
In 1910 Rockefeller controlled most of the American oil sector.
Competitors and public opinion cried out in the scandal, so much so that the federal government took legal action against his company under the *Sherman Antitrust Act*.
In 1911 the Supreme Court ordered the dissolution of the Standard Oil Company.
But government efforts to limit the concentration of the oil industry were short-lived. In the 1930s, 26 oil companies, including Standard Oil from New Jersey, Standard Oil from Indiana, Texaco, Gulf Oil, Sinclair, Phillips 66, Union 76 and Sunoco, controlled two thirds of the sector's capital, 60% of the drilling activities, 90% of the oil pipelines, 70% of the refining plants and 80% of the marketing activities.
Although somewhat attenuated, the concentration of the oil industry remains significant still today. In the United States, five companies - Chevron, bp, Royal Dutch Shell, ExxonMobil and ConocoPhillips - control 34% of national exploration and oil production. [148]
To date, the ranking with the related aggregate data of the ten largest oil companies in the world is shown in the following table.[149]

1 - Saudi Aramco	It daily extracts 12 million Boepd, barrels of oil equivalent, of which 87% of liquids. A growing figure compared to the 10.8 million in 2004. The national company of ' Saudi Arabia is considered the most valuable company in the world, estimated at 10 trillion dollars and capable of generating a billion dollars a day of revenues (2011 data)
2 - Gazprom	With 6% of liquid hydrocarbons, the Russian company saw its production drop from 9.8 million barrels of oil equivalent in 2004 to 8.3 million last year.
3 - National Iranian Oil Co	Production went from 5.1 million in 2004 to six million per day in 2014. Oil represents 52% of the resources extracted by the Tehran government-owned company.
4 - Exxon Mobil	Stable with 4.7 million barrels of oil equivalent, the American company had produced 4.6 million in 2004. Crude oil represents 51% of the total. It is the largest private oil company
5 - Rosneft	The Russian government company has gone from 0.3 million to 4.7 million barrels of oil equivalent per day in a decade, of which 82% is crude.
6 - PetroChina	Crude oil is 63% of production which in 2014 touched four million barrels of oil equivalent per day, growing from the 2.6 of 2004. The company belongs to the Beijing government.
7 - BP	The British multinational has gone from 3.9 to 3.7 million barrels of oil equivalent. Crude oil is 65% of the total.
8 - Royal Dutch Shell	Crude oil is 47% of the 3.7 million barrels of oil equivalent extracted in 2014 by the Dutch multinational.
9 - Petroleos Mexicanos	Production by the Mexican state-owned company went from 4.1 to 3.6 million barrels per day. Crude oil is 75% of the total.
10 - Kuwait Petroleum Corp	Last year it extracted 3.4 million barrels per day, compared to the 2.5 in 2004. Crude oil represents 92% of the total.

[148] *Jeremy Rifkin: "A society with zero marginal cost" Chapter III: The union between capitalism and vertical integration - The second industrial revolution page 69.*
[149] *Source: http://www.panorama.it/economia/aziende/dieci-piu-grandi-compagnie-petrolifere-del-mondo based on information from the British research and consultancy firm Wood Mackenzie.*

Parallel to the enhancement studies on the energy source of oil, Alexander Graham Bell studied how to perfect the telegraph, and in 1875 he patented a prototype capable of sending two signals simultaneously.[150]
The invention was of epic importance as unlike printing and telegraph, the telephone was able to coordinate intense volumes of economic activity in real time and in a centralised way.
The operation of the telephone, however, required electricity which saw a huge jump in importance thanks to the approximately 2.500 electricity companies in the United States in 1896.
The production of electricity in favour of telephone communications also favoured the generation of electricity for lighting and for the supply of factory machinery and household appliances.
The advent of electric light consequently boosted commercial activities and allowed the further increase in economic development.[151]
In the first half of the twentieth century, the transition from steam energy to electricity detonated the productivity of the factories, increasing it by 300%. The electrification of car factories gave free rein to mass production, allowing millions of people to get behind the wheel of a car. In 1916, 3.400.000 registered cars circulated on American roads. Fourteen years later, 23 million cars were registered. The automobile became the essential "engine" of economic growth throughout the Second Industrial Revolution. Other key sectors will later add to the huge industrial system which will later be called the "car era". In 1933, motor vehicle production absorbed "20% of the steel, 12% of the aluminium, 10% of the copper, 51% of the lead, 95% of the nickel, 35% of the zinc and 60% of the rubber used in the United States »
Today, while the era of fossil fuels is drawing to a close, the oil industry remains the most concentrated sector in the world, immediately followed by those of telecommunications and the production and distribution of electricity. Almost all other sectors depend on the fossil fuel - telecommunications matrix necessarily require huge capital outlays to achieve a sufficient degree of vertical integration and economies of scale to recover the investments made. They are therefore forced to manage the entire range of their activities, streamlining the management and control processes to the maximum.
Today, three of the world's four largest public corporations are oil companies: Royal Dutch Shell, ExxonMobil and bp. After the oil giants there are ten banks - JPM organChase, Goldman Sachs, boa Merrill Lynch, Morgan Stanley, Citigroup, Deutsche Bank, Crédit Suisse, Barclays Capital, ubs and Wells Fargo Securities -, which control almost 60% of the world market of banking investment.
500 multinationals come after financial investors, whose total turnover reaches 22.500 billion dollars, equal to one third of the world GDP (62.000 billion dollars), and whose existence is inextricably conditioned and dependent on the energy obtained from fossil fuels, from global telecommunications and from the global electricity network. In no other period of history has such a small number of institutions had such an economic power over the lives of so many people.[152]
The French philosopher and economist Serge Latouche, analyses the relationship between economy, philosophy and ecology in this regard. According to the scholar, the inflationary concept of crisis is nothing more than the product of a concept of progress, contemptuous of the limits of nature.
According to Latouche, reversing the direction towards cooperation and abandoning competition and conflict is still possible. The alternative would be to continue on a road that would lead to irreversible emergencies and disasters. The possibility of a change is perhaps still possible but it presupposes a cultural change and an urgent and global awareness.
Known as the "happy de-growth" theorist Latouche develops the thought of Karl Polanyi and Ivan Illich, elaborating a strong criticism of the western economy which inevitably is now collapsing. By virtue of the proposition of a reversal, he draws up the theory of "de-growth", a thought that opposes a false "irrational, fixed and destructive" economic development as an end in itself. The economy, understood in this way, can only function through a continuous increase in GDP, behaving "like a giant that is unable to stay in balance if not continuing to run, but in doing so it crushes everything it encounters on the its path." [153]
A system of this kind is completely absurd both from an ecological and social point of view as it is aimed at facing a scarcity of resources which it doesn't recognise yet.
Heavy contradiction of this socio-economic system also lies in offering man every comfort but at the same time condemning

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150 Thanks to the funding of the American father-in-law, on March 17, 1876 he filed the patent number 174.465 to protect "the method and the apparatus for transmitting the voice or other sounds telegraphically [...] by means of electrical corrugations, similar, in form, to those that accompany the emission of voice and sounds in the air ", the telephone. Source: http: //biografieonline.it The authorship of the invention actually belongs to the Italian Antonio Meucci, who did not have enough money to patent the "teletrofono" (as he called it), and in 1871 had managed to obtain only one temporary patent that had to be renewed from year to year at the price of 10 dollars and he was able to renew it only until 1873. The United States Supreme Court in 1888 and Congress in 2002 will therefore confirm the attribution of the invention of the telephone to Meucci with the following resolution: "The Chamber intends to give recognition to Meucci's life and achievements, taking note of the work he did in the invention of the telephone". (Article taken from the newspaper: Il Corriere della Sera - Sunday 16 June 2002) .

151 In America in 1910, one house out of ten had electricity; in 1929 most urban houses were connected to the electricity grid .

152 Jeremy Rifkin: "A society with zero marginal cost" - Chapter III: The union between capitalism and vertical integration - The second industrial revolution page 74, 78.

153 Serge Latouche, The Bet of De-growth, Feltrinelli 2007, p. 27.

him to a frenetic lifestyle, of continuous dissatisfaction and such as to produce a community sick of wealth and full of disparity and inequity.
The "serene de-growth" advocated by Latouche constitutes a fundamental alternative to definitively detach oneself from this fake ideology of "economic development".
Resize the GDP in favour of greater well-being like a bien vivre that tends to revalue neglected immaterial values such as culture, leisure, relationships.
The necessary setback, however, is not imbued with nostalgia but with qualitative changes made possible by innovative technologies characterised by ecological and social equity.
Recalling the thought of Ivan Illich, Latouche examines that the indispensable limitation of production and consumption levels will not lead to a life of privation but to a rediscovery of creativity and conviviality.
To achieve this goal, the French philosopher bases his theory on eight axioms known as the "eight Rs"[154]:
re-evaluate (rediscover new values and new attitudes by meeting a different vision of the world and society)
redesign, (redesign concepts such as "wealth", "poverty", "rarity" and "abundance").
restructure, (adaptation of the entire production system and management of social relationships), redistribute, relocate, reduce, reuse, recycle.
The aforementioned framework necessarily requires the exit from capitalism and a scene of intervention by social institutions in a completely different logic.
The restructuring of society must allow for an appropriate redistribution of wealth and opportunities for access to natural resources for all. One of the strategic tools that are mentioned refers to the relocation of production activities which would also make it possible to "re-territorialise" the places and to have a more direct contact with nearby products and markets[155].
The proposed relocation moves to the exhortation to the self-production of goods in order to inevitably reach a "reduction" in the energy, transport, senseless commercial exchanges and above all working hours so as to limit the scourge of unemployment, relive free time.
Last but not least is the reduction in waste production, therefore also in the planned obsolescence of goods[156] (see table). Getting out of the logic of use and throw away favouring recycling and recovery to be reused as raw materials.
The change in mentality will allow the approach to the new well-being and requires the serious contribution of artists and intellectuals capable of "re-enchanting the world" and make actively reflecting on the importance of "getting the economic hammer out of the head". [157]

Most valuable brands according to Forbes in 2015

1 - Apple	**Brand value: 145.3 billion dollars**
2 - Microsoft	Brand value: 69.3 billion dollars
3. Google	Brand value: 65.6 billion dollars
4. Coca-cola	Brand value: 56 billion dollars
5. Ibm	Brand value: 49.8 billion dollars
6. McDonald's	Brand value: 39,5 billion dollars
7. Samsung	Brand value: 37.9 billion dollars
8. Toyota	Brand value: 37,8 billion dollars
9. General Electric	Brand value: 37.5 billion dollars
10. Facebook	Brand value: 36,5 billion dollars

Latouche study is also confirmed in other semantic fields of interest such as the financial one regarding the qualitative vision of growth[158] emerging from the insights of the geopolitical expert Alessandro Politi. Politi reinforces the idea that we are going through one of the most difficult periods in history due to an unprecedented global crisis. Islands of well-being and oceans of poverty, in such a state of affairs, will not allow a serene confluence of the interests of the States.
Part of this worsening, according to the scholar, is also due to some factors, the most important of which refer to the uncontrollable demographic increase in the poorest countries, to the considerable reduction of jobs in rich countries and to the

[154] *The plan to build a de-growth society is therefore a utopia, a utopia in the concrete and positive sense of the word which is another possible world. I proposed to implement this project through an eight-R scheme: Reevaluate, Redesign, Restructure, Redistribute, Relocate, Reduce, Reuse, Recycle. Every time I give a conference there is someone in the room who says to me: "You forgot a very important R, we must also reinvent democracy." Another person tells me: "We have to re-interpret citizenship." The competition is open, many more R. can be added. [Speech by Serge Latouche in the seminar on de-growth organised on Thursday 4 October 2007 by the culture committee of the Chamber of Deputies]. Source: http://pauperclass.myblog.it.*

[155] *Concepts on which the idea of Carlo Petrini was founded, who in 1986 founded the ArciGola gastronomic association and three years later launched the Slow Food movement in Paris, a resistance movement against the best-known Fast Food, emblem of today's life. Today Slow Food exists in 150 countries around the world and takes on a role of great attention .*

[156] *It is no coincidence that technology dominates the top 25 positions of the most powerful companies on the planet. See table.*

[157] *Cfr. Serge Latouche, Decolonizing imagination. Creative thinking against the economy of the absurd, ed. EMI, 2004.*

[158] *Neo growth, which will be discussed in detail in the last chapter.*

disintegration of States. The current screenshot shows the north of the world where countries are discharged from financial interests and a short-term Italian projection that states that a third of Italy will no longer be made up of people born in Italy.
Wars break out due to important social disparities that become unsustainable and certainly not because of "clashes of civilisations"!
In this regard, the real difficulties emerge in finding new sources of non-renewable energy to keep an obsolete and contradictory social model alive.
The water crisis also becomes the impulse to start identifying certain eco-sustainable parameters at a shared level, especially in agricultural and industrial use, where the greatest waste occurs.
In such a context it is not difficult to guess that the solution is in a change of paradigm that should see renewable energy sources as protagonists, the elimination of waste, the use of integration policies among peoples which should become an opportunity for the protection of universal human rights and mutual growth[159].

1.4 Analysis of the labour market in the energy sector ("traditional" employment aspects e.t.r.i.)

In Italy the unemployment rate reaches one of the highest historical levels ever, reaching 12.7%.[160] Young people looking for work, on the other hand, represent 43.1%. The employment rate is 55.5%. In absolute terms, the employed are around 22.5 million, the number of unemployed is around 3.5 and the unemployed between 15-24 years are around 700 thousand.
A necessary premise to understand the employment data existing in the energy sector and the real potential of the various sectors.
Italy has a balance sheet on renewables that can be summarized in the production of one third of national electricity and which has about 200 thousand employees [161].
The study made by the GSE during the conference on the new energy plan of Lazio Region, specifies that in 2012, against an investment of 12.6 billion euros, 137 thousand people found work in the new clean energy plants and 53 thousand in managing existing ones. Furthermore, between 2008 and 2015 the cost of photovoltaics has fallen by more than three times.
Other data, instead are collected for the traditional sources' employment market. Just think that the largest energy giant operating in Italy (and therefore aggregative of different realities), ENI s.p.a., accounts for approximately only 25 thousand employees in the entire peninsula[162]!
The employment data of the energy sector regarding a study carried out by CETRI-TIRES with particular attention to the Apulia region, are completely different as shown in the following table.
According to unofficial estimates, the power deriving from traditional sources installed in Apulia is 6 Gw and about 3500 employees are employed.[163]
The reform of the labour market, according to the current government, should be relaunched with the so-called Jobs Act, focused on a series of manoeuvres including:

- Reducing the cost of energy for companies by 10%
- Less taxes for those who produce work and more tax burden on financial speculators
- Spending Review
- Administrative simplifications
- New job code
- Universal allowance for those who lose their jobs
- Greater transparency in the public sector
- Unique coordination of employment centres
- Union representation
- Electronic agenda (invoicing etc.)

[159] *Nomisma 2006 Report on Economic-Strategic Perspectives - Strategic and Security Scenarios Observatory. Pages 25,26.*
[160] *Istat data June 2015.*
[161] *GSE data - Source Repubblica Ambiente, article of 3 April 2014 by Antonio Cianciullo.*
[162] *ENI s.p.a. annual financial report data*
[163] *Employed per Gw (1,000 Mw): about 600.*

The decalogue will hopefully also include the consideration that our country is currently supplying money to fossil sources in the face of the elements just exposed.[164] We speak about 4.4 billion direct subsidies, distributed to road hauliers, fossil fuelled power plants and energy-intensive businesses, and 7.7 billion indirect subsidies, including financing for new roads and highways, discounts and gifts for drilling.[165]

The decisiveness of the works relating to the environment, in fact, does not only concern the protection of the environment but also the growing economic influence that ecology has on the quality of economic development and employment.

Recognising the pre-eminence of safeguarding the planet, the European Commission, has set binding targets for 2020 in reducing emissions by 20%, by increasing energy efficiency (with savings of 20%) and the 20% share of renewable sources to be achieved on total consumption. [166]

The commitment to keep the planet warming below 2°C creates an opportunity to define new low carbon economies and induce an industrial revolution capable of responding to the current crisis in terms of innovation, competitiveness and work.

The development of renewable energies and the improvement of energy efficiency are now becoming the driving force of the real economy on a global level. According to the UNED and ILO report, the employment offer of the so-called "green jobs" can affect up to 4 million new jobs in the industrialised world and an even higher figure in developing countries. [167]

The energy sector related to the Third Industrial Revolution would significantly support the economic recovery and therefore the fate of the nation. Favourable signs would include the reduction of carbon emissions, new employment, greater well-being, environmental protection.

In the financial sector, between 2013 and 2014 42 billion bonds were issued in the field of green renewables and it is estimated that they can reach 100 billion in 2015. Investments relating to the same sector increased by 16% (310 billion dollars) in 2014 compared to 2013, thus making the "green" workers jump globally to around 6.5 million. China is the leader with a + 32% compared to the old continent which records only + 1%. An excursus shows that in 2003 there were just over 3 million people employed become 4.282 million in 2012. [168]

According to IRES projections, within ten years the contribution to direct employment would be 12,000 units in the whole country to reach a total of 60,500 units if indirect and induced employment are also taken into consideration.[169] The Italian industry could achieve an average annual turnover of between 2.5 and 5.5 billion euros per year until 2025, leading to a major transformation also in the transport and distribution electricity networks. The creation of "smart grids" alone would only entail estimated investments of around € 1.5 billion in Italy to the total benefit of a process of retraining traditional figures operating in the sector. [170]

Building sectors (responsible for 40% of energy consumption), transport and sustainable mobility are among the sectors that can most assist the pursuit of environmental, social and economic eligibility objectives.

According to an ENEA study [171], between 280,000 and 450,000 new jobs could be created by 2020 in consideration of the professional figures referring to green building, the energy certification of buildings, the construction of passive systems for heating and cooling, the design and production of low environmental impact materials for thermal insulation, integration of traditional systems together with innovative ones for the supply of energy for the purpose of optimal management of energy services.

In the 2014-2020 planning European cohesion policy foresees as much as 50 billion euros a year for the strengthening of the production chains of renewables. For Italy, ERDF (European Regional Development Fund) and ESF (European Social Fund) funds amount to 22.2 billion for the less developed regions (Campania, Apulia, Basilicata, Calabria and Sicily), 1.35 billion for the regions in transition (Abruzzo, Molise and Sardinia) and 7.56 billion for the remaining regions; while the ceiling of resources to achieve the thematic objectives[172] is equal to 8.6 billion (41% of the total).

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[164] *Globally, the problem of subsidies to fossil fuels is well known: the latest complaint is contained in the IEA's World Energy Outlook 2013, which quantifies them in 544 billion, five times those for renewable sources. According to estimates by environmental NGOs, only by eliminating these aids would global CO_2 emissions be reduced by 750 million tons, that is 5.8% by 2020, contributing to the achievement of half of the climate objective necessary to contain the increase in global temperature of 2°C.*

[165] *Source: www.qualenergia.it*

[166] *The European Council has translated the climate-energy strategy " 20-20-20" into Directive 2009/28 / EC approved by the European Parliament and the European Council on 23 April 2009.*

[167] *Source: "Green Jobs: Towards decent work in a sustainable, low-carbon word".*

[168] *Spring Meeting, the annual event organised by the Foundation for Sustainable Development, which this year has as its theme "The contribution of the green economy for the recovery of Italy". Source: http://www.fondazionesvilupposostenibile.org*

[169] *In the most optimistic prospects, this figure could even rise to 250 thousand, with a predominance of biomass, photovoltaics and wind power.*

[170] *Source: IRES.*

[171] *National Agency for new technologies, energy and sustainable economic development.*

[172] *Low-emission economy, climate adaptation and risk protection, rational use of resources, sustainable transport.*

1.5 The Keynesian multiplier: employment aspects[173]

The concept was developed during the crisis of 1929 regarding public expenditure aimed at combating unemployment, but it is valid for analysing any chain process by which an original expenditure causes repercussion that multiply its effects.
It is mainly due to J.M. Keynes the generalisation of the monetary term's theory. The scholar showed how the process of amplifying the effects of public spending necessarily translates into an increase in rents, interests, wages, salaries and profits for all those who participate in the activity carried out with it, and therefore in an increase in their consumption, which means that the total expenditure is higher than the initial public one and in turn causes an increase in income for all those who participate in the production of the additional consumer goods required.
Since this process is based on the demand for consumer goods caused by the new income formation, it has the consequence that the higher the percentage of income that is destined for consumption the greater is the multiplier and vice versa[174].
Considering only the goods market, for the multiplier to work without producing bottlenecks or increases in production costs, it is necessary:

- that production factors, including labour, are available in the necessary quantity;
- that the unemployed reabsorbed by the new production can freely dispose of their entire income to purchase goods, without being obliged to pay off debts incurred during the period of unemployment;
- that preference for liquidity does not increase;
- that the new demand is mainly directed towards the internal market;
- that the increase in government spending does not cause inflationary effects (which would be inevitable if the expenditure occurred in a situation of full employment);
- that public investment does not compete with private investment.

Public spending on welfare therefore acts as an "automatic re-balancer", slowing down the fall in income. But only additional public investments will be able to bring the system back to full employment and, as Keynes perhaps ironically concluded, only from that point on the neoclassical theory will become valid again.
Furthermore, it should be borne in mind that for Keynes the multiplier is an out of time relationship between investment and consumption through income[175], but that of course, it takes some time, more or less long, for the aforementioned changes in national income to occur. By applying the same Keynesian formula but giving different meaning to its components, the relationships between the increase in employment, an immediate consequence of the new state investment, and the overall employment that will result by adding to the first increase the secondary ones due to the multiplication process can be studied[176], as well as the relationships between the credit received and that created by the banks.
In this way, Keynes basically overturns, as already said, the neoclassical vision by affirming that it is the demand that creates the offer and not vice versa (refuses Say's Law, since it is not at all obvious that everything that is produced will certainly be sold) and that, another crucial aspect, the demand for labour is determined on the goods market and not on the labour market. Note that reversal is by no means trivial in its implications: Keynes says entrepreneurs will not invest, produce and then hire workers if demand is expected to be low in the future. He therefore gives an important role to the expectations of entrepreneurs on the one hand and to the propensity to consume by families on the other which influences the inclination of the aggregate demand curve. The economic system is uncoordinated because not all subjects have the same social function and the same behaviours and therefore there is no "natural" tendency towards full employment. On the contrary, the system is normally located in a lower occupancy point. Employment, according to these explanations, remains fundamentally determined in the goods market, while the labour market "follows". For Keynes, the ideal is to increase wages with productivity, thus keeping prices stable.
So, in the absence of additional aggregate demand (for example public spending), the system does not go back to full employment by itself, but can turn into a vicious cycle of falling demand, which causes production and employment to fall, which in turn causes a further drop in demand and then settles on a highly inefficient under-employment balance with high involuntary unemployment.

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173 *RE-EXPOSURE OF THE GENERAL EMPLOYMENT THEORY Page 435 CHAPTER 18. UTET Libreria, Torino, 2006 - Keynes J. M., 1936, The General Theory of Employment, Interest and Money.*

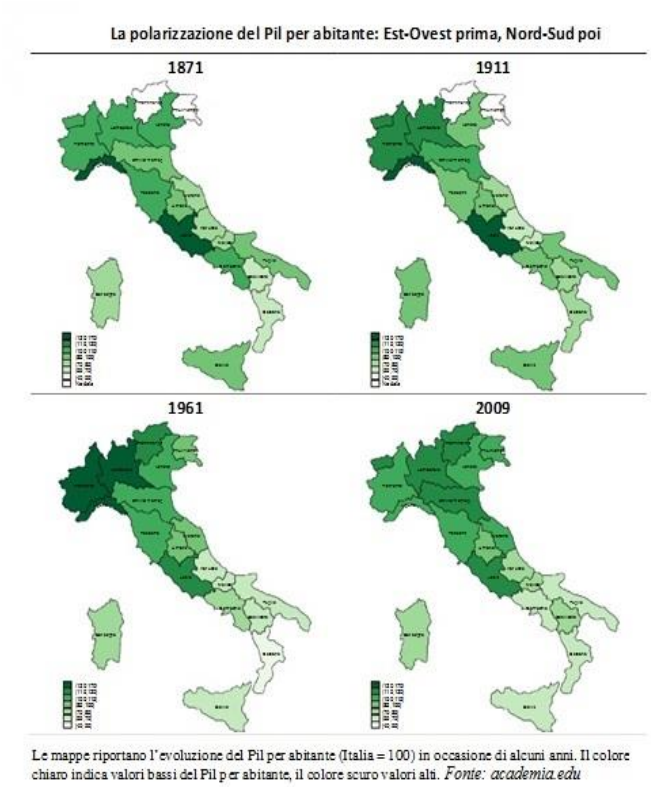
174 *This relationship is expressed in the formula k=1/s=1/(1−c), where k is the m., s the marginal propensity to save and c the marginal propensity to consume, given that the two aforementioned propensities are, in Keynesian language, the percentages of income respectively dedicated to saving and consumption, which added together make up the measure of the income itself.*

175 *The so-called instant multiplier.*

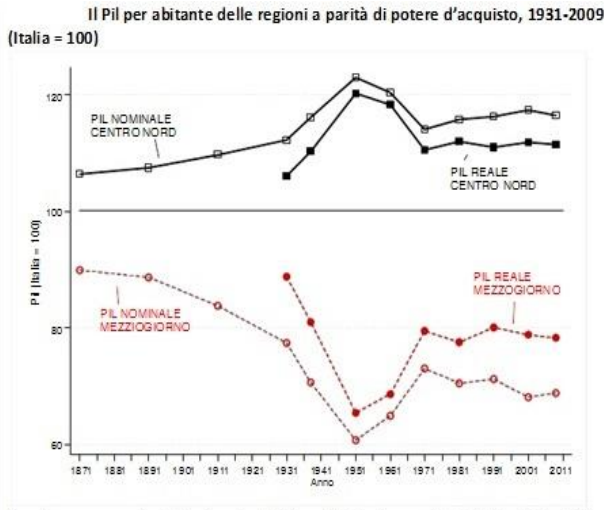
176 *The so-called employment multiplier.*

1.6. Evolution of the GDP of the city of Taranto in the last 50 years (broken down by categories)

Like many western nations, Italy has had a great development of GDP in the last 150 years, going from a discounted income of around 1,500 euros per capita in 1861 to around 25,000 euros today. It should be noted that the best period was from the post-war period to the early 1980s, an era in which Italy had an average annual growth of 4-5% in per capita GDP (even higher than in other European countries), against the average growth of 1% in Liberal Italy (1861-1913) and in Fascist Italy (1922-38). Since the 1980s, growth has slowed down; more conspicuous in the 90s, up to a substantial stasis with large recessions during the 2000s. It is also noted that regional divergences, particularly between the North and South of the country, have always grown, with the exception of the period 1950-1980, the country's highest growth[177].



Le mappe riportano l'evoluzione del Pil per abitante (Italia = 100) in occasione di alcuni anni. Il colore chiaro indica valori bassi del Pil per abitante, il colore scuro valori alti. *Fonte: academia.edu*



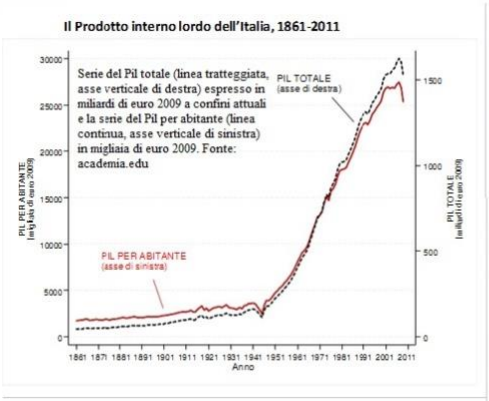
Il grafico pone a confronto l'andamento del Pil per abitante (asse verticale) del Centro-Nord (linea continua) con quello del Mezzogiorno (linea tratteggiata). I simboletti vuoti si riferiscono al Pil *nominale* (non aggiustato cioè per le differenze territoriali nel livello dei prezzi), quelli pieni al Pil *reale* (il Pil corretto con gli indici di prezzo spaziali). *Fonte: academia.edu*

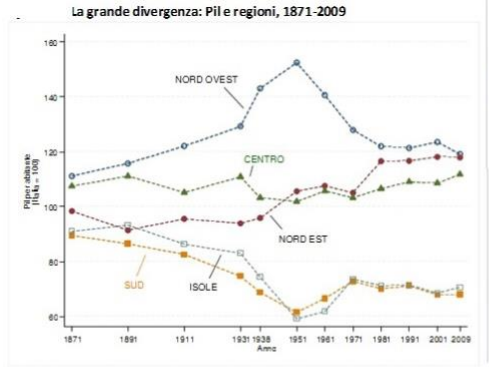
Looking at the maps of per capita GDP, it is possible to see the evolution of the various regions.
Another diagram concerns the divergence of real GDP (non-nominal and with purchasing power parity) between North and South: the differences in real wealth are lower thanks to the lower cost of living in the south.
However, it is quite clear that:

- During recession, economic stagnation or low growth periods, the differences in per capita GDP between North and South increase;
- During periods of strong economic growth (especially in the period 1950-70) the differences in GDP between North and South are drastically reduced.

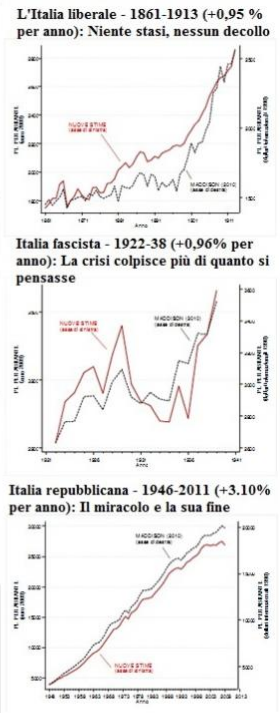
In summary, the only period in the last 150 years that has seen the gap between North and South drastically reduced is the one where Italy has had powerful economic growth, based on industrial development. Paradoxically, at that time assistance to the South was decidedly more modest than that which developed in the following years. The state was not generous, with public spending at 30% of GDP, and investments in major works and infrastructure went to the South rather than subsidies. At that time the South experienced a very strong productivity growth.

177 *Source: academia edu.*





Evoluzione del Pil per abitante (misurato lungo l'asse verticale, con Italia=100) perciascuna ripartizione geografica. La distanza fra il Pil medio di ciascuna macroarea aumenta nel tempo (salvo la parentesi degli anni 1951-1971). Un secolo e mezzo all'insegna della divergenza. Fonte: academia.edu



Stime del Pil per abitante (linea continua) con le stime diMaddison [2010] (linea tratteggiata) per tre sottoperiodi della storia post-unitaria. Fonte: academia.edu

As can be seen from a historical extrapolation of Mariadele Di Fabbio's study[178], the economic history of the area has always been characterised by a strong external component with respect to the territory: the structural characteristics of the first industrialisation in Taranto were those of a state-military monoculture which hegemonized the entire economy of the territory, a direct "donated" and straight development, detached from any market logic and totally dependent on foreign policy designs. This is a particular production, linked to military orders, without any relationship with the economy of the surrounding area, which gave the town bourgeoisie a role of wishful thinking and parasitic "chariot fly", as opposed to the increasingly widespread workers in the area. A working-class city without an authentic bourgeoisie, an industrial proletariat that had, as its direct counterpart, the high military commands.

This industrialisation, catapulted from the outside, has completely put the local entrepreneurial forces in brackets, creating a short circuit between production acceleration and a brake on participation and planning: entrepreneurs carved out profits in the undergrowth of contracts and building speculation, the public administrators managed a micro patronage power, and intellectuals, when they did not want to reduce themselves to drummers of industrial-military expansion, perceived their frustrating inessentiality, their being superfluous in the logic of the barracks-city.[179]

The fate of the economy of Taranto changed considerably following the arrival of the iron and steel industry with the opening of the fourth steel pole which started production in October 1961.

Those were years of great enthusiasm in which the highest Italian GDP in history was recorded. While in 1958 there was +5.3%, 1959 saw + 6.6% and 1961 + 8.3%. It was the culmination of the economic miracle.

Di Fabbio again: According to recent estimates of the Tagliacarne Institute, in 2010 the per capita GDP of the province was approximately 17,000 euros, which keeps Taranto at 92nd position in the national ranking (with an identical value recorded in 2009) and ranks it second after Bari at the regional level. The GDP per capita of Taranto is among other things higher than the regional average, for about 133 euros, but corresponds to 67% of the national one which instead is equal to 25,600 euros per year (Chamber of Commerce of Taranto, 2011).

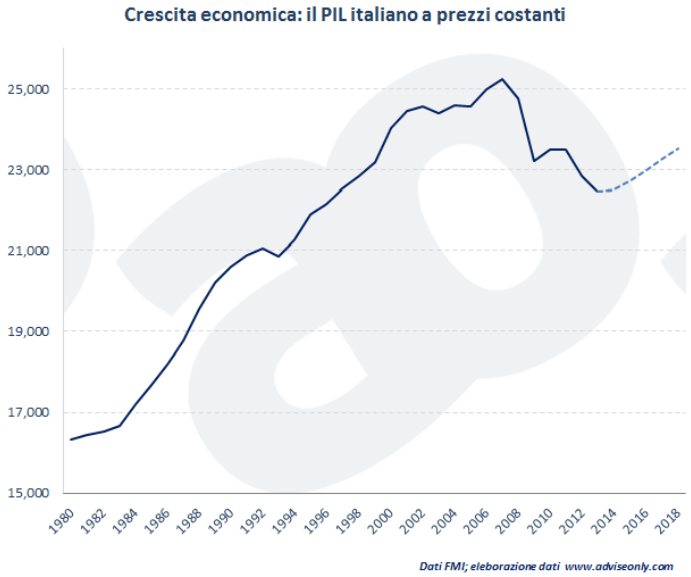
The following graph represents the real per capita income of Italian people, [180] from 1980 to today. Note the estimate of the economic trend according to the IMF forecasts for the period from 2014 to 2018. The pattern highlights two setbacks coinciding respectively with the 1992 and 2007 crises, up to the present day with a small rebound in 2010. The main discrepancy is that after 1992 economy restarted immediately. Other rather important analyses show that the level of income per capita at

178 *Path dependence and traces of change in Taranto. A socio-economic analysis - Chapter 5 page 119.*

179 *Nistri: 22, in Nistri and De Cesare (edited by), 2006.*

180 *"at constant prices": only the growth of the quantities produced excluding inflation is observed.*

the end of 2014 is roughly equal to that of 1997, while only in 2017 the Italian standard of living should return to the levels of 1999. [181]



The sector performances affirm that the growth rate of the Taranto businesses, that is the balance between registrations and terminations, showed a very weak positive value (+ 1.8%) in 2010 thanks to a lower number of cancellations (19, 5% less than 2009) and a recovery in registrations (+ 8.8%) compared to the previous year. However, the increase stops in 2011 until it records a negative value (- 0.5%) in 2012.
The economic sector with the worst performance in the period 2009-2012 is the agricultural sector, which records a loss of 948 units (-7.7%). Manufacturing, financial and insurance, transport and storage activities in 2012 recorded minimal percentage changes of around -1%. The last sector to record a negative value is that of the extraction of minerals from quarries and mines, with a negative variation of almost 6 percentage points. The best positive balances are those represented by Accommodation and restaurant services activities: + 259 active businesses in 2012 compared to 2009 (+ 11.6%), and Wholesale and retail trade: +195 active businesses, equal to a percentage change of 1.6%. The construction sector also shows an increase in the active entrepreneurial base: +161 businesses (+ 3.6%), as well as professional, scientific and technical activities (+101 businesses, +12%) and the rental sector, travel, business support services (+84 units, +9.4%) [182].

1.7. Cost analysis

Finsider, set up in 1937 to manage IRI's investments in the steel sector, entered a deep crisis in the 70s, producing an annual loss of 1,000 billion lire in the following period and reaching the end of the 80s with 10,000 billion lire of debts.
In 1988, IRI decided to put it into liquidation together with the major companies controlled by it: Italsider, Deltasider and Terni Acciai Speciali. A new company, Ilva spa, was therefore set up, to which the recoverable industrial activities were conferred, in the hope of reviving the fate of the state steel industry.
But this soon proved to be an illusion: if, at the end of the 1980s, Ilva (then Italsider) returned to profit thanks to a fortunate conjuncture of the steel market, in 1992 the balance was closed with 2,600 billion lire of net loss and more than 8,000 billion lire of debt.
Reanimating the public steel sector no longer seemed possible, especially in a period of privatisation of public industries: in 1993, Ilva was put into liquidation and sold to a series of companies essentially owned by the Riva[183] family.
In total, the steel centre costed 2,000 billion lire against a current construction value of about 20,000 billion lire. But the Riva know how to do calculations and so do the deal of the century by winning the largest steel mill in Europe for 1,460 billion lire without making a great effort, because the transaction was financed by CARIPLO which then flowed into Banca Intesa and "thanks" to the repayment of part of the amount paid (around 500 billion lire) following a recalculation of the balance sheet situation of the plants at the time of the acquisition.
Following the steel boom, the plant produced profits at the rate of 100 billion lire per month. In two years, the Riva group had repaid the largest steel mill in Europe and it became the number one for steel in Italy, quadrupling its turnover[184].
The choice that led to the construction of the steelworks close to the Tamburi district costed the demolition of dozens of farms and about 35,000 ancient olive trees. Taranto's economy was mainly based on fisheries and agriculture. In particular, olive production and the cultivation of mussels in the Small Sea were awarded the commendation of excellence throughout the national territory[185].

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181 *FMI estimates. Source http://it.adviseonly.com*
182 *Extract from the Taranto case study by M. Di Fabbio, p. 137 - Source: Taranto Chamber of Commerce, 2011; 2013.*
183 *In April 1995, under the Dini government, Ilva was sold to Rilp srl, controlled by the Riva Group (which held 57% of the shares) and other Italian and foreign entrepreneurs.*
184 *Source: STEEL PACT by Sabrina Giannini.*
185 *The mussel and oyster from Taranto, a true gastronomic preciousness, famous all over the world.*

The steel giant, among the many pollutants it spits, produces "dioxin", an intensely carcinogenic pollutant that can also modify and damage the DNA that parents transfer to their children.
Over the years, ILVA has caused pollution so serious as to induce the judiciary to open files not only on the plant itself but also on the bad policy that has allowed certain actions and productions.
In 2001 the European Commission took note of the serious dioxin problem and intervened with an information release for the European population.[186] The Italian national political and health authorities, however, did not accept the amendment to the total detriment of the citizens who in Taranto breathe 8.8% of the European industrial dioxin.[187]
Finally, in 2006 Italy transposed the Aarhus Protocol which sets the limit of dioxin emissions at 0.4 ng/m^3, however not including it within the environmental code and leaving the limit for emissions practically intact, 250 times higher than the legal one.
Reading the European and Italian databases set up to control emissions (EPER and INES) show the seriousness of the situation in which frightening data were highlighted: in Taranto, Ilva emitted over 90% of the inventoried Italian industrial dioxin. Following the disclosure of these data, the Apulia Region was obliged to start the first checks on emissions in the steel mill.
The checks, carried out by Arpa Puglia, were repeated in 2008 and provided a worsening picture with emissions of 172 grams of dioxin per year from the E312 chimney alone. Against the 166 grams of dioxin of all the chimneys of the industries in Austria, Spain, Sweden and Great Britain. [188]
Dioxin was found in Taranto in human blood, in breast milk, in cheese made from milk of sheep and goats that had grazed around the Ilva, in mussels, everywhere. The cultivation of mussels in the Mar Piccolo of Taranto is currently prohibited due to dioxin pollution and free breeding is prohibited in uncultivated areas within a radius of 20 kilometres from the industrial area.
The analyses commissioned by the Health Office of Taranto to the Zoo-prophylactic Institute of Teramo have fully confirmed the alarm of the environmental associations which in January 2010 observed contamination levels of 13.5 picograms of dioxin and polychlorinated biphenyls per gram of fresh weight (the legal limit is 8) with peaks which exceeded 18 picograms in the months of July and August.
The investigations of the judiciary and the health authorities had to acknowledge that a very important part of the sea of Taranto (the "first breast" of the Mar Piccolo) is seriously contaminated. The Agci Agrital technical office in Taranto, through targeted sampling actions, estimated in 2012 the damage generated by the death of mussels in about 11,445,000 euros, equivalent to about 22,890 tons of commercial-sized mussels.
The Region has also imposed a ban on free grazing in uncultivated areas to avoid dioxin contamination of other cattle and in the Tamburi neighbourhood, the closest to Ilva, children have been forbidden to play in the gardens.[189]
The underground situation is no less worrying. In the Belleli area, the groundwater is contaminated in a widespread manner by arsenic, nickel, selenium, total hydrocarbons, fluorides, sulphates and in punctual form by polycyclic aromatic hydrocarbons.
Last but not least, the analysis with which, as mentioned, as many as 35,000 centuries-old olive trees fell for the implantation of the steel giant. Based on CETRI-TIRES estimates, the discounted values and therefore the economic damage of the grubbing-up alone could approach the 200,000,000 euros (about 5,000 euros per plant) for the commercial value of the plants only, without considering (assuming an average of 10 l per plant) the loss of approximately 350,000 litres of extra virgin olive oil and therefore a commercial loss of product of approximately (considering the average of 6.00 euros per litre) 2,100,000 euros. These are the discounted costs for the construction of the ILVA area only.
Due to a wasted and denatured territory, the tourism sector also pays important consequences. The tourism sector could represent for the province of Taranto a considerable factor in relaunching the local economy, however the tourist concentration index [190] places Taranto in 98th place at the national level, penultimate place.
Taranto area contributes only 8% to arrivals for the Apulia region and the expenditure of tourists in 2014 has reached the lowest level in the last five years, reaching around 30 million euros.
In light of the above, it could be said that the costs of the reclamation of a city like Taranto, with entire areas of the sea, subsoil and soil contaminated by dioxin, PCB, heavy metals and assorted pollutants, could be covered simply by reconverting the war expenses in ecological clean-up costs.
There are many disputes by environmental movements (one of which reports: "Ilva costs us more than a war." ***In Afghanistan we lost 7-800 million euros per year. Ilva loses € 100 million per month. The budgetary break-even point for Ilva depends on the annual production of about 7 and a half million tons of steel. If they go below this production level, the plant is at a loss. Not to mention that since 2012 there is no public budget for the "colossus"***. It is evident that from an economic point of view there is no convenience in saving the plants. If workers were given wages by leaving them at home, we would lose

[186] *Source: http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=URISERV:l21280*
[187] *Eper European database.*
[188] *Source: Eper European register*
[189] *Each child breathes carcinogenic pollutants for the equivalent of 1000 cigarettes per year in the inhabited area closest to the Ilva. Source: http://www.mosaicodipace.it/mosaico/a/35069.html*
[190] *Measures the ratio between total annual arrivals and the population.*

around 60 million per month, less than what we lose to leave the factory open. The ongoing rescue operations are used to take time, keep the company alive and return the money to the first category creditors, that is the banks. All while the creditors of series B, the local businesses, and the creditors of series C, the inhabitants of Tamburi who have seen their houses economically and physically destroyed, remain dry-mouthed. And that's why they are protesting now. Rather than giving us some breath, Ilva is poisoning our lungs, not to mention all the economic consequences for the Apulia Region. A billion euro of health impact in 5 years that falls on the coffers of the Apulia Region". In other words, the famous slogan of those who oppose the closure of ILVA, "We will come and eat at your house" is paradoxically a reality. ILVA workers have been "eating" for years at the expense of taxpayers in the form of state subsidies (while I write, we have already reached the tenth "Save Ilva" decree).
Ilva's balance is increasingly in deficit with a daily production that will continue to drop from the current 17,000 to 14,000 tons. With these numbers, the break-even point is fixed at 8 million tons per year, which is now unattainable after closure of the blast furnace 5 for environmental damage. Currently the colossus could produce a maximum of 6 million tons with the three blast furnaces in operation Afo1, adjusted and rekindled for a few months, Afo2 seized and then confiscated by the magistrates after a fatal accident, and Afo4. The orders, however, row against and confirm a turn by the old customers towards foreign competitors, especially from Germany, [191] so as to accumulate according to Confindustria other 250 million euros of debt in recent months.

The costs of the epidemiological report

In L.D. 129/2012 the industrial area of Taranto has been recognised as an area in a situation of complex industrial crisis for the application of the provisions of art. 27 of the law decree 22nd June 2012 n. 83. To ensure the implementation of the interventions provided by the memorandum of understanding of 07/26/2012, an extraordinary commissioner has been appointed authorised to exercise the powers referred to in art. 13 of the law decree 25th March 1997 n.67, converted with modifications by the law 23rd May 1997 n. 135 as amended. Urgent situations such as the Taranto case led to a not always ordered and coordinated regulatory production.
According to epidemiological reports, emissions from the Ilva plant cause diseases and 90 deaths per year in the population of Taranto.
In the years from 2004 to 2010 an average of 83 deaths per year attributable to exceedances of fine dust in the air and 648 annual hospitalizations for cardio-respiratory causes have been calculated. The average death rate, however, rises to 91 if we consider the Tamburi and Borgo districts, geographically adjacent to the plant.
The black record for deaths and hospitalizations for chronic diseases lies with the Paolo VI district, built to house the new citizens of Taranto who moved from the countryside to the city to become workers. The higher percentage than the average speaks of deaths due to diseases of the respiratory system which are approximately 64% higher.
The worst condition is clearly that of the former workers of the steel plant. The analysis of workers who served at the steel plant from 1970 to 1990, showed mortality from tumour pathology (+ 11%), specifically from stomach (+ 107%), pleura (+ 71%), prostate (+50) and bladder (+ 69%) cancer. Among non-cancerous diseases, neurological (+ 64%) and heart (+ 14%) diseases were in excess. Workers with clerical positions presented excess mortality from pleural (+ 135%) and brain (+ 111%) cancers. The framework of compromise of the state of health of the workers of the steel plant is testified by the analysis of hospital admissions with excess admissions for cancer, cardiovascular and respiratory causes [192].
According to the Ministry of Health, the problem of PM10 in Taranto, albeit less than the PM10 pollution of many cities in Northern Italy, is determined by the type of pollutants that those fine dust convey.
The epidemiological report ends with a statement: "The continuous exposure to air pollutants emitted by the steel plant has caused and causes in the population degenerative phenomena of different apparatuses of the human organism that translate into disease and death events".

1.8 Analysis of revenues and profits

Before the acquisition of Ilva, the Riva group was a medium-large group with a consolidated net turnover of around 3,000 billion lire and a capital of just over 800 billion lire. In comparison, the company that the group was acquiring was much larger, with 5,340 billion in turnover, a net capital of 1,994 billion and greater production capacity. It is thanks to the acquisition of the public company that the Riva group becomes the first Italian producer of crude steel, one of the largest in Europe and the seventeenth in the world.

[191] *Federacciai data: in the first part of the year, an increase in steel imports to Italy + 4.2% for the EU imports; + 32% for extra EU imports.*
[192] *Source: epidemiological research by Annibale Biggeri, Maria Triassi and Francesco Forastiere.*

The data relating to turnover, added value and intermediate consumption, assert that Ilva represents approximately 8% of the entire national metallurgical sector[193] and that it participates in the production of national income to the extent of approximately 0.05%, i.e. over 750 million euros.
The trend of exports worsened compared to previous years: if in 2010 a positive value of 18% was reported, in the first months of 2013 exports recorded a percentage decrease of 67%, while imports decreased by 41%.
The trade balance is negative for 297,475,202 euros, the result of the difference between the value of imports, equal to 491,302,528 euros, and that of exports, equal to 193,827,326 euros[194].
Taranto plant therefore contributes 10.35% to intermediate production and 5.18% to the entire sector. These data lead us to conclude that the closure of Ilva would reveal a loss of GDP equal to 0.24%, (about 4 billion euros).
The number of employees in the province of Taranto goes from 166,000 in 2010 to 178,000 in 2012, resulting in an employment rate of 45.7% in the last year (compared to 42.5% in 2010).
In numerical terms, there were 169,582 people employed in the province of Taranto in 2013 and they dropped to 159,134 in 2014.[195]
As regards the economic sectors, the figure for those employed in agriculture remains mostly unchanged (about 10% of the employed), while the number of employees in the industrial sector in the strict sense is growing slightly. The sector which instead recorded a sharp drop of the employed, despite an increase in the active entrepreneurial base, is that of Construction, which, in 2012, lost almost 10% of the workforce compared to the previous year. The number of employees in the Services sector, which collects more than 60% of the provincial occupation, remains substantially unchanged[196].

Analysis of the work created

So Di Fabbio in the study on the path dependencies of Taranto in the chapter "The arrival of the steel industry": "The works for the construction of the Italsider were greeted with great enthusiasm by the entire local population: the thousands of workers in the military Arsenal and shipbuilding, unemployed following the renovations, would soon find work in the new plant.
"In the first five years of construction of the iron and steel industry, more than 15,000 workers were employed in construction companies, limiting, at least temporarily, emigration to foreign countries or Northern Italy.
When Italsider started production, in October 1961, about 6,000 workers were hired; four years later, when the integral cycle production of 3 million tons of steel per year began, Italsider already occupied an area of 6 million square metres. Gradually, numerous small and medium-sized enterprises began to gravitate around the steel mill, which existed on the market as a function of the services they provided to Italsider.
Between 1970 and 1973 the large ironworks employed about 20,000 workers while other 18,000 were hired for the expansion of the plants. At the beginning of the 1980s, the entire industrial complex (together with the other IRI companies connected to the local steel industry) employed about 40,000 people (Vico, 2007). Taranto, symbol of the southern industrial miracle, became the largest Italian manufacturing complex after the FIAT Mirafiori in Turin.
In 1971 almost 50% of the Taranto population worked in the industrial sector, while in the rest of Apulia, those employed in the same sector were only 18% of the active population. The increase in the economic well-being in the area underwent exponential growth: in 1956 the provincial per capita income corresponded to 64% of the national average (against the 57% of Apulia) while 15 years later it almost equalled the national average (against the 70% in the rest of Apulia) (Vico, 2007).
The economic boom will not last long. The steel sector follows a cyclical trend and is heavily affected by the change in demand (in turn dependent, for example, on factors such as investments in related sectors such as the automobile sector), while it is unable to adapt quickly to changes in the market."
The oil crisis of 1973 will produce a terrible downturn in the market and the entry of new competitors, especially from Asia, will lead the ECSC (European Coal and Steel Community) to assign the steel production quotas to European countries and will impose on them to withdraw participation from the steel companies. The global crisis in the sector, combined with indications from the European Community, led to a significant slowdown in production which consequently led to a dramatic increase in the local unemployment rate.
To all this must be added, in the specific case of Taranto, the enormous return unemployment caused by the end of the works for the so-called "doubling", ie the expansion of the steel plant. The plants - which above all from the 1980s onwards would have seen their top management engaged in long processes of structural rationalisation, technological innovations and management improvements - after reaching the maximum peak of employees in 1980 with almost 22,000 units and more than 10,000 in the external procurement, fifteen years later, at the time of privatisation, employed less than 12,000 people, and just over 3,000 more in the activities of the related industries.

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193 *The gross domestic product of the latter ' amounts to 0.59% of the total, that is, over 9.5 billion euros.*
194 *Taranto Chamber of Commerce, 2013.*
195 *Data processed by the regional study centre. Source: http://www.quotidianodipuglia.it/taranto/a_taranto_occupati_ai_minimi_storici_il_2014_anno_terribile/notizie/1268859.shtml*
196 *The labour market indicators published by Istat in 2012 show a substantial continuity compared to the data recorded in previous years.*

At the beginning of the 1990s, less than 13,000 workers were directly employed in Italsider resorting to a system that provided for early retirement, incentives, redundancy funds and mobility.
The repercussions on employment affected even more seriously the workers of small and medium-sized enterprises that gravitated around Italsider, as well as the young people who in that period appeared for the first time on the labour market. The unemployment rate touched 32% in 1992, while the regional average was around 14% and the national average around 8%.
Currently, the Ilva plant employs approximately 9,000 full time units and around 3,000 part time workers. In addition to direct employment, it is essential to also consider the related industries, here understood as a subsystem or a set of all direct and indirect inter-industrial relations. In other words, in this sense the armature includes Ilva, the companies that supply it with production inputs, those that in turn supply something to the latter, and so on.
Calculating the total work units, other 16,000 of the related industries must be added to the approximately 9,000 directly employed in Ilva.
The Wholesale sector is affected by about 2,200 units, excluding that of cars and motorcycles; over 1,600 in the land transport and pipeline transport sector; 1300 in Legal and accounting activities; head office activities; management consultancy; 1200 in the Investigation and surveillance services sector; building and landscape service activities; administrative and support activities for office functions and other business support services; over 1000 in the Manufacture of metal products industry, excluding machinery and equipment.
The closure of Ilva would lead to a loss of gross domestic product in the order of about 0.24%, a figure which corresponds, in terms of 2013 GDP, to almost 4 billion euros. As regards employment, the loss of jobs amounts to about 50,000 full time units, over 5 times the direct occupation of the Taranto plant.
Finally, we come to the trade balance. On the basis of the above estimate, intermediate imports (imports of production inputs by Italian companies) would increase by around € 2 billion 385 thousand. Exports, on the other hand, would decrease by just over one billion euros. On balance, therefore, a closure of the plant would lead to a deterioration of the trade balance of approximately € 3.5 billion [197].
On a total scale, in the last few years the number of employees in the province of Taranto has decreased by around 10,400 units (-6.2%), recording the worst performance at the regional level. About half of the residents of the province of Taranto in working age are inactive and the unemployment rate is confirmed as the highest in the whole of Apulia.

1.9 Analysis of the labour market - city of Taranto

Employment and lost economy - recent history

Each new economic model always involves a transformation of a social nature due to the introduction of new professional figures. In particular, the economy of Taranto has passed in a few decades from an occupational configuration mainly based on the professions related to high quality agricultural products based on solar energy, to an industrial type configuration based on fossil energy. This transition had significant aspects and social costs, briefly outlined in the previous paragraph with reference to the principle of "Path dependence" which conditioned social development based on precise economic choices according to the dynamics described by Adele Di Fabbio.
The structure of the world of jobs of the city of Taranto and of the entire Ionian arch in the years immediately following the second post-war period was in fact mainly based on the production and transformation of agricultural products (as in general for the rest of the Apulia Region), with prevalence of employed in the wine sector, in the olive sector, in pastoralism and in family-run zootechnics and in the production of fruit for meals, both citrus fruits (of which the particular geographical and climatic configuration allowed (and still allows) varieties considered particularly valuable on the market such as clementine, which are part of that "small fruit citrus" commercial category, characterised by some pomological characteristics such as the weight not exceeding 90-100 g, the ease of peeling and the absence of seeds, better known as seedlessness, character, however, conditioned by genetic and above all environmental aspects, such as being near to interfertile species, which can pollinate it). In this group, clementine, widespread mainly in the Mediterranean area, represented about 1/4 of the production of mandarin-like in the 1950s. The progenitor of many of the varieties available is the common Clementine, obtained as a probable hybrid between Havana mandarin and "Granito" bitter orange, observed in Misserghin (Algeria) by Friar Clemente in 1902, hence the name Clementine, although from studies of the University of Catania, it has been confirmed that it derives from a cross between Havana Mandarin and sweet Orange. The excellent organoleptic characteristics are associated with poor conservation on the plant with a depreciation of production, which limits the marketing period; those most cultivated in Taranto area directly or

[197] *Source: http://www.economiaepolitica.it/primo-piano/ilva-i-costi-della-chiusura-e-le-ragioni-per-nazionalizzarla/ - article by Nadia Garbellini - Roberto Polidori.*

indirectly derive from these varieties. It is calculated that this sector only created an important percentage of the occupation of Taranto and also in the province (in the areas of Massafra and Manduria).

The olive sector also had a strong "driving" function in the 1950s. Olive growing was the most practiced, as well as the most suitable, crop on ***light***, stony, superficial soils, persistent on calcarenite, even surfacing: the planting of an olive grove therefore constituted the most ecologically rational system for increasing the unit yields of the most ungrateful lands, so widespread in Taranto hinterland. Obviously where the lands allowed a greater deepening of the roots (as in the para-coastal plain of the western area up to Palagiano) the vigour of the plants increased, and with them their productivity.

The olive tree represented a safe source of income for families who lived on agriculture. A social configuration had developed around this production which would then be wiped out by industrialisation, which was based on the tenancy relationships granted to those involved in production and transformation. The production of the olive grove could in fact be rented together with the rest of the farm if it was part of it. This in consideration of the characteristic biennial production cycle of the plant, so that the multi-year duration of the contracts allowed to balance the oscillation of the yields; these were also related to the periodic pruning operations (one every 3 years), alternating with lighter annual ***cleaning***. More often, however, the management of the olive grove remained distinct from the rest of the company. Sometimes the owner preferred to manage (***in economy)*** all the phases, from cultivation to marketing, passing through the harvest of the olives, to their transport in the ***oil mill*** and to the subsequent transformation.

Another method was the company, in which an external associate (farmer or single entrepreneur or, in turn, in partnership with others) would cover all the costs of collection and transformation while the production was divided according to variable fractions depending on the contractual strength of the contracting parties: the associate received from half to a third or even less of the oil obtained.

A third method provided for the sale of the production on the tree, after complex stimulation operations carried out by two-part estimators, with the possibility of consulting a neutral third party. A variant of this (but it was the rule in the case of olive groves owned by pious places) the fixing of the value of the harvest was followed by public auctioning.

The picking of the olives was preceded by the sending of trusted messengers of the master to the hinterland countries to find the labour needed for the harvest and the work in the ***oil mill***; this was done by entering into contracts (the ***caparro***) in which the workers (***females and children*** for the collection, ***men*** for the ***milking*** of the olives from the trees, transporters) undertook to carry out the required work, after an advance on wages.

The presence, which lasted several months, of hundreds of people (as in large companies such as Masseria Accetta, Statte and la Felice), was a very important moment for the life of the whole community, as well as an opportunity for socialisation; workers generally came from the Murgia of Bari, an area that, mainly cultivated with cereals, offered a substantial surplus of manpower in the winter season.

Finally, the wine sector also contributed to the formation of income and an identifying social configuration, and this from immemorial time. In fact, the history of Primitivo is lost in the mists of time. Arrived in Apulia in all probability from the other side of the Adriatic at the hands of the Illyrians, people of the Balkan region dedicated to the cultivation of vines, began to be marketed throughout the Mediterranean by the ancient Phoenicians who frequented our coasts. And when subsequently the Greeks began to colonize southern Italy (VII century BC), spreading their black berried vines especially in Campania and Lucania, the Hellenic wine (precursor of Aglianico) however valuable, did not penetrate Apulia, a sign that black and strong wine already existed here. Proof is the fact that in Roman times the word "merum" was also used alongside the word "*vinum*" to indicate straightforward, sincere, pure wine as opposed to the first which indicated wine mixed with water, honey, resins and other additives to make it more syrupy. Well while the word " vinum " has entered all the Indo-European languages, the word "merum" has remained instead only in the Apulian dialects, where still today good wine is called " mjier " or " mieru ". What's the reason for this? Evidently the wine that was already made in Apulia was not " vinum", but "merum" in the sense of straightforward, pure, true; that is, good, fine wine. And this since ancient times, before the Romans and the Greeks, when the indigenous peoples perhaps used the lemma "mir" that in Illyrian (and still today in Albanian) means good, beautiful, well done to indicate their red wine. Primitivo can therefore be considered the most direct heir of the ancient "merum", the historical wine of Apulia par excellence, the one that first established itself and became famous in the surroundings of Taranto, where Horace compared the "mera tarantina" to the most famous of the Roman wines, the Falerno of Campania. Thus we arrive to the modern age. The first reliable historical documents on the spread of this extraordinary vine date back to the second half of the 1700s, when a churchman, Don Francesco Filippo Indellicati archpriest of the church of Gioia del Colle noticed that among the many vines that were used to grow in his vineyards, there was one that matured before the others and gave a particularly black, sweet, tasty grape that could be harvested already in late August. Indellicati selected that variety and planted a vineyard of that type; the first monoculture of "Primaticcio" was born which, thanks to its quantitative and qualitative qualities, soon spread to all the areas of Gioia del Colle, Altamura and Acquaviva delle Fonti. If in the Murge the Primitivo starts to shine with its own light, then it will be in the sunny lands of Salento and in particular in the surrounding areas of the Manduria

and Maruggio countryside that it will find a habitat particularly favourable to improving its qualities. From there the "primitive culture" developed, with wine varieties such as the negramaro, moved further south and the aleatico to the north east towards the Brindisi area and the offshoots of the Murge. The jobs guaranteed by the leading sectors of Taranto agriculture both in the city and in the rest of the province were stable and linked to quality products. It is estimated that 60% of household income came from this sector in the early 1950s.

In spite of all this, back in November 30, 1990, ILVA delivered the title of "high environmental risk" territory to the metropolitan area of Taranto.[198]

On a social level, the games were therefore already made when in the distant 30 November 1990 ILVA delivered to the metropolitan area of Taranto, the title of territory "with high environmental risk". [199]

When the impact resulting from the existence of a giant like ILVA does not bring development, well-being and prosperity to the community, there are clearly changes towards the decrease of the resident population. Taranto has witnessed the loss of 50,000 units in the past 25 years.

The available data show an initial well-being, dating back to the activation of the Italsider plant, which reached the peak of 21.785 employees in 1980, then stagnating in the long term, to count 11.796 employees in 1995, the year in which the Riva group took over the reins of the factory.

The employment situation of ILVA was no longer able to meet the needs of the territory as in the past, in 2006, in fact, the employment figure did not exceed 13,346 employees.

Of these 13,346 working units, directly salaried by the Riva group, only 34.16% (4,444) are resident in Taranto, a percentage that is too low compared to the entire population.

The year 2003, in fact, although it showed a large improvement in unemployment for Apulia, was not enough to eliminate the disparities between the provinces. The difference between the best value of Bari (12.1%) and the worst of Taranto (18.1%) has long been attested on 6 percentage points.

In conclusion, ILVA does not represent an important source of income for Taranto, as 65.84% of the amount of money it distributes to workers in the form of wages, circulates outside the borders of the city of the two seas.

In summary, it can be said that employment represents the only benefit that the steel industry provides to the city. However, quantifying the costs of these benefits is very complex. The macroeconomic surveys photograph Taranto, from a purely environmental point of view, penalised due to the negative externalities generated by industrial pollution. The cost of this negative image inevitably compromises the tourist opportunities in the area, which would guarantee an important economic source for the community.

At a microeconomic level, costs become much more accentuated rather than decreased. The malfunctions are counted starting from the mineral deposited on the laundry or cars, which force a monetary outlay in terms of water and energy consumption, (negligible in the short term but considerable in the long run multiplied by the number of inhabitants), to reflect on all terrains of breeders and farmers which result to contaminated. The negative investigation continues on the damage suffered by fishermen and on the regularly increasing costs for medical expenses.

ILVA is capable of harming the economy of the entire community.

In the past, the city had evolved economically thanks to the military apparatus, on which it was completely dependent. The large factories that Taranto had previously had, in fact, were the Military Arsenal, built by the State at the end of the 19th century and specialised in ship maintenance, and the Tosi shipyards, devoted to the construction of ships and born on the initiative of the entrepreneur from Legnano Franco Tosi immediately before the First World War.

After the Second World War the collapse of the productive structure of Taranto was uncontrollable, so much so as to witness an important crisis of the Military Arsenal: in those years 12,500 people were employed, 10,175 in 1949, 9,601 in 1953, 7,884 in 1953, 7,884 in 1957, 6,500 in 1960. The Tosi Shipyards also failed in 1960, the year in which they passed to the State Participations and the employees stood at 1.200, against the 3.600 in 1949 [200].

In 1951 Taranto still showed the supremacy of the tertiary sector, followed by agriculture and ultimately by the industrial sector. The city therefore welcomed the opportunity to host the VI Steel Centre as a providential opportunity for economic and social recovery given that from the first post-war period it was experiencing increasingly conspicuous conditions of misery, hunger and unemployment.

In the second post-war period an effort of productive reconversion from war production to civil production would have been necessary, but any suitable conditions did not arise for which the crisis that hit the territory was violent and uncontrollable.

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[198] *Deliberated by the Council of Ministers on the basis of law 305 of 1989, which in art. 6 states: "the territorial areas and any maritime stretches facing them characterised by serious alterations of the environmental balance in the water bodies, in the atmosphere or in the soil, and which pose a risk to the environment and the population".*

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[200] *Chamber of Commerce, Industry and Agriculture - Taranto (1974). Fifty years / Chamber of Commerce, Industry and Agriculture - Taranto. Economic and social conditions, 1923-1973. Taranto: Series of documents from the Chamber of Commerce, Industry and Agriculture.*

Therefore, the steel centre in a certain sense represented for Taranto a sort of miracle which, at social and environmental human prices (initially not declared or not valued) allowed the city to look to its future with greater serenity and optimism.
Just as some had foreseen the new industrial complex did not delay in producing beneficial effects on the territory, giving breath to the economy and per capita income following the increase in stable jobs (very high marginal costs) and Taranto knew moments of great well-being and began to develop in a chaotic and impressive way.
The steel market in fact, presented itself as an inexhaustible gold mine, so much so that it also occupied the workforce of the neighbouring regions such as Basilicata and Calabria.
In 1967, the master plan of the port of Taranto was drawn up by the civil engineering works of Bari and became one of the most important port facilities in Europe and the third in Italy after those of Genoa and Augusta.
If on the one hand the ferment of rebirth lightened the hearts of citizens, on the other the resolution of employment problems was combined with a powerful action that upset the morphology of the territory and contributed to the birth of a new "industrial monoculture".
Over 500 concession companies were engaged in the construction, maintenance and operation of the plants and 500 hectares of land were invaded by bulldozers and stripped of their identity. Centuries-old olive trees and farms of historical and cultural importance were cut down.
In terms of agricultural value, the area chosen for the establishment of the industrial centre was more valuable than the other areas initially analysed. In the area there were olive crops, vineyards and arable land, as well as the sources of the Tara river and the artesian aquifer.
In terms of sustainability a genotoxic damage occurred, inevitably on a collision course with the concept of sustainable development. According to studies and projections, future generations are more likely to get sick due to DNA modifications and therefore the 'improvements' are not compatible with the sustainability of a population.
In such a general framework we can assert that Taranto is a city that witnesses the progressive disappearance of its sustainable constituents. The current crisis shows that capitalism based exclusively on profits is no longer justifiable and shows the urgency of preparing new schemes that put people as protagonists again.

The employment productivity of the steel mill

Labour productivity detects the quantity of product obtained (output) with the use of a work unit (input) and therefore represents the indicator of the ability of a production system to generate wealth. The growth of the economy roughly matches the sum of the changes in productivity and employment.
To obtain an explanatory index, the estimated productivity of workers must be performed by dividing the quantity produced in a given period of time by the number of hours worked on the project in the same period.
As already stated in previous chapters, Ilva now represents a clearly loss-making production system.
According to the siderweb.com website, 2013 closed with a loss of over 60 million euros for the Riva Forni Elettrici group. The balance sheet data of two years ago appeared on "IlSole24Ore" reported a turnover of 3.7 billion euro compared to a production of 7.6 million for a total loss of 60 million. The data for the first quarter of 2014 signalled a turnaround with turnover increasing to 976 million, against a production of 2.162 million tons.
The data reported by the siderweb.com portal are even more specific: the group's sales revenues amounted to € 3,695 million. In particular, those of Riva Acciai Spa reached 743 million euros, with a decrease of 18.6% compared to 2012. Net operating income (Ebit) was negative for 46 million euros.[201]
The question is addressed by scholars of the opposing parties who try to assess the usefulness and potential of Ilva using the same data but reaching opposing positions.

The competitiveness of the steel market and China.

Federico Pirro, professor of History of Industry and History of Contemporary Publishing Industry at the University of Bari, member of the Scientific Committee of the Ilva Study Centre, argues that the great steel giant can be made fully environmentally sustainable.
But by analysing the data it is clear that the losses continue in any case. In fact, even admitting that the Taranto plant with the restart of blast furnace 1, returns to a production of 6 million tons of steel, trying to reduce the losses that currently show a

[201] *Source: http://www.inchiostroverde.it/lilva-viaggia-a-marcia-ridotta-bilancio-in-rosso-nel-2013-per-riva-forni-e-riva-acciai/*

negative Gross Operating Margin (EBITDA) [202] for the 2015 between 280 and 310 million [203] according to an article by Repubblica Bari, dated 6 October 2015, there would be anyway a net loss of between 40 and 50 million euros per month [204].
The final sentence for the ILVA would however be traveling on the terminals of the World Trade Organisation which classifies China as a "market economy" since 2016 which will lead to the assault on world markets through the practice of low prices. In fact, as recently announced, also in China **Baosteel**, one of the steel giants of the country, has announced that within two years it will definitively close 9.2 million tons of capacity. The cut is equivalent to the production of the golden times of the Ilva of Taranto and a quarter of the current output of the Chinese group. [205]
We present below the extract of an article by astrophysicist Erasmo Venosi which contains interesting data about the current situation. [206]
Ilva ended 2015 with 450 million losses and overall production in further contraction: from 5.5 million tons to 4.8 million tons per year. To balance production costs, 7.5 million tonnes per year would instead be needed.
The blast furnaces in operation have a production capacity of 6 million tons therefore the production of cost balance would be possible only with the reopening of blast furnace 5, the largest in Europe. However, the problem remains caged in the absence of orders.
Steel imports in Italy are indicative of a sector that is now collapsing. 32% more was imported from non-EU countries and 4.2% from EU countries. Ilva has also been excluded from the supply of steel for the TAP (Trans Adriatic Pipeline) which brings natural gas from the Caspian Sea through Greece, Albania and landing in Lecce.
China manages to saturate production capacity and, thanks to state subsidies, practices selling prices lower than production costs. In addition to the steel sector, it must be said that entire European industrial sectors could face serious difficulties, but Ilva could collapse definitively following a series of complications including liquidity crisis, absence of orders, costs of the Hague prescriptions, need to modify the production cycle, which would prevent reaching the aforementioned break-even point.
By breaking down and summarising data in the public domain, Ilva would reach BEP with the production of 7.5 million tons per year, that is 625,000 tons per month and about 20,800 per day. In reality it produces (data as of 2015), about 4.8 million tons per year, that is, 400,000 tons per month and about 13,300 per day.
These productions employ 11.331 direct workers[207] who earn a net of about 1,300 euros per month (excluding social security and pensions) [208].
The monthly cost of salaries alone amounts to approximately 14.730.000 euros (11.331 employees x 1.300 euros net), that is approximately 176.5 million euros (excluding any 14th monthly payments and insurance and social security charges).
According to the judges of the Bankruptcy Court of Milan, the overall exposure of the steel company admitted to the extraordinary administration amounts to 2.91 billion euros. If a liquidation of 150 thousand euros had been guaranteed to each worker and the factory closed, the debt of Ilva would have been lower!
From the indexes shown it is clear that the average daily productivity per worker, combined with overheads, is absolutely insufficient to cover costs and leads to the logical conclusion that keeping it in operation costs more than wisely closing its doors.[209]

1.10 Potential conversion developments and projections by 2020 and 2050

The territories hosting large industrial giants suffer a negative image as they are associated with places of suffering, polluted, marked by urban and social marginalisation, and very often a synthesis of suburbs and urban degradation concomitant with poor working conditions. When an industrial activity is decommissioned, in whole or in part, it still occupies an important area of territory, defacing it with the residues of its activity.
Not always implementing a process of "reclamation", understood as definitive eradication of what has been, reflects the right thing to do. There are cases in which the so-called reconversion allows the conservation of the industrial heritage by finding important environmental and social enhancement solutions for a given territory.
Malena Karlsson of Glashusett, the environmental information centre in the Hammarby Sjostad district of Stockholm, believes

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202 *Profitability indicator that highlights the income of a company based on its characteristic management, without considering interests (financial management), taxes (tax management), depreciation of assets and depreciation.*
203 *affected by works envisaged by The Hague to make the area environmental-friendly for an amount of 114 million with the employing of about 700 employees. Source: http://formiche.net/2015/09/05/cosa-sta-accadendo-allilva-taranto/*
204 *Source: http://bari.repubblica.it/cronaca/2015/10/06/news/ilva-124477013/*
205 *http://www.ilsole24ore.com/art/finanza-e-mercati/2016-07-12/acciaio-cina-baosteel-chiude-impianti-pari-all-ilva-taranto-214621.shtml?uuid=ADvBBir*
206 *Source: http://www.cosmopolismedia.it/categoria/19-ambiente/9411-e-finita-per-l-ilva.html*
207 *Source: http://formiche.net/2015/09/05/cosa-sta-accadendo-allilva-taranto/*
208 *Source: http://www.ilsole24ore.com/art/notizie/2012-09-26/ilva-taranto-121135.shtml?uuid=Abt2ntjG*
209 *Source: http://www.ilfattoquotidiano.it/2014/12/11/ilva-voragine-bancaria-1-miliardo-450-milioni-euro/1262388/*

that remediation is worthwhile. According to her vision, nature always manages to establish itself if man gives it a hand with the use of artificial techniques. [210]
as Liliana Cori and Fabrizio Bianchi write, those that represent "costs" in the beginning are actually "investments" in healthy terms that turn into gains when accounting for diseases and deaths saved both as a health system and at a social level. [211]
There are essentially two systems to assess costs and benefits: Human Capital Approach and Willigness to Pay approach. The human capital approach assigns a monetary value to a health outcome by quantifying the tangible costs (drugs, lost working days etc.) associated with it. Although more practical, this approach provides an underestimation of the real cost as it does not include the intangible costs associated with a pathology such as fear or pain, which are not negligible in particular types of illness.
The Willingness to Pay approach, on the other hand, offers much more realistic estimates of the potential health benefit deriving from a clean-up policy. One of the most used methods concerns the compilation of questionnaires in which the willingness to pay of individuals emerges in exchange for a real decrease in health risk. According to some estimates, the net benefit for example, at the Gela site, amounts to around 6.6 billion euros. [212]
The slowness and uncertainty of environmental remediation in Italy led to the lack of training courses in secondary schools which led to the creation of new suitable professional profiles. The government has recently intervened in an attempt to fill this gap. Art. 4, paragraph 11, of L. D. 145/2013 in fact provided for the adoption of measures aimed at encouraging the training for new skills.

Redevelopment of industrial areas as a development factor

In Europe, the reuse of industrial areas began in the 1960s, adopting three types of actions such as renewal, recovery and revitalisation.
However, the culture of industrial heritage is recognised around twenty years later as a cultural value to be preserved and promoted. The large industrial areas, in fact, benefit from a strategic location that allows most of the time excellent accessibility as they are located near motorway exits, railway systems and large urban spaces that would allow cities to constitute an important opportunity for redesigning of the local urban fabric.
Industrial reuse, therefore, consists of a real conversion of areas and buildings devoid of the life for which they were designed, to give them a new functionality.
Redeveloping an abandoned industrial area means looking towards a functional and social, but also economic, recovery. The same structures that once produced income can be transformed into auditoriums, theatres, congress halls, restaurants, reception structures and much more.
In Italy, the Italian Association for Industrial Archaeological Heritage[213] promotes and spreads awareness of the historical and cultural value of Italy's industrial archaeological heritage.
There are many examples at a global level, but also in Italy, of industrial structures subject to major redevelopments, transformed into museums, exhibition centres, study centres, shopping centres.
Those who were the tireless engines of urban civilisation, factories, warehouses, ports, have become the vibrant hearts of culture, entertainment, so much so that in the urban fabric there is no more distinction between historically residential and once industrial areas.
Important examples recall the Orsay Museum in Paris, a former railway station which has housed a museum of Impressionism since the 1980s.
A sensational model, where industrial archaeology has become places of aggregation and cultural exchange, is certainly that of the Ruhr basin.
Located in North Rhine, it was the area and engine of the German economic miracle, so much so that after the First World War it became the "security" of the economic debts of the German defeat.
When, in the 1970s, with the coal crisis, mining was progressively abandoned, the highest percentage of industrial and mining brownfield sites was recorded in eastern Germany. The area that managed to inherit the highest chimney, the deepest mine, the most specialised steel mill, after the divestment was home to alcoholism, drugs, depression, cured over a period of twenty years.
Today the Ruhr area has become a polycentric metropolis with 200 hectares of surface transformed into a multifunctional park that represents the combination of industrial and cultural heritage. The transformation resulted in 10,000 new jobs, 1,000 industrial monuments recovered, 120 new theatres.
Another virtuous example is represented by the city of Manchester, in the Castelfield area, where a network of canals allowed the transportation of the goods produced.

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210 *Cfr. http://www.youtube.com/watch?v=qhby1cg2YLQ*
211 *L. Cori – F. Bianchi, "Remediation is convenient, the first cost / benefit analyses ", in Ecoscienza, n. 6, 2012.*
212 *Cfr. http://gazzettaeconomica.it/BONIFICARE_CONVIENE_PER_AMBIENTE_SALUTE_ED_ECONOMIA--ida_81085995.html*
213 *AIPAI*

Today the whole area has been converted into the new stage of urban life by creating a university campus where 5,500 students live, an important concert hall and numerous museums. The port area has been completely transformed into Lowry, a massive entertainment complex, a meeting point for residents.
In Northern Europe cities like Norrköpping and Tampere have risen from the black powders from which they were covered. Furthermore, Tampere represents a beautiful example of how public and private can interact and create new governance models.
In Bilbao, one of the engines of the Spanish economy was born from the polluted waters of the Nervion River, with development rates around 6% per year. The Guggenheim museum, born in 1997, attracts millions of visitors every year and Metz is also basing its rebirth on the same wavelength as the Basque city.
Based on some Istat data, it appears that in the Italian peninsula 3% of the entire territory is occupied by abandoned industrial areas that are often polluting and with high health risks. In many cases, major restoration works have been prepared to demonstrate that it is possible for Italy to redesign its own territory. There are virtuous cases of areas returned to nature and society, which from quarries, landfills, swamps, military or industrial sites have been transformed into naturalistic oases, agricultural parks, gathering places, social services offices. It goes from Lombardy, with the oasis of Foppe di Trezzo (once a clay quarry and today a naturalistic area and a migratory stage for many species of birds) to Forte Marghera in Veneto (once a military site, today it is a public park with numerous historic buildings and headquarters of various associations, as well as catering activities focused on local and organic production).
In the historic centre of Rome, the former slaughterhouse inactive since the 1970s now houses the City of the Other Economy, the MACRO contemporary art museum, the Faculty of Architecture of Roma Tre and a social centre. Finally, in Campania, in Naples, the "Lo Spicchio" park, where waste was previously abandoned and illegal activities took place, became an urban space and home to educational workshops.
Museums have sprung up in the former sulphur mines of Perticara Nuovafeltria.
The City of Science located on the foundations of an old chemical industry in Bagnoli, created by the physicist Vittorio Silvestrini, is the first example of a perfectly successful conversion, and houses one of the largest and most innovative interactive museums in Europe.
In Catania there is an example of successful conservation of the industrial heritage: "Le Ciminiere" exhibition centre. The multifunctional complex was obtained from the recovery of part of the buildings in disuse from the post-war period which constituted the large industrial complex for refining the sulphur extracted from the mines of the Sicilian hinterland.
Another important model is represented by the Lingotto of Turin. In this case we are talking about the historic production plant of FIAT, which has now become a large multifunctional centre, renovated by architect Renzo Piano. In the same city, theatres and video stores have filled the void left by tram factories, distilleries and factories of the Officine Grandi Magazzini.
The region that most enhances this type of intervention, in Italy, is Lombardy thanks to the many abandoned buildings. In Rho, just outside Milan, the old Cotonificio Muggiani was renovated in the late nineties and now houses a supermarket and a Holiday Inn hotel. Pirelli buildings in Milan now house the Bicocca University.
Along the Naviglio della Martesana, in the north-east area of the city of Milan, the former Ovomaltina factory has become a furniture and design store under the "Cargo" brand. The renovation of the factory was designed by the architect Mauro Bacchini, who has kept the original structure of the buildings unchanged.
In the province of Varese many of the mills that were often converted into hydroelectric power plants in the midst of the industrial boom have also been used for private homes.
The projections for 2020 and 2050 could be completely rosy thinking of the too many buildings that despite being part of the Italian industrial heritage are in a state of total abandonment.
We list some data below. [214]

- Only a quarter of the planet is in its natural state.
- 33 hectares of land are invaded by cement every year in Italy alone.
- There are 700,000 industrial warehouses (many of which were built more than for actual needs, to benefit from the tax relief from the 2001 "Tremonti bis" law).
- There are 5 million second homes in most cases uninhabited out of a total of 29 million homes.
- In the city of Milan alone there are 880,000 vacant offices.
- There are almost 7000 km of obsolete railway lines (5535 km of closed lines, 502 km of unfinished stretches and 940 km of lines with varied stretch), not to mention the invaluable range of areas and buildings of military property. In Sardinia alone they amount to 144,000 hectares for a built area of 467.000 square metres. [215]

The redevelopment and exploitation of these large disused industrial areas and structures, with projections supported by appropriate policies, would also be supported by WWF Italy.

[214] *Source: http://www.chefuturo.it/2012/09/come-recuperare-gli-edifici-abbandonati-e-magari-darli-a-una-startup/*
[215] *Source: WWF Italy.*

The organization has launched a large campaign _ that wants to trigger a cultural and social movement capable of starting a great process of recovery of the Italian territory.
The objectives concern the reduction of land consumption and at the same time, allow local communities to regain possession of their territory, rebuild the space in which they live with spontaneous initiatives born from below.
Conversion however requires investment, the only engine capable of creating new potential in the economic sphere.
Indeed, they can generate direct, indirect, induced employment.
Direct employment is the immediate result of spending through, for example, hiring (or failing to lay off) technicians.
Indirect employees are created by companies active in the sector which, through an increase in the demand for supplies, stimulate turnover and employment in the upstream sectors.
Finally, the induced effect is generated by the higher consumption made possible by the increase in income and by the mandatory higher operational demand at all levels.
More precisely, the employment impact resulting from the study conducted is calculated as the product of three factors:
(1) average labour productivity (measure of labour savings induced by factors of technological deepening);
(2) the expansion capacity of the induced demand (or multiplier) which is linked, given the propensity to consume, to the trend of the work share on the product;
(3) the volume in real terms of an exogenous demand activated through investment sources.

Conversion criteria

Since the mid-nineties, through a new generation of regional laws, a new model of local urban plan has hardly made its way, focusing on the theme of the integration between urban planning and ecology. The main spin-offs want to answer three major axioms such as:
the need to exclude new forms of urban expansion, in the face of the emergence of the soil as a finite resource and irreproducible public good;
ensure ecological and environmental compatibility with the choices relating to the settlement and infrastructural system;
apply principles of environmental regeneration to all urban transformations, with specific rules of compatibility, mitigation and compensation.
In a general context with these premises there are good reasons to consider abandoned industrial urban areas as decisive places for the future of Italian cities.
The criteria to be used certainly refer to the reduction of soil waste, the enhancement of environmental standards, the strengthening of urban ecological models.
Reducing and tackling soil waste must become a primary concern for governments. Following virtuous European examples must also be a stimulus for the realities less attentive to these dynamics. Germany, as usual attentive to these issues, has set itself the quantitative goal of reducing current land consumption by 75% by 2020.
The United Kingdom has implemented a series of actions ranging from the creation of green areas to the priority recovery of fields, to the adoption of minimum density limits for areas of new urban growth. In Italy, agricultural soils are urbanized at a disarming rate, for example 10 hectares per day in Lombardy, almost 9 in Emilia-Romagna. [216]

Industrialisation, urbanisation, public health.

The metropolisation processes pose a series of questions, connected first of all to the loss and / or degradation of agricultural surfaces, biodiversity, landscape quality, the deconstruction of the urban air, with increasingly significant repercussions on social, environmental and economic sustainability of our cities.
Our cities do not breathe due to air pollution, and the ever-increasing insufficiency of public green spaces, vegetation equipment, soil permeability, ecological urban networks and environmental corridors.
The care of open spaces and vegetation is the necessary prerequisite for the regeneration of the three main environmental factors (air, water, soil), essential for the proper functioning of the city ecosystem.
Reconverting abandoned areas allows the reuse of precious areas that are often found in the heart of urban fabrics and promotes the cascade of virtuous processes of revitalization and redevelopment of neighbouring urban contexts.
There is also the industrial reconversion by which we mean a process that allows companies to enter higher demand production sectors, compared to the one they already operate in, through the introduction of new plants or the transformation of existing ones.
The aim is to be able to produce goods or services different from those previously produced or supplied.
The main reasons that push companies to adopt an industrial reconversion policy are:

[216] *About this, see the First National Observatory Report on Soil Consumption, Maggioli Editore, Rimini 2009.*

- the desire to decentralize some large production units into smaller units, to obtain greater job mobility and mitigate conflict;
- the technical progress associated with the action of the competition, which renders both the production techniques and the production itself obsolete.

The transition cannot fail to include objective occupational and health analyses.
Legislative Decree no. 152/2006 identifies the areas to be included among the "remediation sites of national interest" (SIN) on the basis of health, environmental and social criteria.
An Italian dossier of the ASud [217] association highlights how Balangero, Emarese, Casale Monferrato, Broni, Bari-Fibronit and Biancavilla, for example, have been included in the SIN due to asbestos contamination. To these are added six other sites, including Pitelli, Massa Carrara, Priolo and the Vesuvian coast area, where, in addition to asbestos, there are other polluting factors. 416 cases of malignant pleural tumour in excess of expectations were observed in the range of SIN contaminated with asbestos in the period 1995-2002.
Furthermore, in the SIN of Gela, Porto Torres, Taranto and in the Sulcis-Iglesiente-Guspinese, the connection between increases in mortality from lung cancer and respiratory diseases and emissions from refineries, petrochemical centres and metallurgical plants is not excluded.
If we consider the causes related to environmental exposures, in all the SIN, there are 2,439 deaths in excess of expectations for men and 1,069 for women.
These are the results of the SENTIERI (PATH) study on mortality in 44 sites of national interest for remediation (SIN), large active or abandoned industrial centres and areas subject to the disposal of industrial and / or hazardous waste included in the "National remediation program".
Last December, the government issued decree no. 145/2013: the "Italian Destination Plan", currently being converted into law.
Art. 4 paragraph 1, specifies the title "Measures to encourage site remediation and it is stated that the Ministry of the environment and that of Economic Development can enter into program agreements with one or more owners of contaminated areas or other interested parties to implement integrated safety and remediation projects, as well as industrial conversion and economic production development in the SIN; the stated aim is to promote the reuse of these sites in health and environmental safety conditions.
For established practice, the fundamental conversion criteria include:

- Lighting: the first objective is to respond to the European directive, guaranteeing improved performance and maximising the use of natural lighting, both direct and diffused, in addition to the supply of photovoltaic panels for the production of "clean" electricity.
- Heating: minimising the expenses related to the radiator system and making the most of the configuration of the existing structure, the so-called "solar wall" can be created, a particular green technological system that allows to accumulate external heat and transfer it to indoor environments.
- Green areas: the insertion of green areas allows the elimination of the boundaries between the artificial and the natural, becoming a visual and human refreshment point.
- Water resources: as regards water resources, a series of measures are adopted to limit waste: the recovery of rainwater, setting up an accumulation system, and the adoption of the rain irrigation system for the urban garden. This irrigation system allows to reduce waste, as it makes it possible to direct the water directly to the base of the plants, and, at the same time, to avoid the problem of root rot. The irrigation system will use the cistern already present to collect rainwater to limit the use of water with the addition of chlorine, which in excessive doses proves to be harmful to plants.
- Ventilation: good ventilation is essential for achieving thermo-hygrometric well-being, so it is important to manage the opening / closing devices inside the building, ensuring frequent air changes and avoiding overheating in the summer months.
- Reuse and recovery of any material that can be reinserted within the company structure

Use of innovative materials
The concrete tiles, for example, used in place of the classic brick tiles, offer significant benefits in terms of environmental impact, guaranteeing an aesthetic result very similar to what you would have if using the classic tiles.[218]
Other material to be used is eco-polystyrene, replacing the more common polystyrene, a derivative of oil, is a product synthesised in a completely natural way from agricultural waste (seed skins or plant stems). When they come into contact with the mycelium, a mushroom, a chemical reaction begins that, in a week, transforms them into a material with characteristics similar to polystyrene but totally green!

[217] *Article of 16 February 2014 - by the editorial staff.*
[218] *Tests show that with their use there is energy savings, less CO_2 emissions and their reabsorption in a short time, less production of fine particles and significantly reduced acidification and eutrophication potentials.*

However, it should not be underestimated that, according to the Consolidated Environmental Text, art. 240, the safety interventions differ according to the degree of pollution of the area, that the safety and remediation are two distinct things and that the interventions to be carried out are different, based on the degree of pollution.
The protection of fundamental interests such as that of the health of the resident communities depends on these interventions and guaranteeing growth in this direction is a fundamental task of the authorities.

Conversion of SMEs, starting from the analysis of sectors in crisis and growing sectors

Creating new jobs in the sectors less affected by the crisis remains one of the main objectives of any government.
Renewable energy is one of the sectors that, if properly regulated, could have an anti-cyclical function and create jobs for young technicians and professionals.
With the necessary support, ways and forms should be identified to create hiring quotas for young people with contracts such as training and work, apprenticeships or new legal forms still to be studied. These quotas should be modulated according to the technologies and the intensity of their incentives and efficiency.
All this is also based on a complex study with technical, legal and political aspects, also taking into account the European recommendations on sustainability, energy and competitiveness of the economy. Community policies, in fact, recognise the production of renewable energy as a new income opportunity for businesses and citizens, providing that a percentage of these can become energy, either individually or in association in the territorial energy districts, and even sell energy on the market.
The future of European SMEs is green! The Brussels target is to increase the 20 million workers already registered in this sector at the end of 2013[219].
The trend demonstrates substantial progress in this area compared to previous years with a greater exploitation of the potential of small and medium-sized industries[220]. Their conversion towards greater resource efficiency is therefore one of the objectives to be achieved in order to exit the economic crisis, stimulating new internal demand, exports and jobs.
New jobs, efficient resources and increasingly sustainable markets. The axes of development of the productive activities move in these three main directions. The preferred sectors are primarily efficiency and energy saving, and the reduction of waste after using materials. Low water consumption follows immediately after.
Of the 20 million jobs created in the past two years, 3 million are concentrated in the so-called "eco-industries", engaged in the control of CO_2 emissions, renewables and the recycling of raw materials[221].
Unfortunately, there are still too many bureaucratic and regulatory problems and the lack of adequate technological knowledge, that's why the European Union has just launched a 31.5 million euro call for proposals to help SMEs in creating innovative solutions in the sectors of recycling of materials, sustainable construction, food, water and green business.
The considerations just made allow the dynamics of the already existing companies in crisis to fit together. In fact, crafts, construction companies and trade represent sectors that pay a heavy price for the difficult unfavourable economic situation.
Figures make the described condition particularly alarming. "Almost half of the unemployed have been unemployed for over a year." Almost a quarter of Europeans under 25 looking for work don't find it. In Italy and Portugal, over a third of those under the age of 25 are unemployed and in Spain and Greece more than half »[222].
The aims are, therefore, to spread an "energetic-environmental" culture, raising awareness among technicians who carry out professional support and consultancy activities in the sector, on issues relating to energy scenarios and on current and future operational possibilities: energy saving, the production of diffused energy, all with a view to promoting and enabling the creation of sustainable supply chains from an environmental and economic point of view.
From the T.R.I. support, we will be able to ultimately enjoy:
New professions
Conversion of traditional professional figures now "decadent" or coming from sectors in crisis.

Induced development

In particular, the sectors concerned are:

1. **Energy Efficiency**
    - Improving the efficiency of old buildings
    - Energy Restructuring
    - Solar cooling of tourist plants
    - other

[219] *Eurobarometer: 93% of companies are making green investments.*
[220] *99% of the productive subjects in Europe in the green economy.*
[221] *63% of those who invested in this sector did so to cope with the economic crisis and to reduce costs related to energy and materials. 28% consider environmental protection a priority within their production chain. 67% of European SMEs had no additional costs or decreased them after recovering the investment.*
[222] *Christine Lagarde, Operating Director of the International Monetary Fund.*

2. **Distributed Renewables**
    - Thermal solar
    - Community vertical mini wind
    - Industrial photovoltaic (sheds)
    - heat pumps and low enthalpy geothermal energy
3. **Decarbonisation of agriculture**
    - Photovoltaic Irrigation
    - Solar Refrigeration
    - Hydrogen / Electric Movement Means
    - Anaerobic Short Supply Chain Biodigesters
    - other
4. **Positive energy buildings**
5. **Hydrogen and Energy Storage Systems**
6. **Smart Grid and Energy Internet**
7. **Zero emissions transports**
8. **Circular Economy**
    - Banks of reuse
    - Circuits of short chain recycling
    - Second life shops
    - repair workshops
    - other
9. **Re-operation of the economy**
    - Industrial reconversion
    - 3D manufacture
    - Internet of things Infrastructure
    - Tourist Objects
    - Industrial Components
    - Scheduled Obsolescence Repairs
    - Building fixtures and components
    - Other
10. **Agriculture Promotion**
    - Short Chain Promotion
    - Farmer market
    - G.A.S.
    - Last minute market
    - Food parade
    - local processing of products
    - Other
11. **Tourism Promotion**
    - Deseasonalisation
    - Products Academies
    - Garden therapies

According to Rifkin's analysis, in the knowledge sector as well as in the entertainment sector, the capitalist market is about to experience marginal labour costs close to zero as the internet of things represents a centre that on the one hand destroys job and on the other creates it! In the long term, we will see a small workforce destined mainly for technical supervision figures, while in the short and medium term there will be the last large wave of paid workforce which according to the scholar will last approximately 40 years.
The transformation of the world energy regime from a framework based on fossil fuels and nuclear energy to a scenario dominated by renewable energies will require a substantial contribution of work, with the commitment of millions of employees and the creation of thousands of new businesses.
Modernising and converting hundreds of millions of existing buildings into green micro-power plants and building millions more from scratch will require tens of millions of workers and will open up new business opportunities for energy-saving

companies (esco), small green building companies and ecological equipment. The need to install hydrogen systems and other storage systems capable of managing the flow of green electricity in the entire economic infrastructure will also have massive employment spill-overs, with the birth of as many new businesses. The transformation of the global electricity system into an energy Internet will generate millions of jobs in the field of installations and will create thousands of start-ups for clean-web applications. And finally, reconfiguring the transport sector from internal combustion engines to vehicles powered by an electric motor or fuel cells will require the reorganisation of national road systems and refuelling infrastructures. Installing millions of refuelling points for electric vehicles along the roads and in each car park is an operation that requires a lot of manpower with the related employment implications.[223]

Social capital and sharing economy

The need to encourage the building of solidarity networks and the regeneration of bonds towards responsibility and trust increases the resources present in the family that can be transferred to the community by promoting a sense of active citizenship. Social generativity is the sociological branch that is combined with the principle of subsidiarity, that is, with the right of subjects close to the needs of people and the contexts in which these needs occur, to intervene in responding to these needs.
Therefore the social capital is the set of intangible resources that allow the social actor to achieve objectives that he/she could not achieve alone. This concept is indisputably characterised by fundamental characteristics such as:

- exchange
- reciprocity
- confidence
- trust

Social capital generates social support and social support affects the functioning capacity of citizens in terms of improving their well-being and welfare systems.
There are various forms of social capital although they share the same indicators of trust and reciprocity:

- FAMILY SOCIAL CAPITAL:
  Cohabiting relatives
- SOCIAL CAPITAL OF KINSHIP:
  Non cohabiting relatives
- ENLARGED COMMUNITY SOCIAL CAPITAL:
  Friends, neighbourhood and work colleagues
- MEMBERSHIP CAPITAL:
  Relations in third sector associations
- GENERAL SOCIAL CAPITAL

The functions of social capital are those of making a network of various actors more cohesive and acting as a bridge inside and outside of them.
So for the growth of the social capital, as can be seen, a system also called a "network" is needed, understood as a set of points connected by lines and a fabric of contacts and relationships in which people find themselves included.
The network becomes a metaphor that expresses and refers to systems of circulation, communication, connection to social reality as a dynamic interweaving of relationships that mutually condition each other in a process of continuous negotiations.
In fact, in the environment there are potential resources useful for development and the networks constitute functional ecological niches by facilitating the crossings between requests and offers (social exchanges).
The bonds in turn can be strong or weak and related to the past or future. They are not static and refer to the exchange of information, problem solving, knowledge / skills, trust, access.
A new economic model that has been quietly emerging for some years speaks of 'sharing economy'. Thanks to technologies, the network and above all to a change in the philosophy of the younger generations who increasingly show an attention to sustainable growth models focused on reuse and a better allocation of resources, goods and knowledge, the sharing economy is more and more spreading.

"Sharing economy" and social capital

Defined by most as the new economy capable of responding to the challenges of the crisis and of promoting more aware forms of consumption based on reuse instead of purchasing and access rather than ownership.

[223] *Taken from page 380 of "The zero marginal cost society" by J. Rifkin.*

The sharing economy in Italy has around 250 online collaborative platforms underway.[224]
As often happens to phenomena that enjoy sudden success, very different practices often fall under the same phenomenon. The first is sharing, the common use of a resource understood as a profile distinct from traditional forms of reciprocity, redistribution and exchange. The second is the peer-to-peer relationship in which sharing takes place between people (or organisations), on a horizontal level and outside of professional logic.
The third one is the presence of a technological platform that supports digital relationships, where social distance is more relevant than geographical distance and trust is conveyed through forms of "digital reputation".
The object of sharing is closely linked to this: physical goods (means of transport, from bicycles to cars, to boats and trucks, but also clothes, accessories, telephones, etc.) or digital products (books, films, songs, shows) , spaces (houses and workplaces / co working), time / skills, ideas and money.
Time follows: shared use can be contemporary (e.g. I share my home with another person) or deferred (I leave my home temporarily to another person). Ownership is the most ambiguous criterion: the asset being shared can remain with the owner (e.g. I offer hospitality to a stranger), change ownership (exchange my bag for a pair of earrings) or be owned by a third party with respect to the peer network (e.g. car manufacturers and public administrations offering car sharing services).
Finally, the value of shared goods and services can be determined in cash or through complementary credits/ currencies or, again, fall within the context of a gift relationship (such as in couchsurfing). The price may take into consideration elements often excluded from the exchange logic, such as the polluting impact of an unused object.
The growth of the sharing economy is raising interesting questions. First of all, one may wonder how much this model is linked to the crisis or responds to a more structural rethinking of the relationship between economy and society. One of the most heated debates concerns the relationship between the destruction of value in traditional sectors and the creation of new value: the area in which this ambivalence is becoming more evident is that of hospitality services (such as Airbnb), which are creating difficulties in the hotel sector, while positively affecting cultural consumption and catering. A possible way out could be forms of partnership between traditional companies and collaborative platforms; in Italy we are witnessing the first experiments with Barilla-Gnammo and Adidas-Fubles.
Last but not least, the sharing economy is posing unprecedented challenges to the regulatory system. The old rules often do not apply to new social and economic dynamics and risk suffocating social and market innovations. Numerous initiatives have been taken at the local level to resolve the issues raised by the sharing economy in the individual sectors, while the request for broader interventions is beginning to be felt. It is on this terrain that the strength of what calls itself the "movement" of the sharing economy will be measured.
If the sharing economy is unlikely to replace traditional models, as advocated by some of its supporters, resource sharing platforms can be expected to respond to hitherto latent needs and desires in the coming months and, perhaps more interestingly, encourage the innovation of existing models, both profit and non-profit. It is therefore important to open discussion tables, which also involve the public administration, to enhance the opportunities offered by this perspective. [225]
In addition to sharing in the strict sense, bartering, understood as bartering between individuals (swapping) or between companies, with a view to direct or indirect reciprocity and crowding, when more people contribute to the creation of a good or a service, through creative (crowdsourcing) or financial (crowdfunding) resources, can be linked to this system.
Crowdfunding, in particular, is a phenomenon that has spread in recent years but which has roots much more deeply rooted in time. The term used can be reinterpreted in terms of "fundraising" in the digital age. It encompasses notions of crowd and funding, and the main reasons for its rapid diffusion are to be found in the global geopolitical situation and in the growing diffusion of social media, crowdfunding consists in using the Internet for financial collection from groups of people with common interests in order to support a project or initiative.
The phenomenon can be interpreted as an exchange of information (ideas and projects) and capital (funds) between people or groups of people (crowd), through IT tools (social media, social networks), in a virtual environment (Internet).
Although online fundraising is not an absolute novelty, this type of collection uses the ability of IT tools to reach, involve and excite a large number of people in order to support projects proposed by entrepreneurs, artists, musicians, designers, planners or anyone who has an idea but is unable to find the funds useful to start it.
The business model of crowdfunding platforms, in most cases, is based on a percentage retained by the sum of money collected. The support provided has developed in various forms which differ according to the nature of the exchange.
The most widespread example, in Italy and in the world, is represented by donation / rewards crowdfunding and consists of a non-financial reward (a gadget, a product, a meeting with the creator of the idea, thanks in various forms, etc ...). Another model of growing interest arises from the growing difficulty of access to credit by SMEs, which has contributed to the development of equity crowdfunding. In practice, a loan in the form of risk capital is provided in order to obtain stakes in the company.

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[224] *This was stated by a research by the Catholic University of the Sacred Heart presented during Sharitaly, the first meeting entirely dedicated to collaborative economy. The research finds around 160 exchange and sharing platforms, around 40 self-production experiences, around 60 crowding (of which 27 are active crowdfunding and 14 in the launch phase).*

[225] *Source: http://laretechelavora.com/che-cose-la-sharing-economy/ - articolo a cura a cura di Mattia Schieppati e Ottavia Spaggiari.*

A brilliant example of the application is found in the French region of Nord Pas des Calais, which has developed a master plan for the transition to the Third Industrial Revolution under the guidance of Jeremy Rifkin and under the direct supervision of the President of the Region Daniel Percheròn. To implement the plan, a department for the Third Industrial Revolution was created, led by Claude Lenglet, construction engineer and inventor of the first positive energy building as head of research for the French construction group Bouygues. Within the Department there are various departments led by other prominent figures such as Marq Roquette, a globally known renewable energy entrepreneur, at the helm of the "Distributed Renewable Energy" department, with the aim of total decarbonisation by 2050, providing for the lowering of the consumption of 70% and energy coverage with 30% of renewables.
To achieve these objectives, the Department for the Third Industrial Revolution plans to use 200 billion euros until 2050, with energy savings of 320 billion and therefore an active balance of 120 billion.[226]
The fossil-based scenario, on the other hand, provides for a minimum expenditure of 400 billion by 2050 with no return.
The Nord Pas des Calais will be discussed in detail in a separate chapter to which we refer.

Alternative financing systems and parallel currencies

The Internal Stability Pact, born from the need for convergence of the economies of the EU Member States towards specific common parameters shared by all, constitutes the main means of controlling the debt of public administrations. Therefore Net debt, defined as the balance between revenue and final expenses, net of financial transactions (debt collection and concessions, equity investments and contributions, advances), remains the primary objective to be kept under control.[227]
If on the one hand this instrument is capable of reducing and keeping debt under control, on the other hand it is frequently criticized, especially by those who consider it an instrument that is too "short-sighted", since it is linked to the fluctuations in the results of the individual financial statements and not to the trends of the economic cycles, to the pure detriment of the territories.
In this regard, the analysis of prof. Rifkin on social capital, the democratisation of money, the humanisation of entrepreneurship and the redefinition of work.
Here is the complete extract of the chapter in question.[228]
In 2008, the risk of a collapse of the international banking system terrified millions of people. The credit meshes closed, while the US government was forced to rescue major financial institutions of the country, justifying the intervention with the statement that they were "too big to fail."
US public opinion furiously witnessed the disbursement of $ 700 billion of public money in favour of the banks, as if it were a reward for the demonstrated financial negligence. Meanwhile millions of Americans were losing their homes, being unable to pay mortgages anymore. In short, these citizens were "too small to be interesting".

Peer-to-peer social loan

Following the financial disaster, a new form of loan has appeared on the web, called peer-to-peer lending or social lending. These are online banking platforms, such as Zopa, Lending Club and Prosper, which directly provide loans to individuals or individual projects. As they eliminate the intermediation and high fixed costs of large financial institutions, which end up falling on borrowers in the form of higher interest rates, these financing mechanisms are becoming popular alternative credit channels to traditional banks.
The expansion of the financing activity facilitated by the web pushes the marginal cost of lending operations towards zero, which translates into lower fees and interest rates. Zopa, Britain's first peer-to-peer loan group, has provided over £ 414 million in mortgages. By the end of 2012, the equal social loan groups had disbursed $ 1 billion 800 million, inevitably attracting the attention of banks.
A recent filiation of the equal social loan is the so-called crowdfunding. Kickstarter, the main crowdfunding initiative, was born in April 2009. Let's see how it works.
By collecting financial capital from ordinary people via the web, Kickstarter is able to bypass conventional investment channels. Those who have a project display it on a website indicating a deadline by which the funds needed to finance it must be collected. If the target has not been reached on expiry, the funds are not withdrawn. This formula is intended to provide a project with at least the resources necessary to attempt to get started. Money donated by supporters is collected through transfers via Amazon. Kickstarter retains 5% of the sum and Amazon an additional 3-5%. Unlike traditional lenders, Kickstarter does not claim any title to the project initiatives, but is limited to the role of facilitator.
In November 2013, 51,000 projects had been funded thanks to Kickstarter, for a success of 44% and a cash amount of 871 million dollars. Kickstarter's financing operations are limited to 13 categories: art, dance, design, fashion, film and video, food,

[226] *Source: http://angeloconsoli.blogspot.it/2014/04/nord-pas-de-calais-francia-la-terza.html*
[227] *Source: http://www.rgs.mef.gov.it/VERSIONE-I/e-GOVERNME1/Patto-di-S/CosaeilPatto/*
[228] *"A society with zero marginal cost" - J. Rifkin. Chap XIV in full form.*

games, music, photography, comics, publishing, technology, theatre. Different crowdfunding platforms offer various forms of reward.
The lenders can donate money for free or receive, once the project has taken off, the value of what has been paid in goods or services; or even give their contribution the character of a real loan, with interest, or invest in the project in exchange for a corresponding participation fee. Although in the financial sector as a whole they still have a modest part, crowdsourcing financing initiatives are contributing significantly to the emergence of many of the new start-ups that fuel the development of the IOT infrastructure. Thanks to crowdfunding, the aforementioned Mosaic managed to raise $ 1 million and 100,000 for over a dozen solar projects.
When posting its first solar investment project, the group offered 4.5% interest to anyone who contributed with a minimum of just $ 25. Billy Parish, co-founder of Mosaic, was convinced that if there were no hitches, the $ 313,000 needed to start the initiative would be raised in a month. To his amazement, in less than 24 hours 435 lenders offered the necessary sum. In 2013, the company had a portfolio of 10,000 investors ready to finance its projects. One of the Mosaic solar plants - partly subsidised by the state and private investment funds, but partly by crowdfunding activities - was installed in a 2400 square metre building built in Oakland, California by the non-profit organization Youth Employment Partnership (yep). The cost of the system, which Mosaic leases to the yep, is $ 265,000. With 85% savings in electricity bills, yep can now have a significant amount of money to direct to other important destinations. The partnership is made even more interesting by the option that provides for yep the possibility of purchasing the system from Mosaic after ten years of use: in doing so the organisation could have electricity practically free from that moment.
According to forecasts, the demand for solar technology is expected to grow in the next decade. Bloomberg New Energy Finance estimates that more than $ 62 billion funding will be needed. In this context, social lending, and in particular crowdfunding, will not fail to have its say, putting millions of individuals in a position to finance each other electric micro-installations, yet another example of the lateral power of peer-to-peer collaboration. Although the most cynical have serious doubts that millions of small private operators can trigger an energy revolution with a collaborative effort on a lateral scale, we must not forget that, as mentioned in chapter IX, in Germany, a world leading country in the field of renewables, 51% of the green energy plants are in the hands of small companies or private citizens, while the production of renewable energy by the large national energy companies stops at 7%. Crowdfunding platforms such as Indiegogo, Early Shares, Crowdfunder, Fundable and Crowdcube are making their appearance on every corner of the web.
This is also the result of the launch of the Jumpstart Our Business Startups Act, which, approved by the American administration in 2012, allows small businesses to collect up to $ 1 million from individual citizens each year through crowdfunding platforms for investment. Crowdfunding enthusiasts point out that the heart of the phenomenon is not money, but the intimate pleasure of actively helping other people to realize their dreams and knowing that one's small contribution has a great value: that really contributes to running a project. The Gartner Group estimated that peer-to-peer financial loans would reach $ 5 billion at the end of 2013. In all its multiple incarnations, sharing economy is a hybrid creature, partly market economy and partly social economy.
While market economy is governed by a complex of rules and laws immanent to the capitalist system, social economy follows a different regulatory path, where part of the supervision and regulation is entrusted to the State, but the main role is carried out by self-regulation rules in which millions of people voluntarily recognise the condition to participate in the Commons.

Social capital and the sharing economy, the Commons and the reputation rankings

Social trust is driven by the social economy, far more than the 'caveat emptor'. And as in traditional Commons, a new range of protocols has taken shape in the new collaborative Commons designed to keep up the level of social trust that is needed to guarantee the social capital required by an ethics of collaboration, and which also includes penalties to punish, and even to ban, exploiters and profiteers. Practically all the major collaborative social networks have established reputational evaluation systems to classify the reliability of their members. Unlike conventional rating systems that judge financial reliability in a market economy, reputational rating systems are aimed at classifying the social capital that a person owns in a Commons.
Thredup applies the above based on what it calls the "golden rule of ThredUp", according to which each member of the service is invited to send only items that are "of the same quality" as they expect to receive. The site then places the "quality" of each member's articles on a scale of one to four stars.
A second classification mechanism, that of "style points", evaluates the level of "style" of the article on a scale from 0 to 10. The last parameter of judgment concerns the "punctuality" of the shipment made by the various members.
To users who send torn or frayed clothes, this used clothing online store has a zero-tolerance policy: those who break the rules are identified once, those who repeat the infringement a second time are out. Members with a high level of reliability are put in contact with each other, so as to encourage others to achieve the quality of their contribution.
Like financial assessment services in the context of a market economy, reputational assessment services in the Internet Commons are becoming an important tool for regulating business, ensuring compliance with shared rules and creating social trust. A new version of these services is the one offered by TrustCloud. TrustCloud "measures the quality of your conduct and your online transactions and translates it into a TrustScore, a reliability score that you can use in every corner of the sharing

economy." The reliability of each member of the service is assessed on a scale ranging from 1 to 1000 (the score of perfection). The classification takes into account the consistency, generosity and transparency shown in previous online activities. To determine the reliability profile, TrustCloud's algorithms try to intercept behaviours such as "responsiveness" (ie the ability to respond and react to requests from other partners) and longevity. Service members are issued a free TrustCloud card with evaluation. Also Couchsurfing has its own rating system.
The idea of opening one's home to a stranger so that he can stay there, moreover for free, is a bit distressing; and to this source of concern is added the fact that the host and guest are invited to socialise and share their respective cultures. After each experience of stay, host and guest express a mutual evaluation and draw up a reference document. The golden system of Couchsurfing is called vouching, or "guarantors" system. The user has the right to guarantee for other members, on condition that he has already been met in person and guaranteed by at least three other users. The Commons sharing services now have a volume that is estimated to exceed 100 billion dollars and are growing at a fast pace, while the social economy is taking on an increasingly important role in people's daily lives. It is therefore to be expected that for the millions of individuals involved in the collaborative Commons, the mechanisms for evaluating share capital acquire the same importance as the financial rating has in the capitalist market.
The collaborative economy is gaining consistency. Just today, just before I started writing, I came across a series of interventions dedicated by the "Economist" to sharing economy, with editors and collaborators who exalted its virtues and reflected on its potential effects on the traditional market economy. Many observers are wondering what accommodation the capitalist system, perched on its positions, and the nascent collaborative Commons will find. A suggestive clue may perhaps come from the new types of exchange currency invented to distinguish the transactions that take place in the Commons compared to those concluded on the market.
The currency that a company uses to allow its members to trade goods and services is a good indicator of the values that animate its community. In the masterful essay 'The philosophy of money', the nineteenth-century sociologist Georg Simmel reminds us of the crucial importance that money has had in history for the expansion and deepening of social interaction.
Simmel underlines how coins and banknotes are as many promises of payment, endorsed by a tacit collective trust between strangers by virtue of which it is assumed that the pieces that change hands in a transaction will be accepted by a third party in a new transaction.
If it is certainly true that currencies have always been covered by precious metals of all kinds, first of all gold and silver, anthropologists point out that behind these guarantees there is an even deeper guarantee: social capital, without which the use of money as a medium of exchange would be impossible.
The indigenous people of the Trobriand Islands, in New Guinea, for example, engage in elaborated exchanges of shells, often facing long canoe trips to deliver or receive the pieces, a way to establish bonds of mutual trust. The exchange of social currency has generated sufficient social capital to set the trade in motion.
Until the collapse of the global economy in 2008, when the dark and vacuous recesses of an abnormal, if not criminal, financial system came out, most people assumed that the international monetary system, despite some occasional episodes of volatility, were reliable. We were convinced that if currency problems had occurred and some banks had gone bankrupt, our bank deposits would have been guaranteed by the State (up to $ 250,000 in the United States): the Federal Reserve system would have intervened behind the banks to save the dollar.
The fear only began to spread seriously when economists pointed out that if the monetary system plunged into the abyss, we would still be saved because the US Treasury would continue to print dollars and put them into circulation. Only then did we realise that behind the rules, regulations and protection mechanisms a blind abyss opened.
The collapse of the global financial system has exposed the lasting myth that trade would be a primary institution: history does not offer us a single example of a people who gave birth to commercial markets before creating a culture. We have mistakenly believed that trade precedes and makes possible the development of culture, while in reality the opposite occurs. As I said in chapter I, culture is the dimension in which we become society, the place in which we develop social narratives that allow us to expand our empathetic sensitivity and associate ourselves in larger families of choice. Our shared sense of identity establishes bonds of social trust and allows us to accumulate reserves of social capital sufficient to make us function as an integrated whole. And it is by virtue of this common identity that we establish symbolic pledges which we can use as promises of payment capable of making us operate in mutual trust that both previous commercial commitments and future transactions will be honoured.
Furthermore, we often forget that trade has always been an extension of the cultural sphere. Commerce draws its power from the social capital that accumulates in society. No surprise, therefore, if in the historical moments in which commercial institutions, and in particular financial ones, have compromised the social trust of a community and have depleted its social capital, as happened in 2008, people ended up looking with suspect monetary mechanisms and have sought for alternative ways. In 2008, millions of people turned to gold (which consequently jumped into the world market at record prices), trusting that they would find a relatively safe refuge against the uncertainty of the times. Anyway, some people deemed it senseless to cling to a metal ingot whose nature is once again, in all respects, that of a symbolic pledge and whose value does not reflect the intrinsic value of the metal, but rather the paranoia and panic generated by financial institutions, which have deeply affected social capital and, with it, people's trust in conventional currency.

An increasing number of people have started experimenting with a different type of currency, based on intimate collaboration and supported by new levels of social capital. After the economic collapse of 2008, alternative currencies, often called "complementary currencies", "local exchange trading systems, lets" or "local currencies", began to make headway in various local communities in the world. Occasional examples of this had previously been seen, particularly during the Great Depression, but with very marginal effects.
Their current version, however, could have a decidedly significant impact on society, because it comes to light in an era in which the social economy is experiencing a renaissance, a period in which hundreds of millions of people commit an increasingly large part of their daily life in collaborative activities, be they economic or social, in the collaborative Commons.
The so-called "alternative currencies" are actually social currencies that favour the collaborative exchange of goods and services in the Commons. As in other areas of the collaborative economy, in this case too, people bypass the intermediaries, the general fixed costs of the large financial institutions, the mark-ups and the high interest rates demanded by the companies that issue credit cards, and exchange their working time directly.
What differentiates this form of exchange from the ancient institution of bartering between individuals are web applications that offer a mechanism for accumulating and using points corresponding to an equivalent working time, which can be exchanged against all kinds of goods and services, both in the social economy and in the market economy.
Worldwide, the alternative currencies in circulation are already more than 4000. Many are based on the working time that a person is willing to give to another to produce an asset, repair an object or provide a service. The hours are "deposited" in a time bank, just as if it were money, and they are exchanged with other hours for goods and services. The idea of the time bank was developed by Edgar Cahn, a professor of law at the University of the District of Columbia. It was inspired by the work of blood bank donors, Cahn explains. Its structure refers to a fundamental principle of the social economy: reciprocity. One individual helps another with the expectation that someone will do the same with him in the chain that develops in this way.
The time bank designed by Cahn does not distinguish between the different types of working time: a mechanic's time is worth as much as a doctor's time. The idea is that time should have the same value for everyone and not be hierarchized according to professional or technical skills. Other banks of the time accept, however, that the hours are valued on the basis of the professional profile of those who accumulate them: in this case a tax advisor will earn more hours than a car wash operator.
There are time banks in various regions of the world. For example, the Hour Exchange Portland, Maine, which helps people on the healthcare front. TrueNorth, a non-profit clinic, has entered into an agreement with Hour ExchangePortland under which its doctors agree to be paid in time-dollars by patients who have managed to accumulate services by providing services to other people in the community.
Through the time bank, doctors can then use the time-dollars obtained in this way to receive some services from other people.
Other alternative currencies used in lets are designed to facilitate the exchange of goods. The wir is a Swiss alternative currency that allows to sell goods in exchange for credit for future purchases: the person who sells something receives a credit he/she can spend to buy something in turn from another wir member.
Another use of these local currencies is the one aiming to maintain wealth within a community. BerkShare, available in the Berkshire region (Massachusetts), is one of several social currencies intended to encourage the purchase of local goods and services. The members of the circuit buy BerkShares in one of the six banks in the area by exchanging dollars in parity, with a small additional bonus: a member who deposits 95 dollars receives from bank BerkShares for 100 dollars, thus obtaining a net profit.21 The amount acquired can be used to buy goods and services from local operators.
This ensures that money continues to circulate within the local economy. By relying on a non-profit bank, members avoid the additional expenses they would face if they paid with a credit card or bank check.
The BerkShares made their appearance in 2006: five years later more than three million of them circulated, a fair amount for the local economy. In some of the European regions more hardly hit by the Great Recession, alternative currencies have experienced a real proliferation. In Greece and Spain, complementary currency networks are multiplying. In some of the areas with high unemployment rates, non-profit organizations are committed to creating websites that facilitate contact between those with specialist skills and those who need them: within a centralised market economy which is increasingly impracticable, a distributed, collaborative, side-scale micro-social economy is thus formed. The new exchange mechanism is local currencies, thanks to which at least some workers have been able to find jobs again.
If the social currencies linked to the local dimension are expanding, global alternative currencies are also taking hold on the Internet, capable of transcending the borders of the States.
Millions of "bitcoins" are now circulating in an equal electronic money network. Bitcoin can be converted to other currencies; in November 2013 its exchange rate with the dollar was around 400 dollars per bitcoin. The developers of this currency, Amir Taaki and Donald Norman, say they had the idea when, being in Amsterdam, a British friend asked them to send him money urgently. There were only two possibilities: Western Union and MoneyGram, which demanded a commission between 20 and 25% on transfers (worse than usurers). Thus they developed bitcoin, an Internet currency capable of leaving inflated commissions behind.
Futurologist Heather Schlegel, a consultant to major world banks on transaction parameters, believes that Internet-based global currencies will not replace traditional currencies; and yet she points out that "when the various communities become aware of

the possibility of expressing themselves also through currencies, we will see, I believe, arise hundreds of currencies such as BitCoin [sic], and perhaps some other solution that we have not thought of yet ".
But there are people who go further. According to Jean-François Noubel, co-founder of aol France, it is truly naive to think that the overwhelming force of the Internet, whose distributed, collaborative nature, capable of achieving economies of scale in a lateral way, has generated eBay, Facebook, Amazon, Etsy and thousands of other initiatives, do not end up imposing itself also in the realm of finance.
Noubel confesses that he would not be surprised at all if in the next few years, he saw "millions of free currencies circulating on the web and on our mobile phones".
Parallel currency proposals are currently being assessed also in Roma Capitale [229] in relation to the need to deal with urgent social and environmental interventions that can no longer be tackled due to the limits imposed by the stability pact on local authorities, proposals inspired by the Tax Currency format (or CCF - Tax Credit Certificates) already tested in Ecuador and Greece thanks to the initiative of Professor Toussaint.
In fact, an increasing number of activities relating to environmental protection, urban decorum, cultural and social enhancement of municipal heritage and public common goods are increasingly penalized, suspended or neglected due to an alleged unavailability of the necessary economic resources by local authorities.
In particular, we see languishing the maintenance of the gardens, the rearrangement of the streets, the energy efficiency of the municipal structures (lighting, insulation of public housing, public transport), the virtuous closure of the cycle of consumption without waste with re-use banks (such as the CRIC designed by the AMA), recycling of short supply chain, diffusion of local agricultural seasonal products with direct sales systems, assistance to tourism or educational assistance, to children, families, the elderly.
Most of these activities are the responsibility of the Department of Sustainability which is thus paralysed in its vital activities and unable to achieve vital objectives for this administration.
To quickly unlock the situation, it therefore seemed useful to explore what opportunities are offered by alternative financing systems, such as popular shareholding (crowdfunding), or the parallel currencies on which the Municipality of Rome has opened a dialogue with some of the promoters.
In particular, the Fiscal Currency (or Tax Credit Certificates - CCF) was seen as a proposal capable of allowing the rapid start of these activities without resorting to bank debt, giving the right value not only to the economic capital, but also and especially to the social one created by the work of human beings.
This proposal is inspired by the consideration that a public body cannot be measured only on the basis of the economic results, but that its activity should also be parameterised on results achieved in terms of public social utility. And citizens are ready to recognise that value if certified by the public body. Since that of social acceptance is the basic principle for the issue of money, issuing a local currency in representation of that value allows the coverage and circulation of that currency.
In many cases, these activities also have an economic value, see the case of GAS and direct purchasing communities, banks for reuse, recycling, waste reduction activities. According to Zero Waste California statistics, reuse creates a value 40 times higher than that created by recycling per unit of product at the end of the cycle, and 1000 times higher than the negative value of disposal.
Another example of creating economic value is given by energy efficiency: for example the switching of public lighting from incandescent bulbs to low-consumption ones or the insulation of public housing, create savings that allow recoveries of the investment in time ranging from two to four years.
But in addition to economic value there is also social value: how much are the well-kept green spaces of Rome worth compared to the same spaces left to go down the drain? And the streets without holes? The decor of well-kept flower beds? Is it possible to guarantee these public utilities by issuing a local currency representative of that socially acceptable and universally accepted value?
The precise modalities of this issue and circulation of money (which must be electronic and based on block chain technology) are being studied in collaboration among several departments at the moment in a special working group made up of experts in energy, climate, environment, digital technologies, social communication, local economy and finance which has exactly the mission of studying alternative payment methods to carry out the works necessary for the city of Rome on the environmental, energy, food, social and cultural levels.[230]

Social entrepreneurship

To reconcile the needs of two very different economic systems - on the one hand the capitalist economy operating in the market and on the other the social economy operating in the Commons - alongside new financing channels and social currencies new business models are emerging. They respond to the attempt to identify value in the spaces where the two economies work in

[229] *http://www.romatoday.it/politica/raggi-moneta-roma.html*

[230] *To deepen the question of the application of the Tax Currency to the needs of Rome Capital: http://2011oraequi.blogspot.it/2017/01/una-proposte-intelligente-da-discutere.html*

symbiosis. We have already talked about cooperatives, which for their structure and their operating protocols are the most suitable candidates to overcome the gap between the two systems and to draw value from any fold in which potential synergies arise.
In the United States, a new, interesting business model is the "benefit corporation", which is an attempt to transform the traditional capitalist company to make it more agile and suitable to operate in a hybrid context of markets and Commons.
The most important company that has turned into a benefit corporation is Patagonia, a Californian sportswear company that sells items for around $ 540 million annually.
Benefit corporations, now legally recognized and regulated in 18 American states, offer entrepreneurs a form of legal protection against external investors who in exchange for new liquidity could force them to abandon their commitment on the ecological and social front. Although the benefit corporation functions as a capitalist company, with the relative responsibilities towards the shareholders, the new legal statute allows it to put in the foreground the commitment towards society and towards the environment, removing it from the risk of being influenced by any investors interested only in optimising shareholder value growth.
The benefit corporation falls into the broader and relatively generic category of "social entrepreneurship", which has gained the interest of young people who have studied in management training schools around the world. Social entrepreneurship covers the wide territory that ranges from non-profit organizations, real cornerstones of the Commons, to conventional joint stock companies, the dominant companies in the market economy. In addition to the interaction along the borders where the social and market economy meet, a reciprocal exchange of attributes is taking place between the two models - non-profit organisations and profit-oriented companies - which makes it less clear-cut the distinction between one and the others. Social entrepreneurship is the great tent under which the world of profit and its opposite devise all sorts of accommodation to create an amphibious commercial space, a crossroads of market economy and collaborative Commons.
Social entrepreneurship has its roots in the non-profit community.
Welfare cuts implemented in America, England and other countries in the 1980s and 1990s marked a time of crisis, but also opened up an opportunity for the non-profit sector. The reduction of public aid programs for the most deprived put the most disadvantaged communities at risk.
The attempts to fill the void put in place by private philanthropic initiatives provided those communities with very few resources, compared to the contributions lost with the withdrawal of the state. The concomitance between the worsening of the social burden and the reduction of the appropriations destined for the most fragile communities induced the non-profit organisations to look for some new business model, which in respect of their basic mission would allow to open a source of additional revenue, thanks to which they could keep operating and expand their services.
So it was that many non-profit organizations added some paid services to their offer. Traditional leaders - whose ability was to intercept government subsidies and contributions from some philanthropic foundation so that they could feed and manage programs in the most disparate fields, from the arts to recreation, from nutrition to health - began to be joined by a new type of manager, good connoisseur of business practice and yet committed to using his skills to promote the social well-being of the community he serves.
With the government's disengagement, the promising opportunities that were opening up in the social sector began to interest also new commercial realities, which entered, from a market context, to fill the void. Management guru Peter Drucker magnified the "do well and do good" concept, arguing that the best way to deal with issues like chronic poverty, low schooling, environmental deterioration and a whole host of other social problems was to entrust them to the creative power of entrepreneurial spirit. Schools, kindergartens, public housing and numerous other services or activities traditionally included in the sphere of action of the state became an excellent field of business for private initiatives. Meanwhile, as already mentioned in chapter VII, in the United States of the nineties a new generation appeared on the economic scene, the first to have experienced learning service at school and university. The determining role of servicelearning in establishing the mentality that made new social entrepreneurship possible has never been fully recognised. By learning to collaborate personally on non-profit projects and initiatives to be developed in communities at risk, these young people had experimented a new way of making sense of things and realising themselves, a way that went beyond the strictly commercial opportunities offered by the market.
At least for a significant minority, the enthusiasm translated into a different career scheme: social entrepreneurship was born.
Defining social entrepreneurship can prove to be rather problematic.
Profit-oriented businesses place the emphasis on what is called the "triple base line" - "people, planet and profit" - in the formula coined by John Elkington in 1994. Non-profit organisations prefer the formula "first people and the planet, then profit". An in-depth research conducted among 80 social entrepreneurs reveals the subtle differences with which those active in the commercial sector and those active in the non-profit sector face an identical set of circumstances. Firstly, those involved in social entrepreneurship for profit are essentially looking at commercial opportunities, while the others focus mainly on how to meet social needs. Secondly, although both the one and the other category of entrepreneurs show a clear propensity to risk, this assumes in the two cases different characters: for the former the risk is conceived in terms of return on investment, for the others, who rarely bring personal money into play, the risk concerns the social "reputation" within the community. Third, the study highlighted that although both types are convinced of the centrality of their role, "non-profit social entrepreneurs are

clearly more sensitive to the request to include, and indeed to share the merit of their success with a collective team made up of volunteers and beneficiaries ".
But, apart from the differences, it is interesting to observe the various ways in which social entrepreneurs from both backgrounds operate side by side; especially the children of Generation Y, who are exploring new business models in which the peculiarities traditionally associated with the two different areas are combined. The evolution of social entrepreneurship has been described by the "Economist" in an editorial entitled Capital Markets with a Conscience.
The concept of social capital markets may seem incongruent, since it indicates a rather heterogeneous set of people and institutions. But between the two extremes - on the one hand the capital of initiatives with a pure charitable background and on the other the capital aimed at making money, with all the possible balance between risk, return and social impact between one and the other way - there is a common denominator. The bulk of the debate ... will focus on this denominator, to understand which is the type of social capital, or which is the mixture between the different types, most suitable for successfully pursuing a specific social objective.
Thus, while the benefit corporation constitutes an attempt to temper the profit orientation of capitalist enterprises, bringing it closer to the social and environmental priorities of the non-profit organisations at the service of the social Commons, also the non-profit organizations are making their own adjustments, approaching the profit orientation of capitalist firms.
Nine American states - Illinois, Maine, Rhode Island, Michigan, Louisiana, Wyoming, North Carolina, Vermont and Utah - have promulgated what have been called "L3C laws" (low-profit limited liability company), under which the rules that regulate limited liability companies are modified to allow non-profit organisations to move towards a moderate profit orientation, provided that the primary objective remains social in nature. L3Cs offer non-profit organizations a legal tool to gain access to capital, a step that with their progressive inclination towards social entrepreneurship is becoming increasingly important, and to be able to access it without depriving themselves of the status of charitable organisations.
Social entrepreneurship has become a hot topic in many universities on the planet. Harvard programs include courses with titles such as "Social business management" or "Introduction to social entrepreneurship". The sociology department has a "collaborative" entrepreneurship program to immerse students in the social aspects of the new social economy. The "President's Challenge", another university initiative, makes $ 150,000 available to groups of students who are committed to seeking, both through study and fieldwork, "solutions to global problems such as education, sanitation or purification of water and air ».
Worldwide networks such as Ashoka, the Skoll Foundation, the Acumen Fund and the Center for the Advancement of Social Entrepreneurship of Duke University act as theoretical processing centres, support associations and organizations to finance the promotion of social entrepreneurship worldwide. Founded by Bill Drayton, a leading figure in the social entrepreneurship movement, Ashoka organizes competitions that attract social entrepreneurs from all corners of the planet, leading them to collaborate on topics ranging from human trafficking to conflict resolution. Social entrepreneurs are encouraged to post their projects on Changemakers, the organisation's website, which other people can access to collaborate in the development of the proposed initiatives. Today Ashoka supports the work of over 3000 social entrepreneurs, scattered in more than 70 countries. Founded in 1999, the Skoll Foundation, another protagonist of the world of social entrepreneurship, has granted loans for over 358 million dollars to 80 organisations and 97 social entrepreneurs engaged in social entrepreneurship in the five continents.
The success of social entrepreneurs is measured more by the improvement of well-being in the communities for which they operate than by the return on investment. The decisive aspect is social capital, which in turn is a reflection of the bonds of solidarity and trust generated by the collaborative partnership between the social enterprise and the community. On this ground, non-profit social entrepreneurship generally enjoys (although not always) a certain advantage over profit-oriented ones, because its main objective is "doing good", not "doing well".
There are hundreds of thousands of social enterprises in the United States that employ more than 10 million people and earn $ 500 billion a year. In 2012 they represented 3.5% of the American GDP. About 35% of US social enterprises are non-profit organizations; another 31% are joint stock companies or limited liability companies. Both have experienced an impressive growth curve. 60% of all the American social enterprises were founded in 2006 or later, while 29% were born between 2011 and 2012. In England, there were 62,000 social enterprises in 2010, with a workforce of 800,000 people and a contribution to the national economy of £ 24 billion. Peter Holbrook, CEO of the British Social Enterprise Coalition (sec), predicts that by 2020 the contribution of this type of business to the UK's GDP will be tripled. The SEC is pressuring the government to formally recognise volunteering ?? and that of private business, ensuring tax incentives and other forms of support. According to estimates, in Australia there were about 20,000 social enterprises in 2010; in the non-profit sector, 29% of these organisations had a commercial size and 58% also provided paid services. In the next decades, when the social economy based on collaborative Commons will gain ground on market capitalism, social entrepreneurship, today equally divided into profit-making enterprises and non-profit organisations, will in all likelihood tend to move increasingly towards this last form.

Alternative financing systems and parallel currencies

One of the actions suggested to Alex Tsipras by the National Commission for the reduction of the debt to exit the Greek crisis was precisely the issue of a new currency parallel to the euro for intra Greek payments, not convertible into Euro and not usable abroad, downloadable on a special electronic app on the smartphone. Also in Italy on the initiative of Luciano Gallino,

some economists and scholars, including Luciano Gallino, a recently deceased sociologist luminary, some economists such as Stefano Sylos Labini, Biagio Bossone, Marco Cattaneo, Giorgio Ruffolo, Enrico Grazzini have elaborated the proposal of a complementary currency in the form of the so-called fiscal currency.
The fiscal currency consists in the free issue by the Italian State of Tax Credit Certificates for deferred use and the use of Government Bonds with fiscal value. In this way, the state would create national currency complementary to the euro, and consequently new spending power, without generating debt. This proposal is thus compatible with the rules and (rigid) constraints imposed by the euro system and the European institutions. [231]
The Greek alternative currency was used to pay wages, while continuing to remain in the euro and would have given citizens a credit to the state. The assignees, primarily retirees and civil servants, could have used it to pay taxes or to discount it in the bank by receiving a sum in euros, but less than the nominal value of the security. In this way it would have been possible to pay civil servants and save precious euros to repay foreign creditors, that is, the IMF, the ECB and the Eurogroup.
In Italy, as we have seen, there is the similar project promoted by some economists and intellectuals who refer to the Paolo Sylos Labini Association (APSL [232]) which consists, as mentioned above, in the issue by the state of free of charge Tax Credit Certificates (CCF) (or Fiscal Currency) for an amount equal to 200 billion euros in three years. "The CCFs - explains the journalist Enrico Grazzini - are government securities that give rise to an equal tax discount, but only two years after their issue. The 200 billion in CCF would be allocated free of charge to workers in inverse proportion to income, and to companies in proportion to the number of employees. Those who need euros to spend immediately would sell their CCF immediately by applying a discount. The buyers would instead be all those in good financial health willing to pay the discounted CCF in euros to have the tax reduction on their due date.
Thus the currency - constantly denied by the Italian banks, which have already accumulated around 350 billion in bad credits for unpaid loans - would start circulating again in the economy. Families could restart consumption and companies would return to work and hire. Thanks to GDP growth, employment would increase and the weight of public debt would finally become sustainable."[233]
The proposal would allow the economy to restart without interfering with the ECB monopoly on the euro and without increasing public debt, however, avoiding a unilateral exit from the single currency which would be somewhat dangerous.
Other proposals come from different Italian regions. Let's think, for example, of the experience of "sardex" in Sardinia, the first local currency that allowed in 2015 alone the exchange of goods and services for a value of 31.3 million euros. Local businesses had the ability to produce goods and services, warehouses were not empty and people capable of working, but all this in a gear that did not turn, say the founders.
Sardex is a mutual credit system in which all the accounts of the companies registered in the circuit start from scratch and increase their unit of account. A sardex is equivalent to one euro, but it is not convertible as soon as goods and services are exchanged. Companies can have debts within a certain limit and this threshold is bounded by what they can offer to other companies.
There are no interest rates and the sardex is simply a medium of exchange within a circuit in which debtors do not see the growth of a debt but find creditors willing to spend!
"Money becomes information - explains Carlo Mancuso, one of the founders - but above all a system of rights and duties. Since I take something from the community, I contract a debt to it, and when I repay that debt, I simply return to others what I received from others. I think this is a beautiful thing».
Today almost 3 thousand companies use sardex, including Tiscali, and the Unione Sarda. Stripped of the function of money as a store of value, this currency circulates very quickly based on trust. According to the founders, the circuit has allowed more than 30 million transactions this year and around 84 million since it is operational. [234]
The model has already been replicated in other regions such as Lombardy, Piedmont, Emilia-Romagna, the Marche, Abruzzo, Molise, Sicily and Lazio, the latter with the system based on the "Tibex".
Tibex.net is a new way of rethinking the local economy through a network of companies that exchange goods and services with each other without the use of the Euro. The model uses multilateral credit and debit clearing with a dedicated platform and entrusts a fast, easy and innovative payment system dedicated to businesses and professionals in Lazio. Moving the origins from the aforementioned Sardex experience, the first complementary currency network in Italy, it allows you to be part of a network that supports the economy in Lazio at Km 0, allows you to participate in a sharing economy community that shares ethical values based on trust, to benefit from a recognised tool to compete with multinational companies and therefore create opportunities to increase social and commercial ties in the area.
The most important economic advantages include the following axioms:

- Freeing up Euro liquidity, increasing your turnover and net income

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231 *http://monetafiscale.it/*
232 *http://www.syloslabini.info/online/*
233 *Source: http://www.ilfattoquotidiano.it/2015/04/15/crisi-moneta-parallela-alleuro-in-grecia-e-in-italia-e-lunica-soluzione/1588750/*
234 *Source: http://www.chefuturo.it/2015/09/sardex-financial-times/*

- Eliminating collection times and risks of unpaid
- Acquiring new customers
- Purchasing goods and services through additional sales

Accessing advanced e-commerce tools through your TBX online account
The payment instruments, in addition to the online account at zero cost with Credit / Debit functions, include the "I pay tibex" app, and a tibex card.
The secret of these additional monetary circuits lies in the fact that there is no interest on the credit requested, and this mechanism prevents money from being created from money.
Through the Euro system, States request money from the ECB which, as a private entity, requires interest on the money lent, even if formally impossible to return because the States do not manufacture money.
The perverse apparatus will never allow debt relief and this shows how all nations are, in fact, kept under the absolute control of the major world banks.
By choosing alternative (or complementary) currency, no company depends on a stock exchange index and no market is subject to fluctuations without control; which is why no State can be rated by a rating company, downgraded and then bankrupt.
However, we talk about complementary currency and not alternative currency. This is necessary because unfortunately these models cannot exist without the euro. The sales made within the circuits are fiscally equivalent to the sales in Euro and therefore the same billing procedure must be followed, including the calculation of VAT. The income in complementary currencies must necessarily be integrated into normal company accounting, and it goes without saying that VAT, taxes and contributions must be paid in euros.

Marine economy

Marine economy unites different sectors and traditions in a widespread entrepreneurial fabric that can become an extraordinary lever for the revitalisation of Italy. The sea represents a resource that generates wealth, employment and innovation according to a collaborative and sustainable model.
In Italy, at the end of 2014, 181 thousand companies operated in the marine economy, equal to 3% of Italy's entrepreneurial total. Companies where young people and women also find space, given that one out of 10 is led by under 35 and two out of 10 by women. These are economic activities whose production as a whole reached almost 45 billion euros of added value produced in 2014, equal to 3% of the total national economy, involving almost 800 thousand workers.[235]
As Professor Martin A. Blake explains, "Blue Economy is a philosophy that can embrace different ideas, and which is based on a systemic vision. It is a philosophy that helps people, the environment and the economy to build resilience and sustainability within communities. It can help build social enterprises that work with locally available materials. It can facilitate the production of goods and services, agriculture and the production of any necessary materials. It is the general philosophy that aims to eliminate waste from the system to make it more efficient; there is no waist in nature, therefore there is no waste in the Blue Economy either, but only resources. And some resources can be taken from one production and used in another, but not eliminated, burnt or buried: they must be used in order to be valued, creating job opportunities and safeguarding the environmental balance "
The Blue Economy can be considered the economy of responsibility that starts from the sea and extends to all production chains, from agro-industry, to manufacturing, to tourism. It arises from the ideal concept of ethical development and develops on the important concepts of economic, social, environmental and cultural sustainability. 75% of the planet is made up of aquatic resources; this figure gives the potential generation of new jobs and more economic opportunities from the sea and coastal resources.
In the United States, more than 50 million jobs and over 60% of GDP are already derived from the Blue Economy. The model exported to the Italian seas could suggest a turning point with respect to the economic stagnation that mainly affects the south.
Only the Mediterranean Sea represents 0.3% of the volume and 0.8% of the total surface of the Oceans with a strategic position between three continents, a semi-closed basin and a range of seasons that allows significant biodiversity by hosting over 7% of the ocean flora and fauna known so far. [236]
Analysing the situation in Taranto, it can be seen that in 2013 the fish supply chain, shipbuilding, passenger transport, goods movement, accommodation and catering, sports and leisure activities, accounted for 6.9% of the total added value of the province of Taranto. A cash flow of over 600 million euros and an employment base of around 10,000 units.
The Italian province with the highest added value and the highest number of employees in the blue economy is Rome with almost 6 billion euros and 103,000 employees (12.7% of the national total). The capital is followed by three important seaside cities such as Genoa, Naples and Venice. Despite being located inland, Milan has a turnover of 1.5 billion and 16,000 employees.

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[235] *These are the most significant data of the **Fourth Unioncamere Report** on the **Marine Economy** released on April 30, 2015 on the occasion of the **First National Day on Marine Economy**, which was held between Gaeta, La Spezia and Venice. Source: http://www.unioncamere.gov.it/P42A2672C2507S144/Rapporto-Unioncamere-sull-Economia-del-Mare-2015.htm*

[236] *Source: http://www.distrettopesca.it/BlueEconomy.aspx*

The only Apulian province present among the top ten, by developed occupation, is Bari with about 17.0000 units. Realities like Livorno and Trieste assume a provincial added value deriving from the blue economy up to 16%.
Apulia has 865 kilometres of coastline, around 12% of the national total. Taranto, with its 118 km is penultimate in terms of extension of the coast followed by Brindisi with 115 km. Despite this potential, however, the incidence of businesses connected to the sea economy in Apulia does not exceed 3.5%. [237]
In percentage terms, Apulia achieves the same result as Friuli Venezia Giulia and is far from Liguria which, with almost 9%, is the leading region in Italy. Yet Southern Italy and Central Italy are the two macro areas with the highest concentration of "blue" companies with an incidence on their respective regional business totals of 3.9% (in absolute values 77,338 marine companies in the South and 51,662 in the Centre).
In Italy, the sector plays a major role, higher than the manufacturing industries and has 180,000 units in the Companies Registers of the Italian Chambers of Commerce, equal to 3% of the country's total business.[238]
Starting from some data for 2013, it is noted that the marine economy has produced a national added value of over 41 billion euros, equal to 3% of the total, with a productive force of over 800,000 employees (3.3% of the overall occupation of the country).
Also we cannot underestimate the multiplier effect that allowed the activation of about 80 billion euro of added value on the rest of the economy, for a total production amount of about 119 billion euro (equal to 8.5% of the total of the entire national economy). In statistics it translates into the statement that for every euro produced by the blue economy, two more are activated on the rest of the economy.
From 2011 to 2013, a period of sharp recession, the number of "blue" companies registered in the Chambers of Commerce registers grew by about 3,500 units, marking a + 2% in sharp contrast with the -0.9% of the other sectors (-51,600 in absolute terms). In the period under review, sea tourism, with annexation of accommodation and catering services, marked one of the highest growths: + 4.4%, equal to 3,000 new businesses. To this must be added sports and recreational activities with + 3.6%, equal to almost 1,000 companies. In territorial terms, the most significant increases concerned the Centre (+ 2.5%; +1.300 businesses) and, even more so, the South (+ 2.9%; +2,200 businesses) [239], confirming how this cross-section of economy can represent an important opportunity for the less advanced areas of the country, starting from the following sharing points:

- Thinking about fish and marine resources based on the actual production capacity of the sea.
- Protection and preservation of the marine environment.
- Internationalisation, understood not as the conquest of new markets but in terms of cooperation between markets.
- Management through the scientific approach, favouring research and training.
- Public availability of information.
- Transparent and open decision-making procedures.
- Precautionary approach.
- Systemic approach.
- Sustainable and fair use of resources.
- Responsibility of States as controllers of the global marine environment and of individuals.
- Testing of marine engines with alternative fuels (biofuels, hydrogen etc)

The Third Industrial Revolution and the sustainable use of natural resources

"Oil and other fossil fuels, the energy sources on which today's lifestyle in the Western countries is based, are running out, and the technologies they fuel are becoming obsolete. Meanwhile, the evils that afflict the globalised world - economic crisis, unemployment, poverty, hunger and wars - seem to be worsening rather than resolving. To make matters worse, a catastrophic climate change is looming on the horizon caused by industrial and commercial activities with high greenhouse gas emissions, and which could endanger human life on the planet by the end of this century. Our civilisation, therefore, must choose whether to continue on the road that has brought it a step away from the abyss, or to bravely try to take another one. And we don't have much time to do it. This new energy regime, no longer centralised and hierarchical but distributed and collaborative, and which will mark the transition from globalisation to "continentalisation", will rest on the five pillars.
The scenario envisaged by Jeremy Rifkin clearly denounces the unsustainable environmental impact on the planet that traditional sources will have in the coming years.

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[237] *Source: study "The sea: sustainability as an engine of development", carried out by the Ministry of the Environment and Unioncamere.*
[238] *Data: Taranto Chamber of Commerce.*
[239] *Source: http://www.tarantobuonasera.it/taranto-news/cronaca/364784/news.aspx*

According to Rifkin, the first and second industrial revolution determined a vertical system of energy production and distribution. Fossil fuels - coal, oil and natural gas - are elitist energies, since they are found exclusively in certain places on the planet. They require significant military investments to ensure access and continued geopolitical management to ensure their availability. They also require a hierarchical organisation and huge capitals to bring them from the depths of the earth to the final consumer. This centralised system sets the conditions for the rest of the economy, encouraging similar models in all production sectors. The only possible solution seems to find a remedy in the total change of energy paradigms and by moving the use of renewable sources and the network. The technological breakthrough can in fact put in communication an enormous quantity of capillary points of production, where the current plants can be supplanted by the single houses, true micro centres capable of satisfying internal consumption but also of storing and transferring the surplus to the network.
It will be the definitive transition from vertical to horizontal integration, with the power transmitted to citizens who are now able to self-produce energy.
The future scene thus outlines the revolution of the old asset also in the employment field, with the possibility of creating millions of new employees in the renovation of houses, in the construction of networks, in the development of technologies. The change will be able to profoundly change the geopolitical structure and relations between states, social relations, modes of production.
The pillars on which the new logic rests go through the definitive transit of renewable energy, micro-generation, the development of hydrogen for the storage of energy, a large distribution network accessible to all, electric mobility. According to Rifkin, the great economic revolutions take place when two factors coincide in history: the advent of new communication systems together with new energy systems. Here lies the key to the "new economic narrative" that will lead us towards a no carbon future and towards an era based on distributed capitalism.
Thanks to the most recent innovations, we have moved from personal computers, from telephone cables to cells, bringing in a very short time billions of people to be connected to each other horizontally and with very low costs through the Internet. This democratization of communications has rapidly enabled a third of humanity to share music, knowledge, information and social life in an open and accessible space, effectively implementing one of the most extraordinary evolutionary passages in all human history.
The same will happen with the Third Industrial Revolution. The new collaborative and distributed models which will characterise the production and distribution of energy, will act as an unstoppable push to modify all models and production systems at the base of each economic sector. The way companies conduct their businesses will be transformed. We will increasingly move towards customised, local micro-productions based on minimum capital investments.
In addition to the development of technological innovations and the contemporary harmonious growth of all the pillars on which the economic revolution is based, a real cultural revolution will also be needed. Entrepreneurs and managers will have to rethink their business models, also looking at distributed and collaborative research and development strategies, open source and network commerce, performance contracts, agreements on distributed savings and sustainable supply chains based on low-carbon logistics.

1.11- Towards a society with zero emissions, waste and km

The zero marginal cost society

In the last decade, the phenomenon of zero marginal cost has grown strongly. Millions of consumers have turned into the recent concept of "prosumers", ie producers and consumers at the same time, starting to produce and share personal news across the social Web. The phenomenon of zero marginal cost has created a disarming novelty so as to put the classic concept industries in difficulty but allow start-ups that have become large companies able to keep up with a new concept of doing business.
Until recently, insiders claimed that the phenomenon would soon run aground in solitude without ever crossing the border that separates the virtual world from the economic reality of energy, services and material goods. The extraordinary news is that today that border has been crossed.
The new disruptive technological revolution will put further millions of prosumers in a position to produce 3D printed objects, share energy, at almost zero marginal costs.
The frontier of the Internet of things is given by the combination of the Internet of communications, the Internet of energy, the Internet of transport and automated logistics.
The platform of the Third Industrial Revolution in the coming decades will profoundly transform the planetary economy with billions of sensors connected to flows of resources capable of constantly monitoring performance and transmitting the mass of data thus obtained to an intelligent global-spread network. The new vision will drastically increase productivity and reduce the marginal costs of manufacturing and distribution of physical products to almost zero, as prosumers already do with information products.

In the coming decades, the forecast is that even the energy used to make every component of the global economy work will be generated at almost zero cost. There are already several million pioneers who have transformed their homes and their business locations into micro-power plants that collect renewable energy on the spot.
Unlike fossil fuels and uranium used to generate nuclear energy, in fact, the sun's rays and the wind intercepted between buildings cost nothing! The Internet of Things will allow prosumers to monitor electricity consumption, optimise energy efficiency and sell excess green electricity to others through the increasingly complex Internet of energy.
As Rifkin himself claims:
The advance towards a horizon of almost zero marginal costs and almost free goods and services is a function of the progress made on the productivity front. Productivity is "a measure of production efficiency calculated in terms of the relationship between what is produced and what is necessary to produce it". If the production cost of an additional good or service is almost zero, in terms of productivity this would be the optimal level. Again we are faced with the contradiction that lurks in the heart of capitalism. The driving force of the system is the increase in productivity, determined by the increase in thermodynamic efficiency. It is an implacable process, in which the subjects in the race compete in the introduction of new and more productive technologies, so as to lower production costs and the price of the products and services offered, thus attracting buyers. The race proceeds with relentless momentum, until you reach the finish line, where you reach maximum efficiency and the extreme peak of productivity. Here the marginal cost of production of each additional unit is almost zero. Crossing this milestone, goods and services become almost free, profit plummets, the exchange of properties in the markets atrophies and the capitalist system dies.
Until recently, economists were content to measure productivity on the basis of two factors: the capital invested in machinery and the return on labour. Studying the industrial age, however, Robert Solow, who in 1987 won the Nobel Prize for economics with his growth theory, found that capital in machinery and labour performance is attributable only to around 14% of the entire economic growth: therefore the problem arose of understanding what the remaining 86% should be traced back to. The mystery led economist Moses Abramovitz, former president of the American Economic Association, to admit what other economists were afraid to recognise, that is, "the other 86 percent is a measure of our ignorance." Over the past 25 years various analysts, including physicist Reiner Kümmel, of the University of Würzburg, and economist Robert Ayres, of the Institut Européen d'Administration des Affaires (INSEAD) of Fontainebleau, have reviewed the economic growth of the industrial era by analysing three factors: capital in machinery, labour performance and thermodynamic efficiency in the use of energy. They thus discovered that most of the remaining productivity gain and the remaining growth that occurs in industrial economies is due to "the increasing thermodynamic efficiency with which energy and raw materials are converted into useful work". So the missing factor is "energy".[240]
The productivity gains of the Third Industrial Revolution will exceed those of the First and Second ones.[241]
Prosumers do not limit themselves exclusively to producing and sharing information, in collaborative Commons at almost zero marginal cost, but they also share cars, clothes, houses, facilities to facilitate rentals, redistribution clubs and cooperatives, and much more.
This type of collaborative partnership economy actively involves 40% of the US population with a thousand areas of action: car sharing, shared apartments, travel etc. [242] The "exchange value" on the market is increasingly being replaced by the "sharing value" in the collaborative Commons.
So Rifkin continues:
This huge leap in productivity will be made possible by the nascent Internet of things, the first revolution in history originated from an intelligent infrastructure. The latter will connect every machine, every company, every home and every means of transport in an intelligent network consisting of an Internet of communications, an Internet of energy and an Internet of logistics, integrated into a single operating system. In the United States alone, 37 million smart digital meters provide real-time information on electricity consumption.
Within ten years, every building in America and Europe, as well as in other countries in the world, will be equipped with smart meters.
And every equipment - thermostats, assembly lines, warehouse equipment, televisions, washing machines or computers - will have sensors connected to the smart meter and the IoT platform.
In 2007, 10 million sensors were used to connect the most disparate types of devices to the Internet of things. In 2013 the number approached 3 and a half billion. But far more impressive is the data forecast for 2030, when it is expected that 100,000 billion sensors will be connected to the IOT.
Other sensor-based sensing devices, including aerial sensor technologies, software logs, radio frequency identification readers and wireless sensor networks, will help collect big data in a broad spectrum of areas, from energy price changes to logistics traffic in supply chains, from production flows in assembly lines to the status of services in front offices and back offices, up to real-time monitoring of consumer movements.

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[240] *The society with zero marginal cost" - J. Rifkin. pages 97,98.*
[241] *According to Cisco Systems forecasts, the Internet of Things will generate $ 14.400 trillion saving and revenue in 2022.*
[242] *Between 2012 and 2013, in New York alone, 416,000 people were hosted in houses and apartments thanks to Airbnb.*

The intelligent infrastructure will then make a continuous flow of big data available to each networked company, which can process them with advanced analysis tools and thus create forecasting algorithms and automated systems to improve thermodynamic efficiency, considerably increase productivity and reduce marginal costs across the value chain near to zero.
Cisco Systems estimates that its *Internet of Everything* will generate $ 14.400 billion in saved costs and revenue in 2022. A study published by General Electric in November 2012 concludes that by 2025 the efficiency gains and productivity progress made possible by an intelligent industrial Internet could affect almost every economic sector, affecting "about half of the global economy". And it is by examining the various sectors that we begin to understand the production potential released by the first intelligent infrastructure in history. In the air transport sector, for example, if, thanks to the analysis of big data for the development of more effective routes, for the monitoring of vehicles and instrumentation and for repair interventions, an improvement of just '1% in the use of fuel was reached, in 15 years over 30 billion dollars would be saved.
Another significant example of the production potential offered by the incorporation into an Internet of things is given by the health sector. Health care represents 10% of global GDP, or 7100 billion dollars (in 2011), yet 10% of health expenditure, at least 731 billion dollars a year, is made up of "waste for system inefficiencies ". Furthermore, according to the study by General Electric, 59% of these inefficiencies, that is $ 429 billion, could be attacked with the creation of an industrial Internet: by taking advantage of big data feedback, advanced analysis tools, predictive algorithms and Automation, we could cut the global cost of the healthcare sector by 25%, with annual savings of $ 100 billion. Reducing costs by a single percentage point would result in savings of $ 4 billion $ 200.000 a year, or $ 63 billion in fifteen years. If we increase these efficiency gains, in the air transport and healthcare sectors, then the activity of economic change becomes evident in every other sector, from 1 to 2, to 5, to 10%.
Today the development of the Internet of Things is removing one after another the levels of protection that have made privacy a sacrosanct principle and a right considered not less important than the right to life, freedom or the pursuit of happiness. For the young generation that is growing up in a globally interconnected world, anxious to make public and share with everyone every moment of their lives through Facebook, Twitter, YouTube, Instagram and other countless social media sites, privacy has lost much of its charm. For these children, freedom is not tied to the idea of full autonomy and exclusion, but to the pleasure of being accessible to others and the inclusion in a global and virtual public agora. The watchword of the latest generation is transparency and its modus operandi is collaboration. Its self-expression is realised in the production of parity in small lateral scale networks.
Whether future generations - who will live in an increasingly interconnected world, where everything and everyone will be incorporated into the Internet of things - will still have privacy at heart, is an open question.
Meanwhile, in the long transition from the capitalist era to the collaborative era, privacy problems will continue to be a fundamental concern, destined to significantly affect both the speed of the transition and the paths that will be taken in the next historical phase.
The renewed occupation of millions of people will increase purchasing power, and the construction of the IoT platform will make an exemplary increase in productivity possible. The value chain will once again enhance the multiplier effect throughout the economic body. [243]

The Internet of Things and free or very low-cost energy.

Every industrial revolution is such as it is characterised by its energy-communication matrix.
The first industrial revolution was characterised by energy produced by the burning of coal, by communications revolutionised by the invention of the telegraph that approached and made instantaneous the diffusion of information and the transport system of goods and people that developed around the railways.
The second industrial revolution was characterised by the energy produced by oil and natural gas, by communications revolutionised by the invention of the telephone which allowed everyone to be able to communicate directly with others and by the transport system characterised by the invention of the internal combustion engine.
Both these industrial revolutions, however, have in common the fact that energy, information and goods tend to be managed in an increasingly centralised way and move from the producer to the end user.
The invention and diffusion of the internet has made a change in the way information travel. In fact, in an internet network, information no longer travels in one direction but in multiple directions since each node on the network is represented by a user who is simultaneously the user and provider of information.
A first example of this model are peer-to-peer systems through which users exchange, sharing them, their music files, videos or documents.
This model was then followed in the energy production system in which each user produces the energy he needs himself and exchanges it with the other users of the electricity grid.
The transport and logistics systems are also changing according to this model.

[243] *Source: http://espresso.repubblica.it/plus/articoli/2014/08/28/news/terza-rivoluzione-industriale-cosi-torneremo-ricchi-la-ricetta-di-jeremy-rifkin-per-uscire-dalla-crisi-1.178098*

The first, in fact, is seeing the diffusion in a private sphere of car sharing and pool sharing favoured by the Internet, which allows to bring car owners and users into contact in real time.
In the field of logistics, we are moving towards the creation of a system in which warehouses, goods and means of transport are connected to each other by means of sensors that monitor them instantly and allow us to know and organise in real time and optimally the transport of goods and people. In fact, currently the fact that the goods are stored in mega warehouses even hundreds or thousands of kilometres away from the end users means that the transport of the goods takes place mainly from the warehouse to the final distribution centres with the return of the empty vehicles to the starting point. This means that the vehicles travel empty for almost 20% of their journey with an increase in costs and fuel consumption. Sharing warehouses and means of transport can make the logistics system more efficient.
The diffusion and development of 3D printers, then, will allow, in the not too distant future, to produce goods near the points of consumption using as raw material the one coming from the recycling of waste produced in the same areas; in this way it will reduce even more the path that they must take before arriving at their destination. The bits necessary to give instructions to the various printers spread throughout the territory, instead, will travel for long distances.
The implementation of the internet with the information, logistic and energy system constitutes what is called the internet of things and is the basis of the third industrial revolution.
The fundamental characteristics of this new paradigm are the presence of prosumers, subjects who are simultaneously producers and consumers, the sharing of goods, information, services, means and spaces, the diffusion in the territory and the presence of an infrastructure network that must connect all this.
The advantages of this model are constituted by the fact that costs tend to decrease, up to a marginal cost, that is the cost necessary to produce an additional unit, close to zero, and by the fact that the wealth that in the current model is concentrated in the hands of the few who control the energy, production and distribution systems in monopolistic or oligarchical way are distributed over the many prosumers in the area, thus creating a natural distribution of income.
The centrepiece of this revolution is above all the change in the energy paradigm or the passage of energy production from fossil sources controlled by a few people and concentrated in a few areas in the world, to renewable sources distributed, widespread and accessible to all in a free and democratic way.
In fact, the sun or the wind do not send any bills and do not decide where to go based on political opinions, so you will not have to pay anything to have the source from which to produce the energy you need and, above all, it won't be necessary anymore to comply with the political demands of the governments of the producer countries. The only costs that must be incurred are those relating to the construction of the plants and this means that, once these costs are recovered, the energy is produced at zero marginal costs.
Another characteristic of renewable energies is that they are not very concentrated but distributed over vast territories and if on the one hand this is seen as a disadvantage because it requires the occupation of large areas to produce the energy that is needed, on the other it implies that the energy produced by these sources can hardly be controlled by a few subjects. And in fact, those who want to control energy production from renewable sources, do not focus on the ownership of the power plants but on the control and management of the electricity network with the imposition of prohibitions and regulations to try to limit the input of electricity produced from these sources or from small subjects, to favour that produced by large fossil-fuelled power plants or by power plants owned by a small group of subjects.
This happens because very often the producers of energy from fossil sources are also the managers of the electricity grids. For this reason, network neutrality is necessary, i.e. making sure that no private entity can decide for its own benefit and pleasure which electricity, which energy sources and which producers can use the network and which not.
This problem also arises for other networks. Access to the internet must be allowed to everyone at non-prohibitive costs and not only to those who comply with the requirements imposed by the management companies. The same is valid for the road and, above all, railway network which, when entrusted to "interested" private operators, tend to prevent access to new operators in order to make their services less competitive than those offered by the companies controlled by the manager of the infrastructure network. The latter case, for example, occurred in Italy with the railway network, managed by the same company that controls the former rail transport monopolist and which tried to hinder in any way the entrance to new subjects who were in competition with the former monopolist, not allowing slots or not allowing stops in the main stations or, again, charging higher kilometre rates.
To solve this problem, it is necessary that all networks are transformed into commons controlled and managed directly by public entities.

Neo-growth

In a strategic perspective of transition to the third industrial revolution, in counter-tendency to a greater labour intensity, the weight of the financial markets becomes progressively less important, while the training and enhancement of human capital must acquire a far greater importance, together with the conversion of businesses and workers' skills.

In this context, the Italian post-war economy is no exception. (Erroneous) equivalence between industrialization and development (as if agriculture or forms of economy linked to the territory could not guarantee development like large industry (environmentally impacting). Re-orienting Italy towards the steel industry and heavy industrial plants, based on fossil fuels. This also happened in Taranto where the steel industry was considered a factor of economic development and a source of social well-being. Now we know that's not what happened.
Economies of scale are best attained according to horizontal or lateral models animated by networks of small and medium-sized enterprises interconnected in community form with each other and with civil society organisations and local authorities. The emerging form of business of the third industrial revolution therefore logically appears to be that of small and medium-sized enterprises (SMEs), rooted in the territory, creator of local wealth and innervated in the municipal and regional and therefore institutional fabric.
In this regard, the Nobel Prize North emphasizes how not only individual institutions respond to the dynamics of increasing returns: the entire institutional matrix shapes complementary organisational forms, which, for their part, could generate new integrative institutions.
When the mechanisms that produce increasing returns are linked to inefficient institutions - which therefore do not stimulate a balanced and widespread economic development - groups and organizations will be created willing to exploit the existing constraints to their advantage, producing distortions in the economic system.
The renewed prominence of small and medium-sized enterprises is parallel to the acquisition of a new socio-political prominence also at the local level, because the technologies capable of producing energy through the instantaneous radiation of the sun and the various thermodynamic processes that arise from it (wind, waves, biomass, etc.) are perfectly within the reach of local authorities, unlike the current mega plants.
In such a context, the financing of the distributed energy activities of the Third Industrial Revolution and the entire economy based on them, not only does not need the heavy, expensive and unstable structure of virtual finance, but must be based on new reliable operating logic and dynamics opposed to those of the last thirty years.
These are the foundations of what we call "Neo-growth", which is a different way of growing free, without waste and with a strong reduction of inequalities, the opposite of the multiple manoeuvres, stimulations, financial engineering for artificial growth.
The problem of financial flows must be tackled at the root both locally and regionally and globally in order to obtain concrete and lasting results.
Local level is important because it is the one where you immediately feel the distortions of the current system and where you need to equip yourself with different tools to impose a change from below.
The first device is to restore local public finance to its political and social role through fair taxation and an economy of the common good, because this closes the way to evasions, mafia presences and political patronage.
These are the basis of the virtuous accumulation of a transparent, sustainable and active public budget, as the experience of the Scandinavian capitalist countries amply demonstrates.
The second tool is local modelling of the financial and banking market. This means imposing ethical finance standards in the territory of one's local administration in a formal and informal way (licensing) in order to have healthy local banks that respond to the needs of nullifying usury circuits in the bud and discouraging old and new forms of speculative finance, sometimes passed off as an alternative (asset-based lenders, factoring, merchant cash advance providers).
Active measures of cooperative credit creation, peer-to-peer lending, controlled circulation of alternative currencies, cooperation with reliable Islamic finance circuits, public microcredit, experimentation with elements of the pop economy (share and swap) and creation of other new forms of social financing could be implied.
At national and European level, action pushed from below, that is by the coalition of local administrators, is needed to redefine the rules of the financial market, discouraging speculative and opaque forms of investment *(shadow finance, high frequency trading, tax havens)*.
In a nutshell, the set of necessary measures in the short and medium term is:

- analysis of financial countries under speculative attack to effectively renegotiate it;
- debt recognition and skimming (debt audit);
- strengthening of the European Common Goods Agency (international management and safeguarding of the public goods of a country under financial attack instead of speculative sale);
- closure of inefficient banks and reform of those receiving aid;
- re-regulation of financial markets in the European market
- overcoming the path dependence.

The concept of "path dependence" is frequently used together with the concept of "lock in". The latter indicates the situation of a system that appears particularly "linked" to specific technologies, industries or institutional structures. Arthur uses the notion of lock in to describe those situations in which the processes that cause path dependence gradually lead to a progressive

rigidity of behavioural and / or economic models associated, for example, with a dominant technology or the spatial concentration of industry. In his perspective, it is very difficult that the quasi-fixity of a specific local development path can be interrupted thanks to the intervention of endogenous forces. Due to the internal rigidity caused precisely by lock ins, it is much easier that these are broken by external factors that suddenly and unexpectedly intervene on the territory.
The Third Industrial Revolution is based on the knowledge economy rather than the knowledge of the economy. In the real economy, a diametrically opposed model is growing based instead on the value of work, on the centrality of the human being, on the laws of thermodynamics and on the enhancement of the environment and natural resources as common goods to be preserved to allow survival of the human species in the biosphere that hosts us.
It is therefore from the local level that the affirmation of a new financial model functional to the needs of companies that create value, distributed wealth and work through actual goods and services must start and not through "bets" on changes in the value of financial packages disconnected from reality and from reasonable warranties.
The current financing model for economic activities must be replaced not only for ethical reasons (which would already be enough), but also because it has exceeded the limits of its efficiency, sustainability and reliability.
The so-called "markets" demonstrate it to the financial stabilization measures required by the European Union or the IMF, which now no longer produce the expected results in terms of spreads and stock market values, but are more linked to factors that combine exchange manipulations and asymmetries information (the known "bubbles") with a strong volatility of decision-making processes, in which sentiment risks overwhelming the most objective evaluation criteria, driven by the imperative of over-profit.
This system ignores and devastates the actual processes of financial recovery or creation of real value of the economy of a particular country or of a given company. Growth must no longer be achieved to the detriment of the natural resources of environmental balance and public health (as in Taranto). For this reason it is important that investments are reoriented from the fossil and impacting technologies of the second industrial revolution towards digital renewable and eco-sustainable technologies of the Third Industrial Revolution. This was the subject of the introductory conference held by Jeremy Rifkin in Bratislava, for the Slovak EU Presidency which started on 1 July 2016, [244] confirming its commitment to recommend that all investments foreseen by the European growth plan (so-called Juncker Plan) are used in the technologies of the future (Third Industrial Revolution, renewables, digital economy, sharing economy, circular economy, internet of things, home automation, sensors, hydrogen etc) rather than in the fossil technologies of the past (second industrial revolution). The Bratislava Summit also sanctioned the fundamental role that local authorities (Regions and Municipalities) must play in planning third industrial revolution financial investments in the territory according to the holistic approach proposed by the Zero Territory Manifesto, namely energy investments tending towards zero emissions, economic investments in the circular economy tending towards zero waste, and investments in agriculture aimed at promoting the short chain according to the Km zero model proposed by the Slow Food.
The "Zero Territory" approach allows to plan local economies in order to increase the intrinsic value of the goods and services produced, replacing volatile financial evaluation criteria with other concrete and measurable criteria in the economic evaluation process, such as the quality of the environment, the state of health of citizens and businesses, the prosperity of local culture, the sustainability of the local economy.
With Territorio Zero it will no longer be the accumulation of wealth but its redistribution to determine the assessment of the health of the economy of a territory. This puts an end to the failures caused by the capitalist vision of society typical of the second industrial revolution, now at sunset (consumerism, paroxysmal growth of individual consumption with consequent energy waste, waste production and destruction of agricultural culture with an opaque and complex system of promises of payment often based on dubious guarantees of solvency).

[244] *http://cetri-tires.org/press/2016/la-nuova-europa-le-regioni-europee-protagoniste-della-terza-rivoluzione-industriale/*

2 Energy analysis

Introduction

This study aims at describing an energy production model for the city of Taranto with the exclusive use of renewable energy sources available in the area instead of the current system which makes extensive use of non-renewable sources not available in the area and coming mostly from abroad.
The current energy model is that of the second industrial revolution characterised by a scheme that envisages a few large power plants that have to produce energy for a large area using fossil sources. Over time, this scheme has been imposed to reduce infrastructure and production costs by using larger plants with higher yields.
This model provides for the concentration in a few subjects of the production, distribution and sale of energy: electricity, heat production and transport.
This scheme provides one-way networks in which the flow of energy goes from the producer to the user or consumer, while the flow of money goes in the opposite direction, therefore with concentration of economic resources in the hands of the few "masters of steam" and with an impoverishment of the territories that increasingly need energy for domestic, production, logistics uses, etc.
Over the years it has been seen that the exploitation of fossil sources cannot continue indefinitely. Both for a reason of limited nature of these sources and for a reason of environmental non-sustainability which manifests itself both with pollution and with the emission of greenhouse gases which favours the greenhouse effect and overheating of the earth.
In addition to this, the geopolitical problem caused by the concentration of the world's largest reserves in restricted areas of the Earth must be considered. A first effect of this problem occurred in the 1970s due to the Israeli-Egyptian war with the closure of the Suez Canal which reduced the supply of petroleum products and forced western governments to think about policies to reduce consumption for the first time. The problem was not solved with the solution of that war and the reopening of the Canal, but it grew in the following years when the western powers thought of controlling the oil-producing countries, favouring the rise of dictators who would later turn back versus them. It is the example of Iraq with Saddam Hussein helped by the USA in the rise to power which would then trigger 3 Gulf Wars: one between Iraq and Iran and two between Iraq and coalitions led by the USA. More recently, another battleground for oil control has been the Libyan one with the fall of the dictator Gaddafi which has generated a state of chaos that can no longer be controlled.
With the passing of the years and the reduction of world resources, these situations of chaos will increase more and more causing an increase in economic costs but also in terms of human lives.
For these reasons, the current energy model must be overcome and replaced with a model that uses energy sources that do not involve an increase in greenhouse gases, respect thermodynamics, are available locally and in a widespread and free way.
Research and development of technology today make this possible and at affordable and comparable, if not lower, prices than the current model.

Zero emissions Taranto

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The current energy production system

The current second industrial revolution energy production model tends to produce energy in the moment it is needed. This means that the plants must be sized not for the energy they must supply but for the maximum power needed, which entails an oversizing of the same and a lower efficiency with wasted energy and resources.
In the electricity production sector, this has meant that today in Italy we have a production capacity that is more than double the one needed and that production must be continuously modulated so that it satisfies demand instant by instant. So next to a basic production that serves to satisfy part of the demand continuously and that can be met with more efficient power plants, such as those with a combined cycle, as the power demand increases during the day, less efficient power plants must be activated which can be started or shut down in a short time and which entail a higher economic and resource cost; an example of such plants are turbo-gas ones. These plants also have high costs because they only have to work during peak hours. So if the basic production is satisfied by plants that can operate for 8,000 hours per year, the peak production is satisfied by plants that operate for much less hours. Going to the limit that the peak power that occurs only once a year for a few moments will have to be satisfied by a dedicated turbine.
The average production hours of the national electricity system, given by the ratio between the energy consumed in one year and the peak power, are equal to approximately 5,500 hours per year. The production system, on the other hand, due to oversizing, produces an average of 2,700 hours per year. If you think that the business plans of the new thermoelectric power plants expect them to operate for at least 6,000 hours per year, you understand why the thermoelectric system is in crisis and many power plants are about to be decommissioned.
These hours of production also fell thanks to the increase in electricity production from renewable sources which came to cover almost 40% of electricity production.
In reality there is also another reason. In fact, no investments have been made effectively on energy storage systems and those few existing systems, ie. hydroelectric pumping systems, have not been used effectively.
Also the recent struggle between Enel and Terna about who was in charge of managing the pumping systems that saw Enel win, does not go in the right direction. In fact, this choice sanctioned the fact that pumping systems are not systems for storing energy and regulating the electrical system, but systems for producing electricity. And this is not true. In fact, these systems produce electricity, but only after accumulating it in the form of potential energy by pumping the water with the electricity produced in excess of the demand.
This choice has meant that in recent years the contribution of pumping has gradually decreased because Enel has no interest in storing energy if it cannot have an economic benefit. In fact, in past years, when pumping was used to a greater extent, Enel used the basins to store electricity sold off at night by thermonuclear power plants, especially in France, and then sold it at peak times when the price of electricity was much greater. As the need to store energy from abroad has decreased due to the increase in domestic production, the pumping capacity has been decreasing more and more.

Power plants

The national thermoelectric park has approximately 75 GW[245] powered by fossil sources with 3,400 production plants and 637 self-production ones. In Apulia there are 66 production plants for a total power of 7.4 GW to which are added 9 self-production plants for a power of 125.4 MW. Overall, therefore, in Apulia there are 75 production plants with a power of 7.5 GW.
Considering that in Apulia at 31 December 2013 there were 4,090,266 [246] residents, this means a per capita power of 1.83 kW against a national average of 1.23 kW, therefore compared to the national average in Apulia there is an excess of power plants equal to 3 GW.

[245] *Terna, "Statistical data on electricity in Italy" year 2013*
[246] *ISTAT data as of December 31 of each year - Elaboration TUTTITALIA.IT*

The electricity production of the national plants in 2013 was 183,403.9 GWh equal to an average of 3,017.4 kWh per capita.
In Apulia, the thermoelectric plants produced 27,903 GWh in 2013, equal to 6,821.8 kWh per capita. As can be seen in Apulia, thermoelectric power plants produce more than double the amount of electricity that is produced on average throughout Italy.
The fuels used in these plants are the most varied. Coal, fuel oil, natural gas, steel mill gas, liquefied petroleum gas, waste, etc.
In the territory of the municipality of Taranto there are three thermoelectric power plants powered by fuel oil, refining gas, coke, Ilva steel gas and natural gas. Two of the three plants totally serve Ilva's needs, while the third transfers energy to both Ilva and the national electricity grid.
The total electrical power of the 3 plants is 1.13 GW [247], which, divided by the population of Taranto, result in an average per capita power of 5.56 kW, more than 4 times the national average, with an excess of thermoelectric power of 878 MW.
As for electricity production, these three plants produce a total of 8.577,1 GWh of electricity, with a per capita production of 42,099 kWh, about 14 times the national average.
In addition to the thermoelectric plants, the national electricity park also consists of other power plants that use other sources or other technologies in addition to gas or combined cycle turbines.
The source that provides the highest power and production is the hydroelectric one, both in the basin and in flowing water, followed by photovoltaics, which quickly became the third production source, wind and, finally, the geothermal one restricted to Tuscany alone.

The following table 1 shows the data of the national power plants .

Fonte	Potenza MW	Pro capite kW	Energia GWh	Pro capite kWh
Termoelettrica	75.050	1,235	183.404	3.017
Geotermoelettrica	729	0,012	5.320	88
Idroelettrico	22.009	0,362	54.068	890
Eolico	8.561	0,141	14.812	244
Fotovoltaico	18.420	0,303	21.229	349
Totale	124.769	2,053	278.833	4.587

Potenza e produzione delle centrali elettriche in Italia

Table 1: Power and production of power plants in Italy

In Apulia, after the thermoelectric, the second production source is the photovoltaic one followed by the wind and, finally, a small contribution of the hydroelectric source.
The data of the power plants in Apulia are shown in the following Table 2.

Fonte	Potenza MW	Pro capite kW	Energia GWh	Pro capite kWh
Termoelettrica	7.529	1,841	27.903	6.822
Geotermoelettrica	0	0,000	0	0
Idroelettrico	2	0,000	5	1
Eolico	2.266	0,554	3.883	949
Fotovoltaico	2.641	0,646	3.641	890
Totale	12.437	3,041	35.431	8.662

Potenza e produzione delle centrali elettriche in Puglia

Table 2: Power and production of power plants in Apulia

As for the city of Taranto, electricity production is restricted to two types of plants; thermoelectric and photovoltaic plants[248].

The data of the power plants in Taranto are shown in the following Table 3.

Fonte	Potenza MW	Pro capite kW	Energia GWh	Pro capite kWh
Termoelettrica	1.130	5,559	8.557	42.099
Geotermoelettrica	0	0,000	0	0
Idroelettrico	0	0,000	0	0
Eolico	0	0,000	0	0
Fotovoltaico	53	0,261	73	360
Totale	1.183	5,820	8.630	42.459

Tabella 3: Potenza e produzione delle centrali elettriche a Taranto

Table 3: Power and production of power plants in Taranto

[247] *Data obtained from: Integrated Environmental Authorisation for the operation of the thermoelectric Edison plant, production site of Taranto of the Edison S.p.A. located in the municipality of Taranto and Integrated Environmental Authorisation for the operation of the EniPower S.p.A. thermoelectric plant located in the municipality of Taranto*

[248] *Atlasole, GSE data.*

Considering the operating hours of traditional thermoelectric power plants, it is found that at national level these produce on average for 2,444 hours per year, those of Apulia for 3,706 hours per year and those of Taranto for 7,573 hours per year. From this data it is clear that at national and regional level there is a surplus of thermoelectric power which leads to an inefficient operation of the plants with a waste of resources and an excess of costs.
These data also tell us that more than half of the thermoelectric power should be decommissioned to make the park more efficient and reduce waste and, therefore, costs.

Plants from renewable sources

In recent years, the contribution of renewable sources to national electricity production has increased thanks to incentive policies for renewable sources such as the Feed-in Tariff and the green certificates.
According to Terna data, at December 31, 2013, renewable sources, excluding biomass and bioliquids, covered 40% of the installed power and 34% of the energy produced.
In 2013, Terna's data certified that the incidence of renewable sources on national electricity production was 39.4%, with the exclusion of municipal solid waste. The total production of these sources, in fact, was equal to 109,787.4 GWh.
The following Graph 1 illustrates better the way in which renewable sources have grown from 2006 to 2013, a period in which electricity production has more than doubled.

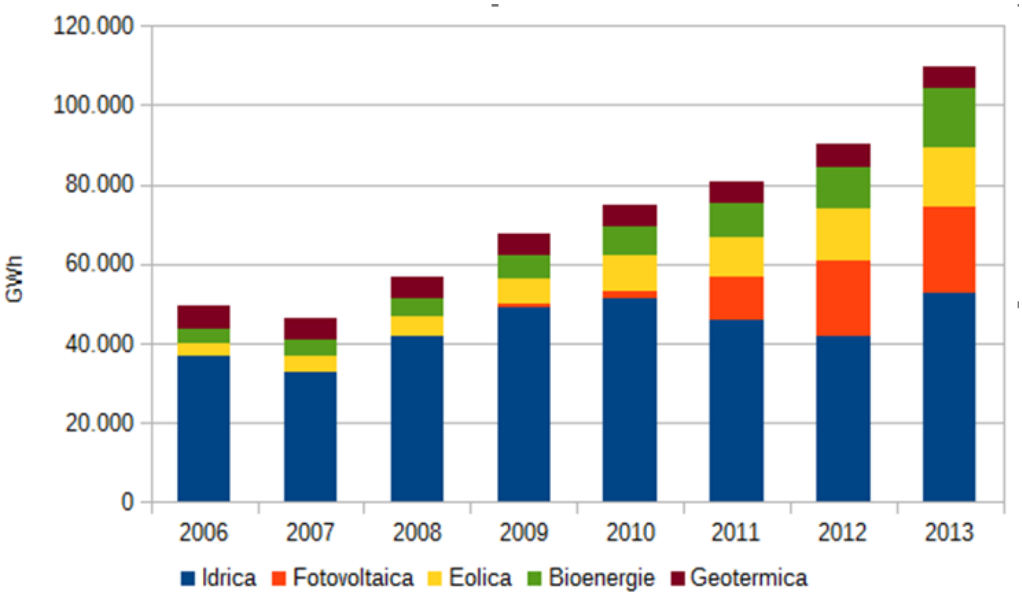

Chart 1: Energy produced from renewable sources from 2006 to 2013

Even between the different sources there was a change with a percentage decrease in the water source and a growth in wind and photovoltaics which became the second renewable source of electricity production. The time trend of the percentage impact of these sources is shown in the following Graph 2.

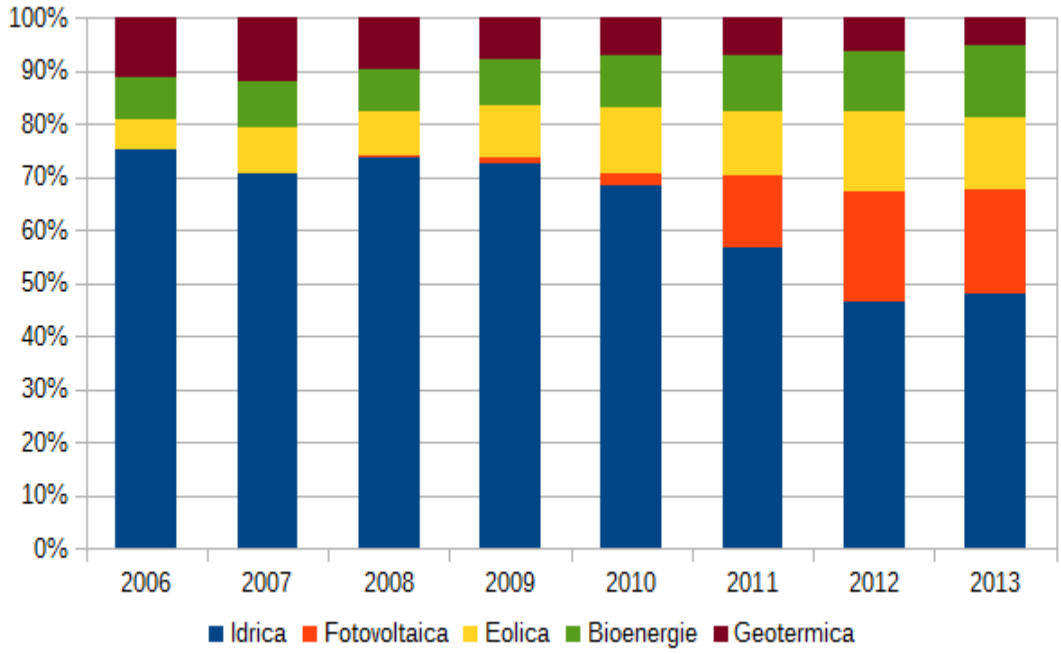

Chart 2: Percentage impact of the various renewable sources from 2006 to 2013

This graph shows how the water source went from 75.1% in 2006 to 48.1% in 2013, while photovoltaics, practically absent in 2006, reached the share of 9.7% of energy produced in the total of renewables.

As regards regional data, however, in Apulia renewable sources cover 39% of the installed power and 21% of the energy produced. As you can see, unlike what could be thought, Apulia has a percentage of energy produced from renewable sources lower than the national average.
In Taranto, on the other hand, renewable energies cover 4.5% of the installed power and 0.85% of the energy produced with a large deficit with respect to both regional and national data.
Taranto's data show that the production of energy used for the operation of the Ilva plant heavily affects the city's energy production.

Public and private transport

Over the centuries, the transport of goods and people has become increasingly important, also because the time spent to move goods and people over the years has gradually decreased.
For many centuries the best way to move goods was by sea as there was no effective road system, even if the Romans had connected almost every part of their empire with the roads: the known consular roads. Once the Roman empire collapsed, however, no one thought of keeping those roads that over time lost their efficiency. To compensate for the lack of roads and the fact that land transport was very long and expensive, waterways developed with the construction of navigable canals in many parts of Europe and in northern Italy. The energy sources used for transportation were therefore wind and human and animal strength.
With the advent of the first industrial revolution and the invention of the steam engine, the way transport took place changed. The ships exploited the mechanical force of the steam engines instead of the wind, while the transport by land saw a development and speed up thanks to the development of the railway. Slowly throughout Europe and the world, the railway lines that connected the production areas of goods or raw materials with ports or places of consumption grew, at the same time, more and more people began to abandon the stagecoaches and used trains for their travels.
With the second industrial revolution and the invention of internal combustion engines, other means of transport developed, such as automotive and air transport.
In Italy the economic boom led to a rapid development of the use of the car and private transport which led to the development of the roads at the expense of the railway lines which over the years have seen the length of the railway lines decrease following the divestment of many railway sections no longer economically viable due to the decrease in the number of passengers who

used the trains, although in many cases the closing of the sections were caused by the fact that the offer did not meet the demand for the timetables and frequency of the trains.
This divestment of the railway sections has not only affected the transport of people, that has moved to private vehicles and buses, but also the transport of goods, which due to the absence of an efficient organisation and incentive policies has involved the development of road transport.
The energy needed for transportation is mainly produced with internal combustion engines, both Otto and Diesel cycles. These engines have a maximum efficiency that is around 30-40% but in normal use this efficiency drops due to the acceleration and deceleration transients or the moments in which the engine remains on while the vehicle is off.
Another reason why the performance is lower is due to the increasing weight of the vehicles due to the fact that there is always a tendency to produce faster and more powerful vehicles that require more rigid bodies to have a good road-holding and be more resistant with an increase in weight. This therefore entails an increase in the consumption of vehicles which invalidates their reduction in number consequent to the European directives which impose a decrease in polluting emissions.
This phenomenon is fuelled by the propaganda of the 'speed myth' for which vehicles that can exceed 200 km / h continue to be produced and requested when the maximum speeds they can travel at is 130 km / h and only on the highway.
The Italian vehicle fleet at 2013[249] consisted of a total of 48.666.032 motor vehicles, of which 36.962.934 cars. For every 1000 inhabitants in Italy there are a total of 800 motor vehicles, of which 608 are cars.
In Apulia the number of vehicles in circulation is equal to 2,844,232 of which 2.24,319 are cars. To make a comparison with the national average, the number of vehicles per 1000 inhabitants circulating in Puglia is equal to 695, much lower than the national value, while the figure for passenger cars is equal to 550, a figure higher than the national average.
In the Province of Taranto, on the other hand, 399.491 vehicles circulate, of which 321.552 are cars. The data of vehicles and cars per 1000 inhabitants is equal to 677 and 545, respectively, close to the values found in the region.
Finally, in the municipality of Taranto, the number of vehicles in circulation is equal to 133.683 of which 108.085 are cars. While the data of vehicles and cars per 1000 inhabitants is equal to 658 and 532 respectively.
The following tables show the data on the number of vehicles per 1000 inhabitants as of 31 December 2013, divided into passenger cars, motorcycles, trucks, motor trucks, tractors, buses and other types of motor vehicles.

Tipo veicolo	Quantità	Veicoli per 1000 ab
Autovetture	36.962.934	608,116
Motocicli	6.481.770	106,638
Autocarri	3.938.026	64,789
Motocarri	276.743	4,553
Motrici	149.563	2,461
Autobus	98.551	1,621
Altro	758.445	12,478
Totale	48.666.032	800,656

Table 4: Motor vehicles circulating in Italy as of 31/12/2013

Tipo veicolo	Quantità	Veicoli per 1000 ab
Autovetture	108.085	531,765
Motocicli	16.677	82,049
Autocarri	5.967	29,357
Motocarri	689	3,390
Motrici	341	1,678
Autobus	538	2,647
Altro	1.386	6,819
Totale	133.683	657,704

Table 5: Motor vehicles circulating in Apulia as of 31/12/2013

[249] *ACI data*

Tipo veicolo	Quantità	Veicoli per 1000 ab
Autovetture	2.249.319	549,920
Motocicli	291.063	71,160
Autocarri	217.224	53,108
Motocarri	34.810	8,510
Motrici	9.158	2,239
Autobus	6.796	1,662
Altro	35.862	8,768
Totale	2.844.232	695,366

Table 6: Motor vehicles circulating in the Province of Taranto as of 31/12/2013

Tipo veicolo	Quantità	Veicoli per 1000 ab
Autovetture	321.552	544,744
Motocicli	42.312	71,681
Autocarri	24.557	41,602
Motocarri	4.768	8,078
Motrici	1.005	1,703
Autobus	968	1,640
Altro	4.329	7,334
Totale	399.491	676,781

Table 7: Motor vehicles circulating in Taranto as of 31/12/2013

These data show that most of the motor vehicles in circulation are made up of cars, which shows that in recent years there has been a tendency to favour single transport and possession of a private car rather than collective transport or sharing of transport means. From an energy point of view, of course, individual transport is more expensive than collective transport, so an efficiency of this transport model would lead to significant energy savings.
The following two graphs show the comparison between the data of the vehicles per 1000 inhabitants and the percentage distribution of each type of motor vehicle in Italy, Apulia, the Province of Taranto and Taranto.

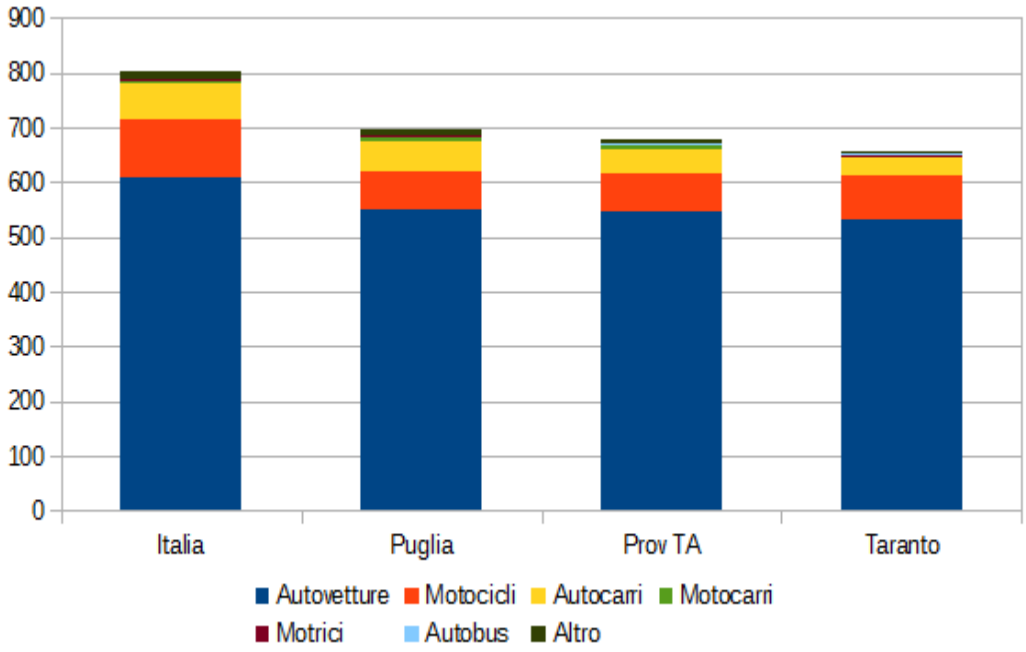

Chart 3: Comparison of the number of vehicles per 1000 inhabitants divided by type

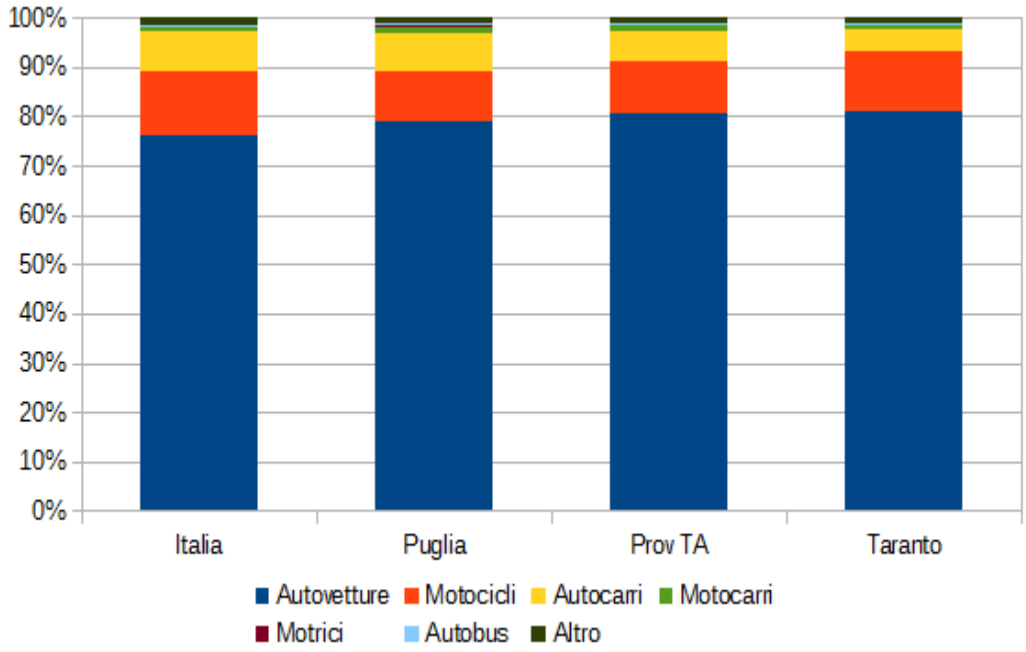

Chart 4: Comparison of the percentage distribution of the various types of vehicles

Renewable energy sources available in the area and energy production systems

The exploitation of renewable sources is based on the principle of producing energy with sources available in the area. These sources can be programmable, that is, activated only when you want and need. For example, programmable sources include wood biomass; in fact having wood from a forest available, those who need to warm up can do it whenever they want by lighting a fire in a fireplace.
A second important feature of renewable energy sources is that an accumulation must be created in order to exploit them. In the previous example, those who need to warm up with wood in winter will have to stock it up during the rest of the year.
A third characteristic of renewable sources is that they are not concentrated but distributed, so to meet everyone's energy needs, it is necessary to have a certain area of land, coverage, forest, water basin, etc. available.
The advantages of using renewable energy sources are:

- they have no masters so nobody can ever ask us money for exploitation, at the most we will have to pay royalties to the community;
- they create energy independence both for the individual person who uses them and for the community that will no longer have to depend on fossil sources extracted thousands of kilometres away which are mostly managed by dictators or absolute monarchies;
- in the long run they zero the energy cost precisely because once the infrastructure is repaid, the sources are available for free;
- they can be shared whereby those who manage to produce more energy than necessary can share the excess energy with the community;
- they are distributed, so the energy production model constituted by the large power plant that satisfies a large community is outdated and with it the large infrastructures for transmitting large quantities of energy from one area to another.

The transition from fossil to renewable sources, therefore, involves a paradigm shift. In fact, if with the fossil model we think in terms of power, sizing the whole system according to the maximum power with great expenditure of resources, with the renewable model we need to think in terms of energy, sizing the infrastructures according to the energy needed in a time frame. Hence an energy system based on renewable sources requires a production system that provides the necessary energy for a certain period of time which must be combined with an energy storage system that serves to overcome the discontinuities that may arise between the moment when the production takes place and the moment when the consumption takes place.

In fossil systems these discontinuities are overcome by the fact that the power plants are of great power and satisfy the needs of a large number of users whose behaviours tend to mediate with each other's so that the demand for electricity will follow almost similar statistical curves.
In the renewable sources model, instead, the fact that the energy is produced for the individual user ensures that there will always be a time when the demand and production do not coincide, so it is necessary to accumulate the energy produced when the sources are available and then use it when needed. The classic example is the solar source which is not available for 24 hours.
To date, with a hybrid electric model, the storage system has been obtained in a virtual way from the electricity grid, leaving fossil fuel plants to overcome production shortages. But in an electric model without fossil fuel production plants, it is necessary to have a real storage system.

Solar

Sun is the energy source that allowed life on Earth, in fact thanks to solar radiation it was possible not only to have on most of the planet an average temperature that allowed to have water in a liquid state, but solar radiation also enables those vital processes, such as photosynthesis, which allow the development of the plants that are at the base of the food chain.
The energy that the sun transmits every day on earth is 14,000 times what humanity consumes in all forms, so solar energy is more than enough to satisfy all our needs. In addition, the Sun is also the engine of other phenomena that can be exploited to produce energy. In fact, it is thanks to the sun that the water cycle is generated which allows the sea water to return to the mountains in the form of rain or snow. It is always the sun that creates the thermal gradients that produce the pressure differences from which the air masses move in the form of winds.
That's why the energy of the Sun is the main one among the renewables.
This energy can be exploited in various ways. The most basic way is the thermal way with which you can heat a fluid that, while circulating, heats the environment or the fluid can be used to start a turbine and produce electricity.
The other way of using the sun's energy is producing electricity through the photovoltaic effect.

Photovoltaic

Photovoltaic refers to a system that uses solar energy to directly produce electricity through the photovoltaic effect.
The system consists of a system for capturing the sun's rays and generating electricity and a conversion system that serves to make the electricity produced by the capturing system usable by electrical appliances.
The collection system generally consists of flat photovoltaic modules which contain semiconductor material which, when hit by solar radiation, generates a movement of electrons and therefore electricity. The most used semiconductor material is crystalline silicon but there are panels that use other materials such as amorphous silicon, various metals and in the near future also organic materials. To differentiate the various types of panels we speak of first, second or third generation modules.
Crystalline silicon modules belong to the first generation because they were the first to be developed and produced as silicon sticks were used which cannot be used in the electronics sector to make microchips. So we refer to metallurgical, solar and electronic silicon as a function of increasing purity.
A photovoltaic module consists of many photovoltaic cells connected together in series and in parallel: the modules currently on the market have a power that is around 250-300 W. In order to be used to produce the necessary electricity to satisfy electrical needs, the modules must be connected in series forming strings which are then connected in parallel to form the photovoltaic field.
The modules produce direct current electricity which in order to be used by electrical appliances must be transformed into alternating current at a voltage and frequency equal to that of electrical supplies. For this purpose, electrical converters, also called inverters, are used, which through electronic circuits are able to convert electricity from direct current to alternating current. The voltage range in which the inverters operate is guaranteed by the number of modules making up the strings, while the maximum operating current by the number of strings connected in parallel. For this reason, when the number of modules is high, these are divided into several subfields each connected to an inverter.
The electricity produced, after conversion, can be directly consumed by electrical equipment or it can be transferred to the electricity grid or, again, accumulated to be consumed at a later time. When the systems are built in a system connected to the electricity grid, we speak of a grid connected system, if there is no electrical connection then we will speak of off grid systems. The latter are widespread in places not reached by an electricity but lately they are also spreading in the areas reached by the electrical network when the owner decides to detach himself and thus be independent. In this case, there is always a need for an electrical energy storage system to cope with times when the system does not produce. In other cases, there is a tendency to build a system that is connected to the electricity grid but that uses the electricity from the grid only in case of emergency.

The following Figure 1 illustrates the scheme of a grid connected photovoltaic system.

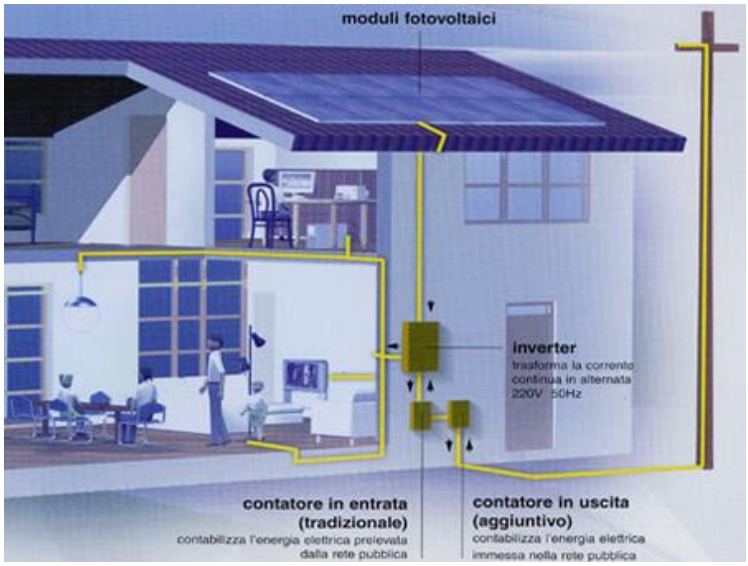

Figure 1: Grid connected photovoltaic system scheme

Until 2013, photovoltaic in Italy was incentivised with the Feed-in Tariff, a mechanism that recognised the electricity produced by the plants at a rate that was intended to repay the construction and financial costs for the construction of the same plants. The tariffs were differentiated according to the size of the systems and the level of architectural integration. The electricity not consumed and transferred to the electricity grid up to the Fourth Feed-in Tariff was valued either with the Exchange mechanism on the spot or with the Dedicated Withdrawal or the Sale for larger plants.
Today there are no longer any Feed-in Tariff mechanisms but the other mechanisms for the enhancement of electricity remain. Unfortunately, unlike other European countries, direct sales of electricity by a producer to a consumer are not possible in Italy as this activity is reserved for electricity companies. So the producer must sell the excess energy back to the electricity company, through the GSE or trader, and then the latter sells this energy back to the end customer. Of course, the purchase and sale prices are different to allow the electricity company to have a profit. A simple way that does not weigh on bills to encourage electricity produced by renewable sources by private individuals, would be to allow them to directly sell the electricity they produce to other private individuals, perhaps with the intermediation of the electricity companies obliged to purchase and sell at the same price.
The energy performance of photovoltaic systems varies by the type of modules used and is between 9% and 17% of the incident solar energy.

Thermal

In addition to producing electricity directly, solar energy can also produce thermal energy to be used to heat rooms, water or for summer cooling through absorbers.
The system for producing thermal energy consists of exploiting panels that capture solar radiation and transmit heat to a heat transfer fluid which, in turn, transfers it to a system in which it is accumulated and then used during the day.
Panels can be of different types. They range from the simplest non-glazed panel suitable for hot areas, up to the vacuum panels which are more suitable for the colder areas where with the vacuum we tend not to transfer the accumulated heat to the outside during the coldest moments of the day.
The heat transfer fluid is generally made up of water with the addition of an antifreeze liquid a bit like in the cooling systems of heat engines. This fluid can circulate naturally, taking advantage of the difference in density between hot and cold liquid, or with forced circulation. In the first case the heat storage system must be at a higher level than the panels precisely because the warmer liquid tends to rise upwards, while in the second case the storage system can be located in any area and the circulation is guaranteed by an electric circulator.
The storage system is called a boiler and is a tank full of water which is heated with the heat transferred by the heat transfer fluid circulated inside a coil. This water can be used to heat rooms or to integrate heating, for example with a low temperature radiant panel system, or to produce domestic hot water perhaps integrated by another type of system during the winter season.
The main problem, however, is the summer period when the plant is able to produce more energy than necessary. This can cause problems due to the high temperatures that the heat transfer fluid can reach. To overcome these problems there are two possible solutions. Either cover part of the surface of the panels or try to use this heat to produce cold with absorption systems

or, if present, to heat the water in a swimming pool. The problem is that there are no systems of this type of domestic size yet, so solar cooling is only possible in the case of large surfaces.
The overall energy efficiency of this type of system is approximately 50% of the incident solar energy.
On the market there are "hybrid" panels that integrate both photovoltaic and thermal, so by using the same surface it is possible to produce electric and thermal energy with overall yields that can reach around 65% -70%.

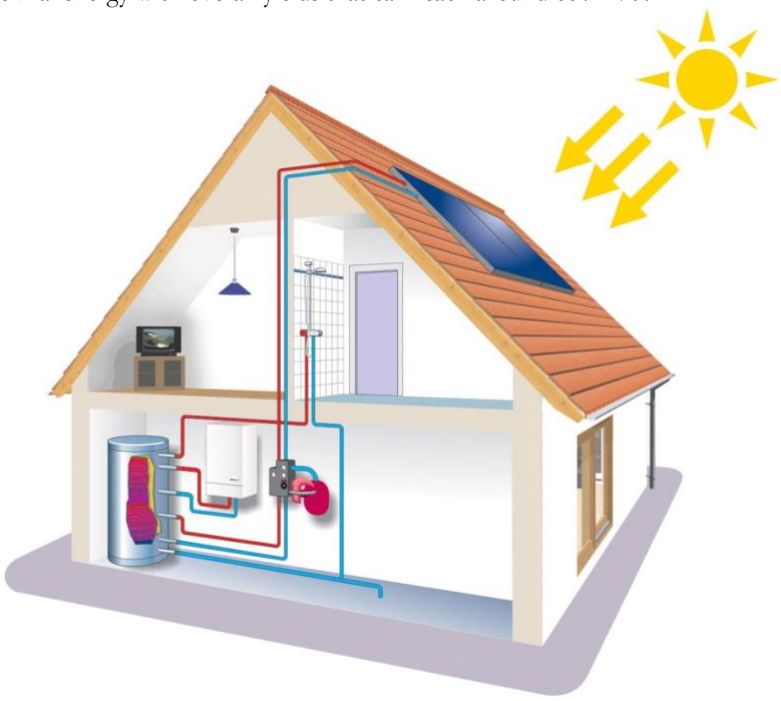

Figure 2: Solar thermal plant scheme

Another way of producing heat and accumulating it using solar radiation is that of solar ponds, natural or artificial brackish water lagoons that are not very deep and which, thanks to the stratification of the heat caused by the difference in salinity, tend to accumulate solar heat in the deepest part. This heat can then be withdrawn and thus exploited. A common use of the solar ponds system is for the desalination of sea water to obtain fresh water for drinking use.

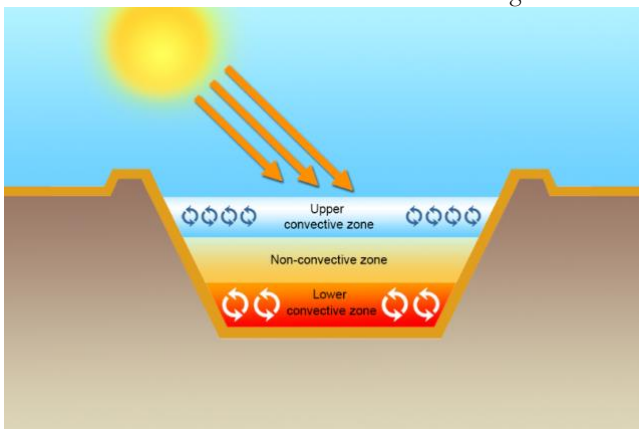

Figure 3: Solar pond

Thermodynamic

Solar energy can also be used to produce heat used to generate steam to be introduced into a turbine and thus to produce electricity. In this case it will be necessary to produce superheated steam for which flat panels are not used but flat or parabolic mirrors that concentrate the sun's rays in a focal point where they produce high temperatures. With these systems it is possible to obtain temperatures above 500°C.

The technological limit is all in the heat transfer fluid used to transfer heat. The oldest systems used diathermic oil which tends to burn at temperatures above 300°C, so in these systems it is important not to exceed this temperature. Furthermore, the oils used are also polluting; here is the reason why it is not recommended to use this system.
In more recent systems, however, the oil has been replaced with other materials such as potassium fertilizers that melt at high temperatures. These systems have no thermal limit and they can reach and exceed 500°C, as already said. Furthermore, the fact of using fertilizers makes these systems less polluting. The mirrors used can be flat, parabolic or linear parabolic. The former can reflect the sun's rays on the top of a tower or on a tube placed above them. Parabolic mirrors reflect the rays towards their focus, a bit like parabolic antennas. The linear parabolic mirrors, on the other hand, reflect the sun's rays on a tube inside which the heat transfer fluid passes. The heat is accumulated in tanks where it is kept for several hours and from which it is taken to generate the superheated steam which is expanded in the turbine and thus produce electricity.
Tower plants are present in various parts of the world, especially in the desert areas of the USA, the Middle East or Spain. Linear parabolic mirror systems that use fertilizers, on the other hand, were developed by Carlo Rubbia when he was president of ENEA and an example of this system, even if partially revised, is in Augusta (SR) in Italy.
Parabolic mirror systems, on the other hand, are used for small users. In them the solar rays are concentrated in the focus where they heat a fluid which is used to operate a Stirling engine and thus generate electricity.

Figure 4: Thermodynamic solar power plant with flat mirrors and tower

Figure 5: Thermodynamic solar parabolic mirror

Figure 6: Thermodynamic unit with linear parabolic mirrors

Systems of this type are capable of transforming 60 to 70% of the incident solar radiation into heat. By combining this yield with the efficiency of a Rankine cycle turbine which is equal to 40-45%, an electrical yield of the system is obtained which varies from about 24 to 31%.

Aeolian

Wind energy is one of those that humans have used most in history. For many centuries, in fact, transport by sea between the various continents, including all the great explorations, took place thanks to sailing ships that exploited the wind as their propulsive means. Even today there are sports competitions between sailing boats, also very sophisticated for the materials used; the most famous of these races is the America's Cup.
Subsequently machines were invented that transformed the wind into mechanical energy to move the machines. This is how the windmills to grind the wheat to produce flour or pump water to keep the lands dry or to operate the mechanical looms were born and developed.
Wind is a phenomenon originated by the movement of an air mass from one area to another due to the difference in pressure. This pressure difference is generated due to the temperature difference originating from the sun, so also in this case the "engine" of this energy form is the sun.
Today, wind energy is exploited by machines that transform the circular motion imparted by the wind to a rotor into electrical energy to be fed into the grid.
Over the years, different types of wind turbines have been developed that are capable of generating higher powers. So while the first models could reach maximum powers of a few Megawatts, now there are turbines that have maximum powers of several Megawatts.
The most powerful turbines have a horizontal axis and have a rotor made up of 3 composite blades, the less powerful ones can have both horizontal and vertical axes. The heights are variable and mainly depend on the diameter of the rotors.
The most powerful turbines not only have the largest rotor diameters but also have systems that allow to adjust the angle of attack of the blades according to the wind speed and that allow the plan of the rotor to be positioned orthogonally to that of the wind.
Turbines have operating limits so they can only operate within wind speed limits. The minimum speed below which the turbine does not start is called the cut-in speed, while the maximum speed beyond which operating the turbine is dangerous is called the cut-out speed. The nominal operating speed of the turbine is the minimum wind speed for which the turbine produces the nominal power.
The characteristic curve of a wind turbine has a trend of increasing power in the first zone as a function of wind speed, then stabilises at the maximum power value up to the cut-out speed and then resets. The following Figure shows the trend of a characteristic curve.

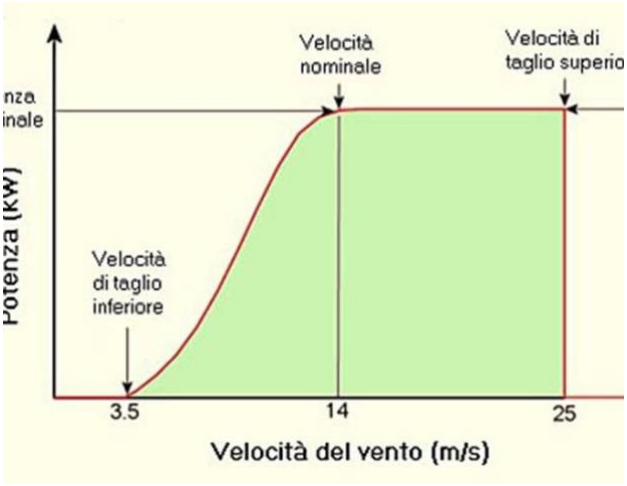

Figure 7: Characteristic curve of a wind turbine

Based on power, wind turbines can be classified into:

- Micro-wind: power below 20 kW
- Small wind turbine: power between 20 and 100 kW
- Wind: power greater than 100 kW.

Furthermore, wind farms are:

- Inshore: if placed inland
- Onshore: if placed in the coastal strip and in the marine area near the coast
- Offshore: if placed offshore, more than 10 km from the coast.

Turbine productivity is not easily predictable except on the basis of statistical estimates in annual periods. This is because the wind is random in both speed and intensity and because it has a variable behaviour from area to area as it is strongly influenced by the orography. To estimate the productivity of a wind power plant at a site, therefore, there is a need to conduct anemometry campaigns for periods of two or three years and thus estimate the windiness of the area.
The power supplied by a turbine, instead is a function of the density of the air, the surface swept by the blades and the cube of the wind speed. This can be assessed by the Betz Law which also identifies the maximum theoretical energy that can be extracted from a wind turbine which is equal to 59.3% of the kinetic energy contained in the air mass.
Another characteristic feature of wind farms is the Capacity factor which identifies the relationship between the energy produced in a given period of time and the nominal power of the plant. In practice this value indicates the number of hours that the plant would have worked to produce the same amount of energy at nominal power. In Italy the average capacity factor of the national wind farm is 25% equal to 2,190 hours per year.

Figure 8: Horizontal axis turbines

Figure 9: Vertical axis wind turbine

Low enthalpy geothermal energy

Geothermal energy is the energy generated by exploiting the terrestrial heat resulting from the natural nuclear decay of the radioactive elements contained within the Earth. This energy manifests itself naturally through volcanism and the effects it produces.
The earth's heat grows with depth and the temperature increases on average by about 30°C per kilometre of depth. In some areas there are anomalous conditions whereby the thermal gradient is much higher and thus it is possible to find high temperatures at lower depths.
These phenomena can be used both to produce heat and electricity. The first application that made it possible to produce electricity using the geothermal source was made in Italy in Larderello in Tuscany.
In ancient times geothermal energy was exploited in the thermal areas for bathing. Subsequently thermal springs have been used for district heating houses and greenhouses.
The geothermal energy used to produce electricity is referred to as high enthalpy and is available only in certain areas of the Earth. Next to it there is also a low enthalpy energy that can be exploited anywhere through heat pumps.
Heat pumps are heat machines that take thermal energy from a low temperature source to a higher temperature well. They are used for example to heat a room during the winter or to cool it during the summer. For the performance to remain constant, the source must be at a temperature as constant as possible. For this purpose, the earth's crust can be used which, beyond the first metres where the temperature undergoes seasonal and daily variations, is at a constant temperature throughout the year. This fact makes it possible to obtain COP of the heat pumps equal to about 3-6, that is, for each kW of electricity 3-6 kW of thermal or cooling energy are generated.
These systems, if combined with systems for the production of electricity from renewable sources, allow air-conditioning of the environments in a completely natural and free way.
In order to function, these systems require a heat exchange system between the environment to be conditioned and the ground. This system can be vertical or horizontal or mixed.
The vertical system consists of a hole in which to circulate the pipes that exchange heat with the ground. The depth of these holes can be of hundreds of metres so their cost is quite high. For this reason, it may be interesting to create holes shared between several users so as to divide the construction costs. This type of holes could be made, for example, to replace the air conditioning system of homes in densely populated areas, such as historical city centres.
Another exchange system is carried out with rings or coils placed horizontally at a depth of at least 2 m. This system, unlike the previous one, requires large surfaces for which it can be built only where there is such availability, or in areas with lower population density, such as the suburbs.
Another way to exploit geothermal energy is to exploit it for district heating or cooling by creating fields with geothermal wells.

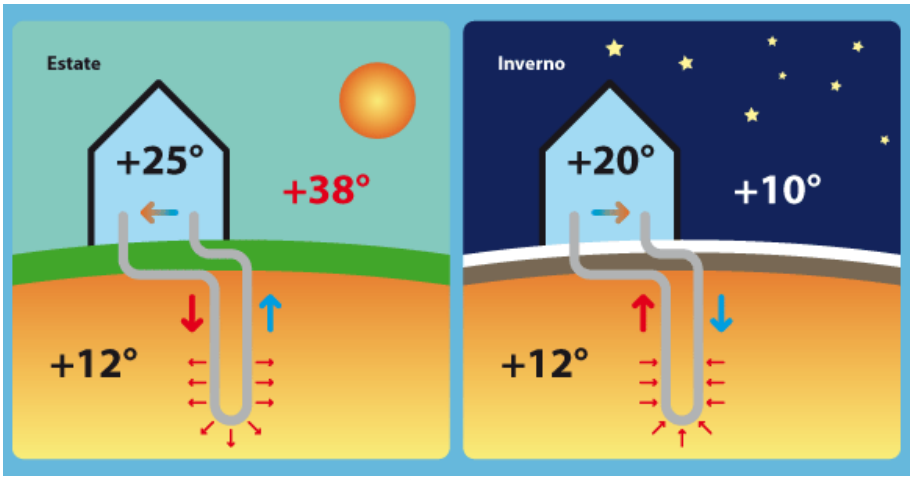

Figure 10: Operation scheme of low enthalpy geothermal system

Biomass

Italian legislation defines biomass as "the biodegradable part of products, waste and residues from agriculture (including plant and animal substances) and from forestry and related industries, including fisheries and aquaculture, mowing and pruning from urban greenery as well as the biodegradable part of industrial and urban waste".
It can be used as it is or after a "manipulation" that transforms it into liquid or gaseous biofuel. The biomass historically most used to produce energy is wood that used to be and is still burned today to produce heat or to prepare food.
Based on its physical state, it can be distinguished in:

- solid: wood, wood chips, pellets, mowing, dried fruit peels, kernels, etc.
- liquid: vegetable oil, bioethanol, biodiesel, etc.
- gaseous: biogas, biomethane.

The advantage of biomass is that once burned it tends to release into the atmosphere almost the same amount of CO_2 accumulated for its growth. This occurs when it is sustainable, i.e. it comes from a short chain, otherwise a large part of the CO_2 that it has accumulated during its development would be lost for its transport by means that use fossil fuels.
Biomass, both vegetable and animal, originates from the chlorophyll photosynthesis that occurs in the presence of sunlight, therefore it can also be seen as a form of storage of solar energy in the form of sugars, cellulose and proteins.
Biomass can produce energy both in the form of heat and electricity. In the latter case, to maximise the benefits it would be advisable for the electricity generation plant to be in a cogeneration configuration, so as to recover up to 90% of the available energy.
In countries where there are large amounts of woods, for example, it is not uncommon for cities to be heated by plants that burn wood.
Of course, like all combustion, even that of biomass will produce substances such as NOx, fine dust, particulates, ashes which must be taken into account. Compared to the combustion of fossil fuels, however, SOx or aromatic substances will not be produced.
Technologies have recently been developed to obtain fuels for use in transport to replace fossil fuels. For this purpose, plants that are necessary for human and animal nutrition such as corn or rapeseed can be used. In this case the benefits are lost because on the one hand plants are removed from the diet and on the other the demand increases the prices of these products creating problems especially in poor countries.
A solution to this problem can be to use plants that are not suitable for human or animal nutrition, which can grow in poor or marginal soils, which are resistant enough not to need pesticides. For example, one of these plants whose use is being studied is the common cane from which about 10 t of bioethanol could be produced for each hectare cultivated.
Another way not to take plants away from food is to exploit the residues of agro-industry processes to be digested in special anaerobic digesters and thus obtain, for example, biomethane and fertilising substance to be used in agriculture; or to exploit the used cooking oils, for example those of the fries, to produce biodiesel to move agricultural tractors, with a view to agricultural decarbonisation.
In the field of automotive traction, it is worth mentioning the large production of bioethanol from sugar cane in Brazil, where it covers around 20% of fuel consumption.
In addition to being substitutes for fossil fuels, cellulosic biomass can also be used to replace oil in the production of plastic substances.

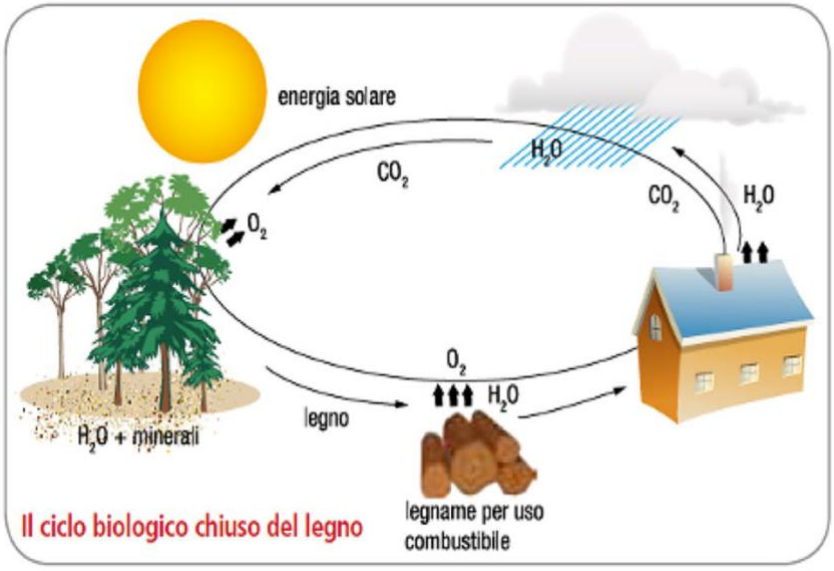

Figure 11: Biological cycle of wood biomass

Hydraulic energy

The hydraulic energy is the energy that is produced by moving a mass of water. Water is the most abundant substance on Earth and the one on which life depends. The water cycle is moved by the sun which warms the waters of the sea, lakes or rivers and transforms them into steam which goes up towards the highest part of the atmosphere where it condenses forming clouds. When optimal conditions are found, the water falls to the ground in the form of rain, snow or hail. Snow accumulates on the peaks of the mountains or in the colder areas forming glaciers, while rain partly flows to the surface, partly penetrates the ground from where it resurfaces through the sources. In all cases, these waters are collected in the waterways that descend to the valley until they reach the sea where the cycle restarts.
The flow of water has been exploited since ancient times by human beings to generate energy. The first uses of the water motion occurred with the mills which, through wheels moved by water, set millstones in motion to grind grains, olives or salt. Subsequently, the first factories were built around the waterways and used hydraulic energy to move the machines. At the end of the nineteenth century, then, the energy of water was exploited by turbines to produce electricity.

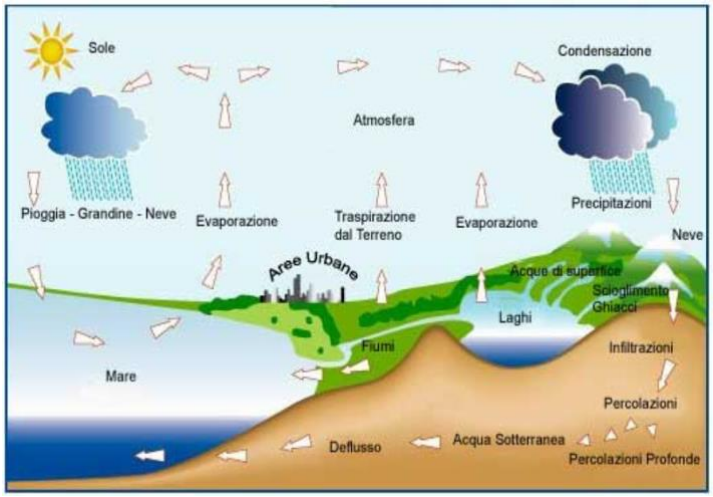

Figure 12: Water cycle

In Italy the main renewable source with which electricity is produced is hydraulic power still today. To produce energy from water, a jump must be created. This can be produced in several ways.
A first way is to create an artificial reservoir by means of a barrier where to accumulate and regulate the flow of water. This way has the highest impact on the environment as the creation of the reservoir submerges the lands and changes the morphology and climate of an area.
Another way is to derive a quantity of water upstream, pass it through a channel and then return the water downstream. These systems partially modify the flow rate of the watercourse in the stretch between the intake and return works. In some conditions this could compromise the life of the watercourse, so it will be important to take a quantity of water that does not affect it.
Finally, there are the systems of exploitation with flowing water in which the jump is created inside the riverbed through a crossbar from which the water is taken which sets the turbine in motion and which will be returned to the waterway downstream of the crossbar. Then there are other hydraulic machines such as wheels that take advantage of both a jump of water and the speed of the water and Archimedes' screws suitable for jumps of a few metres.
The energy that can be produced by a turbine can be calculated by the following formula:

$$E = V * \pi * h * \rho * \eta$$

where:
V is the volume of water that flows through the turbine;
h is the jump suffered by the water;
ϱ is the water density;
η is the efficiency of the turbine.

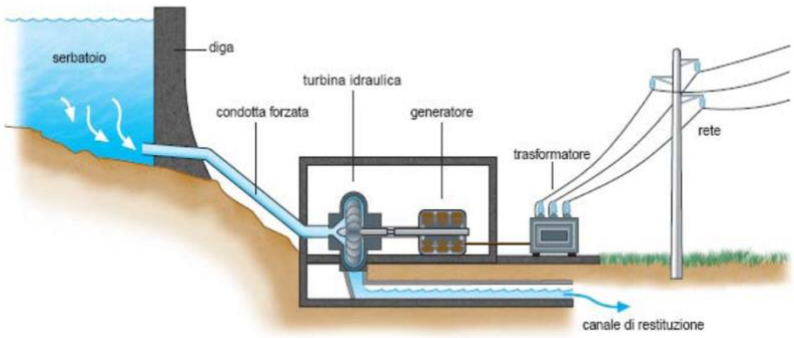

Figure 13: Reservoir hydroelectric power plant scheme

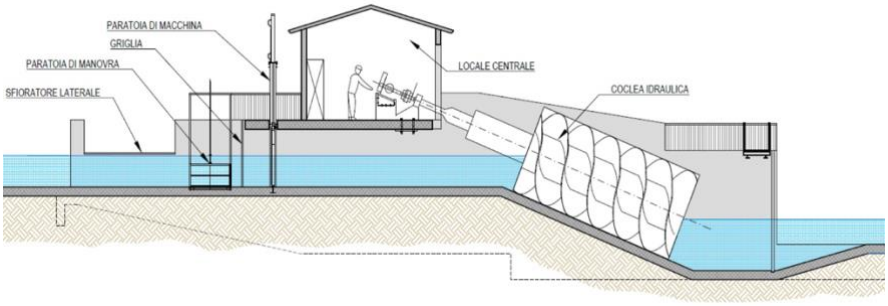

Figure 14: Scheme of a hydraulic power plant with Archimedes screw

Accumulation system

The most widespread energy production system so far provides for the production of energy at the same time as it is needed. However, this system entails inefficiencies and higher costs. In fact, such a system must be sized on the basis of the maximum power required only at certain times and not on the basis of the average power. In this way there is an oversizing of the generation systems which, as happens for example in the Italian electricity system, will tend to work for a lower number of hours per year and with lower efficiencies.

Just to give some examples, the instantaneous production of power means that in domestic environments, for example, there is a need to install a boiler for the combined production of heat and DHW that has a power of 25-30 kW only because it must guarantee that power when you need to take a shower, when about 10 kW of power might be sufficient for heating. The same happens in the electrical production system in which, to guarantee the maximum power peak of about 58 GW, recorded in some hours of a day in July 2015, we need plants that guarantee this power when the average power, obtained by dividing the total annual demand for the number of hours per year, is equal to about 38 GW. Furthermore, the fact that demand is not constant, but varies during the day, means that in order to guarantee the offer at all times, power plants that have low efficiency must be switched on and off with a consequent increase in fuel consumption and, therefore, in costs.

In fact, there are two production systems: those that have greater efficiency but are poorly adjustable in power and therefore must work for many hours at almost constant power, such as combined cycle power plants; the more flexible power plants that can be turned on and shut down in a short time but which have low efficiencies and therefore higher production costs, such as turbo-gas plants.

In order for demand to be met all year round, there is a need for a number of power plants that are turned on practically all year round at constant power and which supply what is called baseload in addition to a certain number of power plants that intervene at certain times of the day to cover the peak-load. Among the latter are the plants that will only turn on once or twice a year. This means that the efficiency of the national thermoelectric system is approximately 41%.

One way to make this system more efficient could be to size the production systems based on the energy required rather than on the basis of power in order to produce all the energy with the most efficient power plants and thus have a thermoelectric efficiency greater than 50%.

To do this it is necessary to produce excess energy in the hours when there is no demand and to accumulate and use it in the hours of the day when it is needed.

Furthermore, it must also be taken into account that an electrical system made up of a few large power plants concentrated in certain areas of the territory does not allow the cogeneration or trigeneration structure, so the thermal waste which cannot be used to generate electricity and which could be used to produce heat or cold, must be thrown into the environment like waste.

This means that on the one hand we burn fuels to generate electricity by throwing 60% of the total energy into the environment in the form of heat and on the other hand in our homes we burn other fuel to produce heat.
If the plants were more and more distributed throughout the territory, responding to the needs of each individual community, this residual heat could be distributed for the conditioning of homes and for the production of domestic hot water. In this way the overall efficiency could even exceed 80%.
Another way to recover this heat could be to use electric heat pumps instead of gas, oil or biomass boilers, so that the heat transferred to the environment to produce electricity is then recovered by air-water or air-air heat pumps to heat our homes and / or produce domestic hot water.
In any case, even by maximising efficiency in the energy system, the use of fossil fuels does not prevent the introduction of CO_2 into the atmosphere with an increase in the greenhouse effect and, therefore, in the increase in global warming. This is why we must stop burning fossil fuels in any case.
As said, to make the energy system more efficient it is necessary to have systems that store energy in various forms. These systems can be concentrated, distributed at user level or a mix of the two.
The accumulation system most used to date is made up of pumping systems consisting of two water tanks placed at different altitudes through which electrical energy is transformed and stored in the form of potential energy obtained by pumping water from a reservoir at a lower altitude towards one at higher altitude. In this way, when it is necessary to have electricity, we will just need to open the valves and feed the hydroelectric turbines with the water coming from the upper tank. The efficiency of these systems is around 70-80%.

Batteries

One of the storage systems most used for isolated users not connected to the electrical grid is that of batteries. Electric batteries or rather accumulators are electrical energy storage systems in the form of electrochemical energy. The system consists of electrodes immersed in an electrolyte in which during the charging phase the electric energy produces ions that migrate and accumulate at the electrodes generating a difference in potential. In the discharge phase, then, the potential difference creates an electric current that makes the ions react and reconstitutes the starting substance.
The oldest accumulators are lead-acid ones but today other types of accumulators are being developed such as lithium-ion, salt, redox ones.
The main problem of chemical accumulators, in addition to the substances they may contain, is that of cyclical life, i.e. the number of charge / discharge cycles after which they must be replaced. In fact, many accumulators, especially those with lead, allow a low number of cycles which entails the replacement of the entire pack after a few years.
In the most modern accumulators, efforts are being made to increase the number of cycles so that management costs can be saved and efficiency increased.
Salt batteries are recently developed batteries that have the advantage of not containing pollutants and being totally recyclable. The disadvantage is that they operate at relatively high temperatures, equal to about 200°C, to maintain which they consume part of the accumulated energy.
Another type of accumulator is that of flow redox batteries which exploit a redox reaction between two liquid electrolytes contained in two tanks that flow inside a cell where they are separated by an electrochemical membrane where the conversion of electrochemical energy takes place directly into electric energy. The advantage of these batteries is that they can be recharged quickly by replacing the liquid electrolyte contained in the tanks and recovering the used electrolyte to be regenerated. For this reason, they have a high cyclic life and adapt to traction.

Hydrogen

A way to store energy is to do it in the form of chemical energy. One of the energy carriers that can be used for this purpose is hydrogen which is not found in nature in molecular form but only combined with other elements as in water where it is combined with oxygen. The system for storing energy consists in splitting the molecules in which hydrogen is present, thus obtaining hydrogen gas which can be compressed in cylinders to be stored and then distributed for its use. Hydrogen can be obtained through the electrolysis process of water, with which electric current is passed between two electrodes causing the water molecule to split. The hydrogen thus obtained can be stored in cylinders in the form of compressed or liquefied gas at low temperatures.
Another way to obtain hydrogen from water consists in high temperature electrolysis with which the economic efficiency of the process is increased because heat is cheaper than electricity. The temperature at which the electrolysis takes place is between 100°C and 850 ° C.
The hydrogen thus obtained can be used both as fuel in combustion engines to obtain thermal and mechanical energy, to be transformed or not into electrical energy, and in the fuel cells with which electricity is directly obtained.

Another use of hydrogen could be for example to mix it with biomethane to obtain hydro methane to be introduced into the gas network or to feed the means of transport.

Compressed air

One of the accumulation systems in the form of mechanical energy is that of compressed air with which electrical or mechanical energy is used to compress the air inside a tank where it will be stored and from which it will be taken when needed to feed air machines and thus regain mechanical or electrical energy.
Storage can take place in above ground tanks or in underground or submarine tanks. As underground tanks, natural cavities are used, such as spent methane deposits or caves where to pump the air, while as submarine tanks, the use of balloons anchored to the seabed kept under pressure by the same weight of the water is being studied.
According to research published in 2013, compressed air systems are able to accumulate during their operating life up to 240 times the energy necessary for their construction and installation followed by pumping systems that reach up to 210 times.

The flywheels

In these systems, energy is stored in the form of kinetic energy through flywheels which are set in motion and vacuum rotated in the absence of friction.
To do this, the flywheels are placed inside a watertight container and suspended in the presence of a magnetic field with the aim of eliminating any friction. The rotating mass is connected to an electric motor and / or an electric generator. The charging phase consists in increasing the rotation speed of the mass through the electric motor, while the discharge phase consists in starting a generator, or the same motor if reversible, and thus lowering the rotation speed of the mass.
The advantage of these systems is that they have a high energy density as they can store a lot of energy and weigh little. Therefore they could be used for transport systems where the weight of the storage system has a limit. In fact, the use of flywheels occurred in Formula 1 with the energy recovery devices in the Kers deceleration phase.
One limitation is the fact that the masses continue to rotate for years if not decades before stopping, so in the event of an accident, it must be ensured that the amount of energy contained is not discharged immediately. For this purpose, systems have been studied which in the event of an accident immerse the masses in a fluid that slows them down to a stop and absorbs energy in the form of heat.

The thermal accumulator

Thermal storage is perhaps one of the most common systems at home. It is used to accumulate heat to be used for heating domestic hot water or for domestic heating. One of the oldest thermal storage systems is that of electric boilers in our homes, or boilers with which the heat absorbed by the sun accumulates.
But alongside the low temperature storage, there are high temperature storage systems in which to "retain" the heat collected through molten salt systems. These systems are those used in solar thermodynamic systems and are used to ensure that superheated steam can be produced to power electric turbines even in the absence of sun.
The storage capacity of these systems depends on the insulation with the outside, in fact over time the heat will tend to transfer from the fluid contained inside the storage system to the external environment, dispersing itself.
Storage systems are not only used for storing heat but also for cold. Refrigerators, freezers or cold rooms, for example, can be considered storage systems. Alongside these systems there are others used to accumulate the cold produced by refrigeration machines for summer air conditioning. In this way it is possible to produce the cold at times when it is more convenient, for example in the evening, to accumulate it in the accumulators and then use it in the hottest hours of the day.

Energy saving, recovery and efficiency

Even in the energy field, the main source to "produce" energy is given by savings.
In fact, today we produce a lot of energy that for various reasons we waste, either because our homes are not well insulated, or because we use obsolete systems, or because we do not carry out maintenance on a constant basis.
Wastes mean that every year resources are used which are then thrown away for one reason or another and which actually produce greater damage. Just look at what happens with the global warming produced by fossil sources.
Energy savings can be implemented in every area from the smallest to the largest one and must be encouraged in every way.
It is in times of major energy crisis that we start talking about energy saving. For this reason, in the 70s following the energy crisis produced by the Arab-Israeli war and the closure of the Suez Canal with the drastic increase in the cost of oil, there was

talk of saving energy for the first time. Sundays on foot started in that period when private vehicular traffic was banned to limit fuel consumption. Unfortunately, that period ended early and consumption and waste began again.
Another initiative undertaken to save energy is summer time, that is the adoption of a different hour from the solar one, with an increase of one hour, in the spring and summer period so as to take advantage of the longer light time and lower energy consumption. In practice it is as if all the normal activities that take place in a certain hour in winter, in summer take place an hour later. This reduces the electrical consumption caused by the evening lighting. In fact, if in a normal working day we go to sleep at 11 pm and in summer the sun sets at 7.00 pm, solar time, the hours in which each of us keeps the lights on at home are equal to 4. Turning to summer time, the sunset will take place at 20 and you will always go to sleep at 23, saving an hour of electric lighting and, therefore, of electricity consumption. According to Terna, in 2013 the adoption of summer time resulted in a saving of around 540 GWh of electricity equal to an economic saving of around 90 million Euros.
With Law 10/91 we began to talk about energy saving in the building sector and to impose the calculation of heating systems, of the heat loss of opaque and transparent surfaces, the imposition of a maximum heating temperature, a period of heating, depending on the climatic area to which the Italian territory was divided.
Over the years, the concept of saving has been refined up to the energy certification of buildings with Legislative Decree 192/2005.
Energy efficiency in construction is currently incentivised with tax deductions equal to a certain percentage, which is currently 65%, of the expenses incurred divided into 10 years.
In addition to energy saving in the building sector, over the years there has also been talk of saving in the transport sector, even if obtained indirectly through the reduction of polluting emissions in the vehicle exhausts. The most ambitious project is that of the State of California which has as its objective the elimination of greenhouse gas emissions from vehicle exhausts. This reset can be achieved by increasing the efficiency of cars with internal combustion engines, increasing the consumption of biofuels, increasing the number of cars with zero circulating emissions, producing the energy necessary for the transport system with renewable energy.
In addition to these cases, energy savings and efficiency can be achieved, especially in the industrial and tertiary sector, also by using more efficient machinery or lighting systems than traditional ones.

The insulation of buildings

Law 10/91 introduced the concept of sizing heating systems and energy savings in Italy. The aforementioned law has divided the Italian territory into 5 climatic zones classified according to day degrees. This subdivision is used to establish the external temperatures to be considered for the calculation of the heating systems, the period in which the heating system can be switched on and the number of daily hours for which the heating can be kept on.
For the calculation of the heating systems it is necessary to know the thermal power that crosses the external envelope of the buildings instant by instant which is determined according to the methods established by UNI standards which have identified the coefficients of thermal transmittance for each material. The lower the value of this coefficient, the lower the thermal energy that passes through the material. So insulating materials have lower thermal transmittance coefficients.
This concept is enough to understand that a more isolated building is a building that exchanges less energy with the external environment and therefore requires less consumption.
The insulation of the buildings is therefore essential to reduce energy consumption, especially the winter ones in the colder areas.
For this reason, materials have been introduced over the years that tend to increase insulation. Some of these materials are of fossil origin, for example expanded plastic materials such as polystyrene, while others are natural materials or obtained from natural materials such as rock wool, sheep's wool, straw, hemp, wood.
The insulating materials are effective in thermal insulation as they tend to have gaps that reduce the transmission of thermal energy.
The insulating materials can be inserted both in the cavities of the walls and at the intrados or extrados of these. The most effective system is the one called "the coat" which consists in applying slabs of the insulating materials outside the building, closing it, in fact, as if it were a coat. This system is effective because it allows both to improve the insulating characteristics of opaque surfaces and because it allows to exploit the thermal inertia of the walls. In fact, these tend to accumulate heat when the heating systems are turned on and release it, thanks to the insulation towards the outside, inside the building during the hours when the systems are turned off.
Other elements that disperse a lot of thermal energy and that need to be insulated are the windows, especially the transparent ones. Compared to older windows, today there are thermal break and PVC windows that have excellent insulating performance. In addition, double or triple glazing is used for glasses which have an empty cavity or filled with inert gas such as argon or krypton and which are treated with low-emissivity films that limit radiative heat transmission.

In the construction of a new building, today, materials that have good thermal insulation characteristics could be used. Today, for example, hemp and lime bricks can be found on the market and can be used in tamping instead of traditional bricks. In this way, an environment not only more isolated but also healthier is obtained as these materials are breathable unlike bricks.
To give an idea of the savings achievable with an efficiency improvement intervention of an existing building, it is enough to see that a wall built according to the traditional system in use in the 70s and 80s, formed by internal plaster, 8 cm perforated layer, air chamber of 10 cm, 12 cm of perforated layer and external plaster has a transmittance of 0.93 W / m2 K, while the same wall made more efficient with an external coating system just 5 cm thick drops to the value of 0,46 W / m2 K, therefore a 50% reduction in transmittance.
Therefore considering that the opaque surfaces represent about 70% of a building, the only thermal insulation of these surfaces could allow a saving of thermal energy for heating equal to about 30% in non-insulated buildings.
Furthermore, these interventions would allow to restart an economic sector that has suffered heavily from the economic crisis.

The recovery of thermal waste

Most people do not pay attention to it, but the energy that is wasted with thermal waste, that is, that dispersed in the environment through the fumes or cooling water, is certainly not indifferent and the recovery of this heat could allow to achieve energy savings.
Consider, for example, old boilers that heat water and throw fumes into the atmosphere at temperatures of the order of 100°C. If these fumes were not released into the atmosphere but an attempt was made to recover the heat they contain to raise the temperature of the water before it enters the boiler, a more efficient use of the fuel would be obtained.
To heat a litre of water by 1°C, in fact, you need about 1 kCal of energy, equal to about 1.16 Wh. This means that to take a shower with about 50 l of hot water at a temperature of 37°C (the aqueduct water temperature is around 15°C), about 1.3 kWh of thermal energy will be needed. Considering that the efficiency of a traditional boiler is around 90%, it is clear that recovering the heat of the fumes would save 10% of energy.
What described above is what happens in modern condensing boilers where, in reality, efficiency can exceed 100% if referred to the lower calorific value of the fuel. However, one cannot think of replacing all the existing boilers, especially those of high power, so one can think of inserting a system that allows to recover the heat of the fumes by bringing the old boiler closer to a condensing one.
Other heat that each of us wastes is that contained in the hot water that we throw into the drains daily: that of the shower for example. Also in this case there are systems that fit into the drains and recover the heat from the water by using it to preheat the water from the municipal water supply before it enters the boiler. Just think how much heat energy could be recovered in hotels or sports facilities.
The biggest wastes, however, are those that occur in the industrial sector. Just think of how many industries use heat in their process and how the no longer usable heat could be recovered and used in district heating systems.

New technologies for public and private lighting

Since Edison invented the electric light bulb, many steps have been taken, yet until the European Union banned them a few years ago, incandescent bulbs were the most used ones.
Today, various lighting technologies are available, among which the most promising seems to be the LED technology with which, compared to traditional bulbs, savings are achieved that can reach 80% with the same light effect. In addition, LED technology also has the advantage of having a longer life than traditional ones, reaching up to 50,000 hours of operation which for a street lighting system, for example, means a useful life of about 13 years, compared to 2-3 thousand hours of traditional light bulbs. So the savings with the use of LED technology is twofold.
Another way to achieve savings in public lighting is to use remote management systems that with the use of sensors allow you to adjust the light intensity, i.e. the number of lighting fixtures turned on, according to natural lighting and time, for example by decreasing the number of lighting fixtures switched on during the night with less traffic, or by switching them on only when a pedestrian or a vehicle passes.
But artificial lighting is also used in work environments even during the day when natural light could be exploited. Also in this area, there are systems that through the use of the so-called solar tunnels, in the simplest case, or optical fibre systems, allow to illuminate a work environment with sunlight during the day. These systems are combined with the artificial lighting system and through light sensors they can guarantee the pre-set lighting level by switching on the artificial bulbs as needed.
With the use of these technologies it is possible to obtain great energy savings in those work environments where it is necessary to maintain a constant level of lighting during the day. And that's why it would be important that at least in public offices, schools, hospitals lighting systems were integrated with these systems which in the long run would pay for themselves with the savings achieved.

Efficient private and public transport

Energy savings can also be achieved in the public and private transport sector. In fact, most of the transport takes place by road with vehicles equipped with an internal combustion engine fuelled by petrol, diesel, LPG or methane. These motors provide the necessary torque and power at all times, therefore since they operate at a variable number of revolutions, they work with lower efficiencies than the optimum obtained at a certain rpm. Furthermore, in some moments the motors remain on even if they do not supply mechanical energy to the wheels: this is the case when the vehicle is stopped at a traffic light or when it travels a downhill stretch.
Unlike internal combustion engines, electric motors in addition to having a constant torque at each speed allowing mechanical simplification with the elimination of the clutch, have the advantage that they do not consume energy when the vehicle is stationary or runs on a downhill stretch, on the contrary, some types of motors are transformed into electric generators during braking or downhill, allowing energy recovery.
This is why electric motors are more suitable to be used for means of transport, their limitation lies in the fact that they need a heavy battery pack with not very short recharging times which becomes a limit when you have to travel long distances. For city use, however, electric cars are the optimal means as they can be connected to a charging system when they are parked for example during working hours and thus increase the runtime.
To extend the runtime of a vehicle, an electric power generator consisting of an internal combustion engine fuelled by biofuel or hydrogen can be inserted, which would operate at a fixed number of revolutions and therefore at maximum efficiency. Another alternative is to use hydrogen fuel cells or the flow batteries that allow a fast charging as it is sufficient to replace the solution that allows it to function.
Systems for the conversion of existing urban public transport into extended range electric vehicles have recently been introduced. The system consists of inserting some electric motors for wheel motion, a battery pack, a control system and an internal combustion engine to recharge the batteries when the charge drops below a certain level. Systems of this type are known as series hybrid systems and differ from the most common parallel hybrid systems in that the internal combustion engine never provides motion to the wheels. Using this scheme, some old city buses were transformed by removing the old diesel engine and using the diesel engine of a compact car as a generator.
In addition to improving the efficiency of individual means of transport, another way of making the whole sector sustainable is by sharing means of transport and encouraging the use of public transport. In fact, many cities are clogged by traffic generated by cars in which there is only one driver, if we shared the vehicle with other travel companions the number of vehicles would drop and the traffic would be more fluid. The same goes for the use of public transport: just think that a bus can carry up to 100 people but occupies less space and consumes less energy than 100 cars.
Alongside the incentive for car sharing and the use of public transport, the use of bicycles can be increased and encouraged with the creation of cycle paths in the centre of urban areas.
All this requires the construction of infrastructures such as outlets for electric recharges in parking lots or hydrogen distributors.

Quantification of current energy needs by sector and type

The energy requirement of the city of Taranto is quantified using Terna data for the quantification of electricity consumption, ISTAT data for the quantification of methane gas consumption and data by the Ministry of Economic Development to quantify the fuel consumption for automotive and of methane gas.
In this chapter we will try to divide this data by the various sectors as well as by type.
As regards electricity, total consumption relative to the national, regional and provincial levels are shown in Table 8.

	Totale GWh	Pro capite kWh
Italia	291.083,5	4.787,9
Puglia	17.050,9	4.168,8
Prov. Taranto	6.040,7	10.266,9

Table 8: Total and per capita electricity consumption

From the comparison of the per capita data, it can be seen how the electricity consumption in the province of Taranto is more than double the national and regional ones.

As regards electricity natural gas consumption at national, regional and provincial levels, the data are shown in Table 9.

	Totale Mmc	Pro capite mc
Italia	60.935,0	1.002,5
Puglia	4.136,2	1.011,2
Prov. Taranto	1.170,5	1.983,0

Table 9: Total and per capita consumption of natural gas

Also in this case the per capita consumption of methane gas related to the province of Taranto is higher than the national and regional data.
Consumption relating to automotive products at national, regional and provincial level is shown in Table 10 below.

	Benzina		Gasolio motori		G.P.L.	
	Totale t	Pro capite kg	Totale t	Pro capite kg	Totale t	Pro capite kg
Italia	7.899.394	129,9	24.692.840	406,2	1.564.226	25,7
Puglia	398.960	97,5	1.475.348	360,7	73.071	17,9
Prov. Taranto	51.862	88,1	157.470	267,6	6.403	10,9

Table 10: Total and per capita consumption of transport products

In the case of automotive products, on the other hand, per capita consumption in the province of Taranto is lower than both national and regional values.
Starting from these values and considering the presence of ILVA, the current energy needs related to the city of Taranto have been estimated for each sector and are shown in Table 11 below, whose calculations will be better highlighted in the following paragraphs.
As can be seen, the industrial presence in Taranto entails a significant increase in the per capita consumption of electricity and methane with a value, compared to national and regional values, equal to 6 times for electricity and 4 times for methane, while for fuels the values are lower.

The comparison between the per capita values expressed in kWh is better highlighted in Chart 5.

	Totale	Pro capite
En.Elettrica	4.982,7 GWh	24.664,9 kWh
Metano	1.158,2 Mmc	5.733,4 mc
Benzina	17.806,8 t	88,1 kg
Gasolio	54.067,4 t	267,6 kg
G.P.L.	2.198,5 t	10,9 kg
Gasolio agricolo	3.512,1	17,4

Table 11: Current total and per capita energy consumption in the city of Taranto

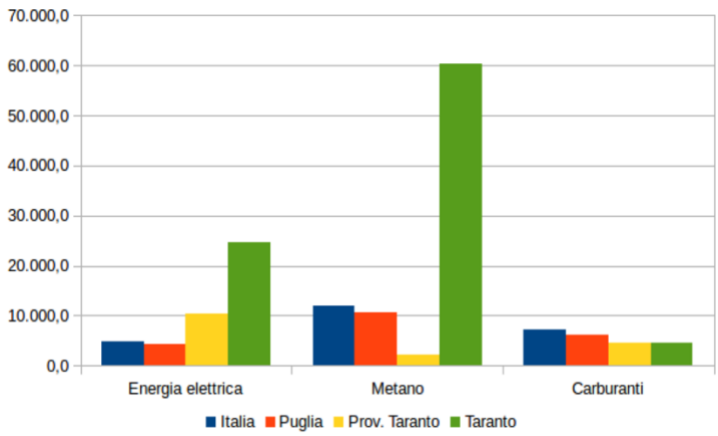

Chart 5: Comparison of current energy consumption per capita

In the following paragraphs, consumption will be divided by sector: domestic, service, production, transport and other.

Residential home sector

The current consumption of electricity in the residential domestic sector is estimated starting from the per capita values of Italian regional and provincial domestic consumption. These values are shown in Table 12.

	Totale GWh	Pro capite kWh
Italia	64.255,0	1.056,9
Puglia	3.988,5	975,2
Prov. Taranto	598,2	1.016,7

Table 12: Total and per capita domestic electricity consumption

As we see the figure of per capita consumption in the Taranto province is in line with the national and regional levels. Taking this figure as the per capita value of the city of Taranto, the total electricity consumption can be estimated as equal to **205,4 GWh**.
In addition to electricity consumption, methane consumption must also be assessed. To do this, the data provided by Istat on the consumption of methane gas for domestic use and per capita heating of the provincial capitals will be used. Unfortunately, these data are updated to 2011. For 2011 the per capita consumption of methane gas in the city of Taranto was **198.1 m^3** which, taken as the figure for 2014, corresponds to a total consumption of **40.0 mm^3**.
The summary of current energy consumption in the domestic sector, considering a higher calorific value of 10.5 kWh/Sm^3 for methane, corresponding to the 38.1 MJ /Sm^3 value indicated by the AEEGSI, are shown in Table 13.

	Totale GWh	Pro capite kWh
En.Elettrica	205,4	1.016,7
Metano	420,1	2.079,6

Table 13: Total and per capita energy consumption for the domestic sector

Service industry

The consumption of electricity and natural gas will also be considered for the service industry, and for electricity the consumption will be divided between public and private.
Methane consumption can be inferred by subtracting the consumption of methane gas for the provincial capitals supplied by Istat from the consumption data provided by the Ministry of Economic Development.
The per capita consumption of methane gas from the distribution network in the province of Taranto is equal to **206.3 m^3**; if this value is also taken as a reference for the city of Taranto, we just have to subtract the per capita consumption of methane gas for domestic use to obtain the consumption data relating to the Service industry of the city of Taranto. Doing the relevant calculations, this value is equal to **8.3 m^3** which corresponds to a total consumption of methane gas for the tertiary sector equal to **1.7 Mm^3**.

The electricity consumption of the Italian, regional and provincial service industry is shown in Table 14.

	Totale GWh	Pro capite kWh
Italia	98.951,4	1.627,6
Puglia	4.574,2	1.118,4
Prov. Taranto	665,0	1.130,2

Table 14: Total and per capita service electricity consumption

As you can see, the regional and provincial data are quite similar and are lower than the national figure. For the city of Taranto, the overall figure will be assumed to be equal to the per capita value of the Province of Taranto. With this figure, the total electricity consumption for the Service industry of the city of Taranto is equal to **228.3 GWh.**

Public

To evaluate the current electricity consumption of the public Service industry, the values provided by Terna and grouped under the item ***Unmarketable services*** which includes the items ***Public administration, Public lighting and Other unmarketable services*** are taken into account.
The national, regional and provincial data of these items are shown in Table 15.

	Totale GWh	Pro capite kWh
Italia	19.655,5	323,3
Puglia	1.073,5	262,5
Prov. Taranto	196,5	334,0

Table 15: Total and per capita public service electricity consumption

As we see the figure of per capita consumption of the Taranto province is higher than both the regional and the national level. Assuming this value as relating to the city of Taranto, a total electricity consumption of **67.5 GWh** is obtained.

The breakdown of these consumptions into the various items included is shown in Table 16.

	Totale GWh	Pro capite kWh
Pubblica amministrazione	33,6	166,6
Illuminazione pubblica	20,3	100,6
Altri Servizi non Vendibili	13,5	66,8

Table 16: Breakdown of electricity consumption in the public service sector

Private

Electricity consumption in the private service sector are those reported by Terna as ***Marketable services*** which includes the following items: ***Transport; Communications; Business; Hotels, Restaurants and Bars; Credit and insurance; Other marketable services.***
The national, regional and provincial consumptions of these items are shown in Table 17.

	Totale GWh	Pro capite kWh
Italia	79.295,9	1.304,3
Puglia	3.500,7	855,9
Prov. Taranto	468,5	796,3

Table 17: Total and per capita private service electricity consumption

Unlike the public Service industry, the per capita consumption of electricity in the private Service industry of the Province of Taranto is lower than both the national and regional figures. Assuming this value as relating to the city of Taranto, a total electricity consumption of **160.9 GWh** is obtained.
The breakdown of the total and per capita consumption of electricity in the various items included in the category ***Marketable services*** is shown in Table 18.

	Totale GWh	Pro capite kWh
Trasporti	7,9	38,9
Comunicazioni	8,8	43,5
Commercio	45,4	224,7
Alberghi, Ristoranti e Bar	20,3	100,6
Credito ed assicurazioni	3,3	16,3
Altri Servizi Vendibili	75,2	372,2

Table 18: Breakdown of electricity consumption in the private service sector

Summary

Once the data of the electricity and methane gas consumption of the Service industry have been obtained, the energy consumption of the various items can be obtained, which is shown in Table 19.

	Totale GWh	Pro capite kWh
En.Elettrica	228,3	1.130,2
Pubblico	*67,5*	*334,0*
Privato	*160,9*	*796,3*
Metano	17,6	87,0

Table 19: Service industry energy consumption summary

Production sector

In assessing the current energy consumption of the city of Taranto, it is useful to include the consumption caused by Ilva too. In fact, the data we have refer to the consumption of the province and, having to follow the same method used previously, that is to consider the provincial per capita data as characteristic of the city of Taranto, we should subtract the data relating to Ilva and other large Taranto plants first; otherwise they would be spread among all the inhabitants of the province and the consumption relating to Taranto alone would be underestimated.
To begin with this analysis we consider the national, regional and provincial electricity consumption reported by Terna under the item *Industry* which are shown in Table 20.

	Totale GWh	Pro capite kWh
En.Elettrica	228,3	1.130,2
Pubblico	*67,5*	*334,0*
Privato	*160,9*	*796,3*
Metano	17,6	87,0

Table 20: Total and per capita productive sector electricity consumption

As can be seen, in fact, the average per capita consumption figure of the Province of Taranto is 4 times the regional and national figure. If we analyse the overall figure of electricity consumption in the Province of Taranto, it can be observed that of the total 4,712.8 GWh, 4,087.3 GWh are consumed by the steel industry and 342.2 GWh by Refining and coking plants. These two contributions of electricity consumption are totally attributable to Ilva and the petrochemical of Taranto and therefore it is correct that they are subtracted from the provincial data. In this way, the provincial electricity consumption of the production sector will be 283.3 GWh equal to 481.5 kWh per capita. Taking this value into account, the electricity consumption of the production sector without Ilva and the petrochemical sector of the City of Taranto drops to **97.3 GWh.** And considering Ilva and petrochemical consumption, it can be seen that the electricity consumption of the productive sector of the city of Taranto is equal to **4,526.8 GWh** equal to **22,408.0 kWh** per capita.
Therefore the per capita consumption of electricity in the production sector is strongly influenced by the presence of Ilva and the petrochemical industry to the point that the figure is 11 times the national and regional figure.
A similar observation will be made for the consumption of methane gas. The data of the Ministry of Economic Development for methane gas consumption in 2014 are shown in Table 21.

	Industriale	Termoelettrico	Totale	
	Totale Mmc	Totale Mmc	Totale Mmc	Pro capite mc
Italia	13.581,5	17.902,5	31.484,0	517,9
Puglia	918,5	2.230,2	3.148,7	769,8
Prov. Taranto	638,0	410,7	1.048,7	1.782,4

Table 21: Total and per capita productive sector methane gas consumption

Also for the consumption of natural gas it is observed that the per capita data of the province of Taranto is almost double the regional and triple the national ones.

Of this consumption, that of the thermoelectric sector is totally attributable to the Taranto thermoelectric plants that serve Ilva, while to establish the rate of consumption of natural gas of the industrial sector to be attributed to Taranto, it will be necessary to process the data taking as reference the average sector consumption in the other Apulian provinces.
The average per capita consumption figure of the other Apulian provinces is equal to 80.1 m^3. Assuming this value as relating to the Province of Taranto, it is found that the consumption of methane gas in the industrial sector purified from the consumption of Ilva is equal to 47.3 Mm^3, by subtracting this value from the total data, a consumption of 590.7 Mm^3 of methane gas is obtained. This value is compatible with the data reported in a 2007 report of the Ilva plant [250] in which the consumption of methane gas from 2000 to 2005 results to be between 550 Mm^3 and 400 Mm^3.
Assuming for Taranto an average per capita consumption of methane gas for the industrial sector equal to the average of the other Apulian provinces and equal to 80.1 m^3 as mentioned above, we obtain a total consumption without the Ilva consumption equal to 16.3 Mm^3. Therefore the total consumption of methane gas for the city of Taranto is **607.0 Mm ^{3}**, corresponding to **3.004,6 m ^{3}** per capita.

The summary of gas consumption in the city of Taranto is shown in Table 22.

	Totale Mmc	Pro capite mc
Totale	1.017,7	5.037,6
Industriale	*607,0*	3.004,6
Termoelettrico	*410,7*	*2.033,0*

Table 22: Methane gas consumption in the productive sector in the city of Taranto

The overall consumption of the city of Taranto in the production sector expressed in energy terms is shown in Table 23.

	Totale GWh	Pro capite kWh
En. Elettrica	4.526,8	22.408,0
Metano	10.685,7	52.895,2

Table 23: Energy consumption in the production sector

Transport sector

The energy consumption of the transport sector is estimated starting from the data released by the Ministry of Economic Development on the sales of petroleum products for automotive use both in the road and motorway network and outside the network.
Also in this case a comparison will be made between the national, regional and provincial data to highlight any differences and then this latter data will be averaged for the provincial population and used as a characteristic figure also of the city of Taranto.
The 2014 national, regional and provincial automotive fuel sales figures are shown in Table 24.

	Benzina		Gasolio motori		G.P.L.	
	Totale t	Pro capite kg	Totale t	Pro capite kg	Totale t	Pro capite kg
Italia	7.899.394	129,9	24.692.840	406,2	1.564.226	25,7
Puglia	398.960	97,5	1.475.348	360,7	73.071	17,9
Prov. Taranto	51.862	88,1	157.470	267,6	6.403	10,9

Table 24: Total and per capita sale of oil products for automotive

As can be seen, the per capita fuels consumption of the province of Taranto is lower than both the regional and national data. Taking the provincial per capita consumption as a reference for Taranto, the fuel consumption of the city of Taranto can be assessed as shown in Table 25.

[250] *Annex D.10 "Energy analysis of the plant", February 2007*

	Totale t	Pro capite kg
Benzina	17.806,8	88,1
Gasolio motori	54.067,4	267,6
G.P.L.	2.198,5	10,9

Table 25: Consumption of petroleum products for road transport in the city of Taranto

Once the fuel consumption data have been estimated, it is possible to determine both the value of the total energy contained in the fuels and that of the mechanical energy that internal combustion engines can develop. These values are reported in Table 26 and Table 27 respectively.

	PCI MJ/kg	Totale GWh	Pro capite kWh
Benzina	43,6	215,7	1.067,54
Gasolio motori	43,3	650,3	3219,1
G.P.L.	46,1	28,2	139,4

Table 26: Total energy contained in the fuels consumed in Taranto

	Rendimento	Totale GWh	Pro capite kWh
Benzina	0,30	64,7	320,3
Gasolio motori	0,38	247,1	1.223,3
G.P.L.	0,27	7,6	37,6

Table 27: Mechanical energy developed by internal combustion engines in Taranto

Agricultural sector

As for the agricultural sector, the data on the consumption of electricity and agricultural fuel will be used and hence the consumption related to Taranto will be assessed.
The national, regional and provincial electricity consumption data provided by Terna are shown in Table 28.

	Rendimento	Totale GWh	Pro capite kWh
Benzina	0,30	64,7	320,3
Gasolio motori	0,38	247,1	1.223,3
G.P.L.	0,27	7,6	37,6

Table 28: Total and per capita agricultural sector electricity consumption

Please observe, the per capita consumption of the Province of Taranto is higher, albeit slightly, than both the regional and national data. To evaluate the consumption relating to the city of Taranto alone, the provincial per capita consumption data will be used, from which it can be deduced that the electricity consumption of the sector for the city of Taranto is equal to **22.2 Gwh**. As for the consumption of agricultural diesel fuel, national, regional and provincial data are shown in Table 29.

	Totale t	Pro capite kg
Italia	1.868.400	30,7
Puglia	159.378	39,0
Prov. Taranto	10.229	17,4

Table 29: Total and per capita consumption of diesel fuel

From these data it can be seen that the per capita consumption of agricultural diesel in the Province of Taranto is almost half the regional and national consumption. Using the provincial per capita value, it is possible to estimate an agricultural diesel consumption for the city of Taranto equal to **3,512.1 t**. With these data, the energy consumption of the agricultural sector of Taranto is obtained, which is shown in Table 30.

	Totale GWh	Pro capite kWh
En. Elettrica	22,2	109,8
Gasolio	152,1	752,8

Table 30: Energy consumption in the agricultural sector of Taranto

Estimate of achievable energy savings

In the previous chapter, the energy needs of the city of Taranto in the various sectors were quantified. This requirement also takes into account energy losses caused by the inefficient way in which energy is produced and used.
In a zero-energy perspective, the first operation to be done is to efficiently exploit the necessary energy by eliminating inefficiencies and reducing losses and waste to the bare minimum. In fact, the best renewable energy is the one that is not consumed.
The current energy model is made in such a way as to waste and lose a lot of energy. Think, for example, of the way in which electricity is produced with a few large power plants that must serve very large areas. This centralized model means that already in the production phase a large amount of energy is wasted because it cannot be used to meet the energy demand for heat and cold since the considerable distance between the power plants and the consumption places would cause almost all the energy to dissipate before reaching the users. At best, i.e. in gas-fired combined cycle plants that have an efficiency of over 50%, about one kWh of thermal energy is dispersed for every kWh of electricity produced. In this way, the demand for thermal energy both for air conditioning and for the production of domestic hot water is satisfied by burning other fuel while with smaller plants located near the consumption centres, this demand could be met by creating district heating and cooling lines bringing the overall efficiency of the plant to values around 80%.
Another sector in which a lot of energy is wasted is that of transport based mainly on road transport and the exclusive use of vehicles.
An internal combustion engine has a maximum efficiency between 30% and 40%, but the fact that it does not always work at optimal speeds, that it must cope with accelerations and decelerations, that must always remain on even when the vehicles do not move, makes the overall efficiency drop to values of around 20% or less. Electric traction, on the other hand, has significant advantages in that it does not consume energy when the vehicle is stationary and manages to regenerate energy in deceleration, braking or downhill, therefore the overall efficiency of the vehicle is much higher even when the necessary electricity is produced with thermoelectric power plants. And it rises further when electricity is produced from renewable sources.
This is why the transition to electric traction already today, especially for city vehicles, would entail a considerable saving of energy which would be increased if the use of vehicles becomes collective, with public transport or with car sharing. While for the transport over greater distances, the use of hybrid vehicles or the shifting of the transport of goods from rubber to iron, would entail further savings.
Finally another source of waste is that relating to residential buildings where due to incorrect construction or construction in times when energy saving was not taken into account, large quantities of energy are dispersed for air conditioning due to inefficient insulation of the dispersing surfaces. Today a properly built building may not even need a winter heating system or summer air conditioning, being able to accumulate heat during the summer and cool during the winter season.
In this context, due to the energy production model, there are many energy wastes caused, as mentioned above, by the absence of electricity production plants that supply a district heating or district cooling network. In practice it is as if fuel were burned twice, once to produce electricity and another to produce heat, when the fuel used for the production of electricity would be sufficient to satisfy most of the thermal demand. But this is made impossible by the fact that there is a centralised energy production model, with few large power plants.
In this chapter, therefore, we will try to quantify the savings that can be achieved if energy were used efficiently so as to reduce, together with the needs, the resources necessary to produce it. This estimate will also be a basis for quantifying the economic and employment effects that could be achieved thanks to these energy efficiency measures.
As in the previous chapter, the savings estimate will be broken down by each sector taken into consideration.

Residential home sector

In the domestic residential sector, we need energy to operate household appliances, for air conditioning, for the production of domestic hot water and for cooking food.
The energy vectors mainly used today are electricity and natural gas, although there are also other vectors such as biomass, generally woody.
To eliminate fossil fuels, it is therefore necessary to shift a large part of consumption to the electric carrier and to use solar heating mainly for the production of domestic hot water.
To this end, the thermal requirement for the production of domestic hot water is quantified, assuming that this demand is today met with gas boilers, so as to extrapolate it from the methane gas consumption figure that refers to both heating and domestic hot water production.
To do this, we will assume a daily per capita consumption of domestic hot water equal to 50 l/house, therefore the energy requirement necessary to heat this water from a temperature of 10°C to a temperature of 50°C, with a temperature difference of 40°C. To do this, 2.33 kWh/house will be needed every day. For each inhabitant, it is thus possible to estimate an annual thermal energy requirement of 850 kWh equal to a methane consumption of 90 m^3.
If you want to cover this requirement with solar thermal, an area of 1 m^2 of panels will be needed for each inhabitant.
The remaining part of the heat requirement, today covered with natural gas and equal to 1,229.6 kWh per capita, can be met with electric heat pumps which would require an electrical requirement of approximately 491.8 kWh if a COP equal to 2,5 given by considering only the insertion of the heat pump to replace the boiler while maintaining the existing systems.
To assess how much thermal energy can be saved with energy efficiency measures, one must first evaluate the construction status of residential buildings in Taranto. This assessment can be conducted starting from the ISTAT "Population and Housing Census" data published in 2011.
This census shows that the city of Taranto has 90,960 homes located in 15,325 residential buildings with an average of 5.93 homes per building.
The breakdown by period of construction of the buildings is shown in the following table

As can be seen almost 70% of the residential buildings were built in the period from the post-war period to 1990, the year before the first Italian law that dealt with energy saving in the building sector. Therefore it is very probable that we will have to intervene mainly on this part of the building stock with energy efficiency measures in order to obtain the greatest savings. If we intervened on this part of the building heritage with energy efficiency works such as the replacement of the fixtures and the insulation of the opaque surfaces, and assuming that with them we will obtain a saving of 30% for each building on which we operate, we can think to obtain an overall saving of 20% on energy needs for air conditioning.
Reducing the energy requirement by 20% would result in a saving of 245.9 kWh per capita which overall translates into a saving of 49.7 GWh of thermal energy.
In this way, the heat requirement will drop to 983.7 kWh and the electrical requirement for heat pumps to 393.5 kWh per person.
As for current electricity consumption, one can think of a reduction of the same due to the use of more efficient appliances such as LED lamps or washing machines with double water inlet. From these interventions, a 10% reduction in current electricity consumption can be estimated: 3% from the use of LED bulbs and 7% from the use of washing machines with double water inlet.
The electricity requirement would thus drop to 915.0 kWh per capita.
In this way, the electricity requirement to meet the electric and heat consumption of the domestic sector will be 1,308.5 kWh per person.
Multiplying this figure for the population living in Taranto gives the overall electrical and thermal needs for the residential sector: respectively equal to 264.3 GWh and 171.7 GWh.

Service industry

The tertiary sector mainly uses electricity for the operation of electrical and electronic appliances, lighting, air conditioning, the movement of people with lifts, escalators and treadmills and thermal energy produced with methane gas for the production of domestic hot water, for heating, for food preparation, etc.
The requirement of service sector is 228.3 GWh of electricity and 17.6 GWh of thermal energy met with natural gas. By dividing these data by the inhabitants of Taranto, the current per capita needs of the service sector are respectively equal to 1,130.2 kWh of electricity and 87.0 kWh of thermal energy.
Energy savings in the service sector can be obtained with interventions similar to those of the residential domestic sector, indeed some activities that are located inside buildings for predominantly residential use could benefit from the same efficiency measures. For the others, however, it will be necessary to act with ad hoc interventions.

Without a precise knowledge of these activities, it is difficult to estimate how much thermal energy could be saved with energy efficiency measures, just as it is difficult to estimate how much thermal energy is necessary for the production of domestic hot water. Given these uncertainties, the need for thermal energy is prudently left unchanged, estimating that 40% of this energy is produced with solar thermal systems and the remaining 60% with electricity, similarly to what happens for the residential domestic sector.
The thermal energy to be produced with solar thermal systems is thus equal to 7.0 GWh while that produced with heat pumps is equal to 10.6 GWh which with an average COP of 2.5 entails an electrical requirement of 4, 2 GWh.
For electricity, savings could be obtained with the use of more efficient lighting fixtures, with the use of systems such as solar or optic fibre tunnels that use sunlight to illuminate the interior during the day, with solar cooling for summer air conditioning, recovering the energy in the elevators during the descent. Also in this case, specific energy diagnoses should be made for each site to calculate the amount of energy that could be saved.
The only estimate regarding the savings that can be made here is that relating to the consumption of public lighting.

Public

Electricity consumption in the public service sector is 67.5 GWh, of which 20.3 GWh are consumed for public lighting. The use of efficient LED lights, instead of traditional ones, and flow regulators that change the brightness of the lighting conspicuously according to the time, leads to savings which are conservatively estimated in 50% of current consumption, equal to 10.2 GWh. So the final consumption of electricity for public lighting can be estimated at 10.2 GWh.
As mentioned above, the remaining part of the savings that can be achieved is difficult to evaluate, so it is preferred to keep the current consumption figure.
At the end of the efficiency increase, the electricity demand for the public service sector can be estimated at 57.3 GWh.

Private

As previously mentioned, the estimate of the savings achievable in the private service sector is not simple as the activities are very heterogeneous and there is no data relating to the individual activities that allow reliable estimates to be made regarding the areas in which to obtain electrical energy savings.
Generally, in the service sector the consumption related to lighting is higher than in the residential household sector because in general the electric lighting is used for many more hours: just think of the commercial sector. So the use of efficient lighting systems or the use of sunlight with systems that manage to convey it to the interior of the premises would lead to significant savings especially in the warmer months.
Even replacing summer air-conditioning systems with solar cooling systems could lead to great energy savings. These systems, in fact, are suitable to be used for summer cooling as there is a large amount of solar heat which can be used to be converted into fresh air by means of absorption systems.
A lot of electricity is also consumed by lift systems which, if equipped with reversible motors that generate electricity during the descent, allow a reduction of approximately 30% in consumption. In this way, the electrical consumption for lifts is that necessary to overcome friction and inertia.
Even if a lot of electricity can be saved with these and other interventions, due to the impossibility to have reliable estimates, it will be assumed that electricity consumption will remain equal to the current ones. Furthermore, we must also consider the fact that the activities of the private service sector can grow in number thanks to the economic model that we want to propose for Taranto and therefore the energy needs could also be higher.
Therefore the electricity consumption of the private service sector remains equal to 160.9 GWh.
Summary
Summarising the values obtained for the public and private sector, it can be seen that the requirement is 7.0 GWh of thermal energy produced with solar plants and 222.4 GWh of electricity.

Production sector

The production sector of Taranto is heavily influenced by the presence of ILVA and the refinery which absorb a large amount of energy.
To date, the energy required by the entire production sector is equal to 4,526.8 GWh of electricity and 10,685.7 GWh of natural gas.
In Taranto without ILVA and the refinery, this demand, of course, will drop significantly. In fact, 4,429.5 GWh of electricity are consumed by the steel, refining and coke oven sectors. By removing this contribution from the current total data, there will remain an electricity demand for the production sector of 97.3 GWh.

Again in the absence of specific energy diagnoses, it is difficult to estimate how much of this electricity can be saved. So the final figure is assumed to be 97.3 GWh.
The same goes for methane gas.
Of the 1,017.7 Mm^3 of methane gas consumed in the production sector, 410.7 Mm^3 are consumed by the thermoelectric sector and it has been estimated that 590.7 Mm^3 are consumed by Ilva. By subtracting these consumptions from the total figure, the consumption of the remaining part of the production sector is obtained which is equal to 16.3 Mm^3, corresponding to an amount of energy equal to 171.0 thermal GWh.
It is necessary to determine how much of this requirement is required for room air conditioning and the production of domestic hot water, which can be satisfied with heat pumps and solar thermal systems, and how much of the consumption is required by the production process for the presence of ovens. This is because if we wanted to cover this need with electricity, the yield to be attributed would change. In fact, for an electric oven, the efficiency between the electricity consumed and the heat supplied can be assumed to be equal to 1, while for heat pumps this value, as we have seen, can be assumed to be equal to 2.5.
If we want to be cautious, risking overestimating the need for electricity, it is possible to satisfy all this thermal demand with electrical systems with efficiency equal to 1. In this way, the electricity consumption for the production of thermal energy would be equal to 171.0 GWh which, added to the demand for electricity previously determined, give the industrial sector a need for electricity equal to 268.3 GWh which divided by the inhabitants of Taranto provides a per capita electricity requirement for the industrial sector of 1.328,18 kWh.

Transports sector

The transport sector is perhaps the one where there is the greatest energy waste for the reasons mentioned above. So much can be achieved in terms of energy savings by making the entire sector more efficient.
The efficiency of the transport sector in general must be based on three aspects: transition to sustainable means of transport that increase efficiency, sharing of the means of transport between multiple users and passage of long-distance transport of goods from rubber to iron.
Naturally, within a city like Taranto, the aspects to be treated will be the first two because long-distance transport does not affect the energy saving of city transport.
The mechanical energy produced by the internal combustion engines of the vehicles circulating in Taranto determined indirectly by the fuel sales has been estimated at 319.42 GWh, against an amount of energy contained in the fuels sold equal to 894.1 GWh.
This data shows that a large part of the energy contained in the fuels is wasted in the heat emitted into the environment.
Using more efficient means of transport not only means not wasting this energy, but also improving the mechanical performance of the vehicle. In fact, the data of the mechanical energy produced by the engines contains other wastes of resources due to the fact that not all this mechanical energy is transferred to the motion of the vehicles. Just think of what happens when a vehicle is stationary at the traffic light, a very typical case in the city, with the engine running that transforms the thermal energy contained in the fuel into mechanical energy that does not transfer to the wheels as the vehicle is stationary. For example, a vehicle with electric traction, in addition not to needing a heat engine that produces mechanical energy, also avoids wasting this energy because when the vehicle is stationary the traction system does not consume energy.
According to the data on the consumption of cars released by car manufacturers and contained in the "Guide on fuel savings and CO_2 emissions of cars" published by the Ministries of Economic Development, of the Environment and of Infrastructure and Transport in 2015, it appears that consumption of fuel in the urban cycle is approximately 20% greater than that of the extra-urban cycle. This higher consumption can be reduced by using means of transport with electric traction.
Therefore by modifying the existing car fleet by switching to vehicles with electric traction, it is possible to estimate a saving in terms of mechanical energy, compared to that currently produced by the engines, equal to 63.9 GWh thus obtaining a mechanical energy requirement equal to 255.5 GWh. This value can still be lowered with the shared use of means of transport, such as car sharing and carpooling, and the increase in public transport. For precautionary reasons, this further reduction in consumption is not evaluated. The mechanical energy requirement will be satisfied with electricity which is equal to the mechanical requirement also by virtue of the fact that the savings that would be obtained from a virtuous use of the transport systems are not considered.
In this way the electricity requirement for the transport system is equal to 255.5 GWh which, divided by the inhabitants of Taranto, corresponds to a per capita value of electricity equal to 1.264,9 kWh.

Agricultural sector

Consumption in the agricultural sector is equal to 22.2 GWh of electricity and 152.1 GWh of energy contained in agricultural diesel.
In a Zero Territory perspective, the agricultural sector will be one of those to be focused on, so no decrease in electricity consumption compared to current consumption is considered. Indeed the introduction of photovoltaic irrigation, which will replace current electric or internal combustion engine pumps, will lead to an increase in these consumption.
Agricultural diesel will be replaced by electricity in a similar way to what has been said with the transport sector by targeting either electric agricultural vehicles or hydrogen powered fuel cell agricultural vehicles obtained through the electrolysis process using electricity produced by photovoltaic systems and / or wind farms owned by the agricultural entrepreneur or by a group of agricultural entrepreneurs gathered in consortia or cooperatives.
Currently, the overall efficiency of the process of hydrogen production by electrolysis and conversion into electricity with PEM fuel cells is approximately 43.8%, so if you wanted to produce and store energy in the form of hydrogen for the traction of the agricultural vehicles, an amount of electricity equal to more than double the mechanical energy needed should be produced.
With current data, the mechanical energy produced by the diesel engines of tractors is equal to 57.8 GWh, so to produce this energy through PEM fuel cells powered by hydrogen produced by electrolysis, an amount of electric energy is needed equal to 132.1 GWh.
In the end, therefore, the electricity needs of the agricultural sector will be 154.3 GWh which, divided by the population of Taranto, entails a per capita quantity of electricity equal to 763.6 kWh.

Quantification of energy needs after efficiency improvement

After calculating the energy that can be saved with efficiency measures, the actual energy needs of the city of Taranto to be met with renewable sources can be determined.
To clarify the starting and final data, the current energy needs are shown in the following table, divided by energy vector for each sector.
The current total energy requirement of the city of Taranto is therefore equal to 17.152,3 GWh equal to 32.010,5 kWh per inhabitant.
After the efficiency measures and without the energy consumption of the ILVA and ENI plants, the energy requirement divided by energy vector for each sector is that summarised in the following table.

As can be seen, the energy requirement to be fully satisfied with renewable sources has dropped to 1.343,5 GWh equal to 6.650,6 kWh for each inhabitant of Taranto.
The overall energy demand thus decreased by 92%.
But the most surprising results are that by carrying out these interventions:

- CO_2 and other polluting substances related to energy production will be eliminated
- energy dependence from the outside is eliminated and the resources that are spent today to buy energy remain in the area
- new employment opportunities linked to distributed energy production are generated

Estimate of available areas and energy production by source

The ISPRA study "Soil and Territory" published in 2015 was used to estimate the usable surfaces for the installation of renewable energy plants, which concerned the consumption of soil in the main Italian cities, including Taranto.
The results of this study have shown that the municipal area of Taranto is divided as follows:

Residential areas		Industrial, commercial and infrastructural areas (ha)	Urban green areas, sports and without current destination (ha)	Agricultural, semi-natural and wetland areas (ha)	Forests (ha)	Water bodies (ha)
Continuous fabric (ha)	Non continuous fabric (ha)					
581	1.141	3.966	371	16.289	136	2.092

In addition, another study conducted by the Municipality of Taranto concerning the Borgo district was treasured. The latter study was useful for estimating the percentage of coverage of the urban area and therefore the surface area of roofs available.
The Borgo district covers a total of about 107 ha. The blocks measure about 64 ha, so the area occupied by public roads is 43 ha, corresponding to about 40%.
Of the 64 hectares occupied by the blocks, the surfaces of the buildings amount to approximately 46 ha.
From this figure it can be determined that the percentage of surface occupied by buildings compared to the total area of the neighbourhood is 43%.
Taking into account that the surface of the Borgo Antico district of approximately 31 ha can be excluded from the calculation, the surfaces of the remaining part of the residential area equal to 443 ha having a continuous fabric and 1,141 which have a discontinuous fabric remain to be assessed.
Taking into account that the percentage occupied by buildings in the Borgo district is 43%, for the remaining parts of residential areas with continuous fabric it can be considered a percentage of 25%. So the area occupied by buildings can be estimated as 110 ha. This leads to a total area of buildings available for the installation of renewable energy plants in residential areas with continuous fabric of 156 ha.
For discontinuous residential areas, on the other hand, an occupation percentage of the buildings is estimated, compared to the overall surface, equal to 10%, thus obtaining a value of 114 ha.
In this way, a value of available surfaces equal to 270 ha is obtained.
Potentially this surface would be sufficient to allow the coverage of the needs of the domestic residential and service sectors, but other factors must also be taken into account, such as shading, exposure and the current use of these surfaces. So in a prudential way it is estimated that 50% of these areas will be used.
It is also necessary to evaluate the surfaces of the residential areas with discontinuous fabric which could be occupied by canopies or gazebos as well as those available for small wind systems. Potentially these surfaces are equal to the part of the areas not occupied by buildings or by the road system estimated at 50% of the total surface, so it can be assumed that other 455 ha can be added to the existing roof surfaces.
Therefore the usable surface of residential areas can be estimated at 135 ha for solar systems plus another 455 ha for solar and wind plants.
Of the industrial, commercial and infrastructural areas, approximately 1,500 ha are occupied by the Ilva plant, therefore, estimating the remaining part of the area occupied by roads equal to 50%, the available area can be estimated at 2.733 ha.
Unlike residential areas, almost all of these surfaces can be considered usable for the installation of solar or wind plants. In fact, in addition to the surfaces of the roofs, in this case also the surfaces of parking and other areas are available.
Therefore the usable surface of industrial, commercial and infrastructural areas is considered equal to 2.700 ha.
In conclusion, it can be assumed that the surfaces in which renewable energy plants can be installed to cover the energy needs of the city of Taranto measure 3,290 ha, of which 135 ha of residential building roofs where only photovoltaic and / or thermal solar systems can be installed.

Roofing of buildings

The surface of the roofs of residential buildings that can be used for the installation of renewable plants is 135 ha, or 1,350,000 m^2.
To these must be added the surfaces of the roofs of non-residential buildings, such as those of industrial, commercial and infrastructural plants. This area can be estimated, as done for the surfaces of discontinuous residential areas, in 10% of the surface of these areas, thus obtaining other 273.3 ha, or 2,733,000 m^2.
These surfaces can be used mainly for the installation of photovoltaic and solar thermal systems in order to try to meet the electrical and thermal needs of the home and the service sector.
The following paragraphs will estimate the powers that can be installed on these surfaces and the energy that can be produced.

Photovoltaic Solar

Considering that each kilowatt of photovoltaic solar system occupies an average coverage area of 10 m2, it is estimated that the photovoltaic solar power that could be installed on the roofs of residential buildings in Taranto is equal to 135 MW to which to add 273.3 MW roofing of industrial, commercial and infrastructure buildings, for a total of 408.3 MW.
Taking into account that according to Terna data, the average annual producibility of photovoltaic systems is equal to 1,378 hours, the electricity that could be produced is equal to 562.6 GWh.
This energy could cover about 48% of the electricity requirement of the city of Taranto equal to 1,164.8 GWh.
In order to cover the remaining part of the electricity requirement, 602.2 GWh would be missing, equal to 437 MW of photovoltaic panels which, if installed on surfaces other than roofs and, therefore, on dedicated installations, could occupy an area equal to 874 ha, considering that each kilowatt occupies 20 m^2.

These plants could be installed on the surfaces of the residential, industrial and commercial areas not occupied by buildings which are estimated at 2,914.7 ha, thus absorbing 30% of this surface.

Thermal solar

The thermal requirement for the production of domestic hot water in the residential and service sectors of the city of Taranto is 178.7 GWh.
This requirement could be covered with solar thermal systems installed on buildings both separately and jointly with photovoltaic systems.
An estimate of the surfaces needed to cover this need can be made considering the direct component of solar radiation which is generally equal to about 70% of the global radiation. The global radiation for the city of Taranto can be considered equal to 1,820 kWh / m^2 so that the minimum necessary surface can be equal to approximately 175,500 m^2 of captive surface.
This surface corresponds to 13% of the estimate of the surfaces of the roofs of residential buildings suitable for solar systems.

Areas to be reclaimed

Most of the surfaces that can be used for the production of energy from renewable sources to cover the energy needs of the city of Taranto, are placed in the areas to be reclaimed where the Ilva and Eni plants are located today. These surfaces, as mentioned, amount to about 15,000,000 m^2 and since it is unlikely that after reclamation they can be destined for other uses than industrial ones, one can think of creating an energy pole in these areas where to produce the necessary renewable energy to satisfy all the needs of the city of Taranto that cannot be covered by the surfaces just considered.
This site can also be used for the positioning of storage systems, for the production of hydrogen or fuel from renewable sources necessary for both the production of energy, electricity and heat, and to cover the needs of the transport system.
Any type of production plant could be installed in this area: photovoltaic, thermodynamic, wind and biomass.

Photovoltaic Solar

The areas to be reclaimed, once reclaimed, could all be occupied by photovoltaic systems, thinking that each kW occupies twice the surface occupied in a building, about 20 m2, the maximum power possibly installed is equal to 750 MW which multiplied by a production of 1,378 hours per year, gives us a total production of electricity equal to 1,033.5 GWh with which 88.7% of the total electricity requirement of the city of Taranto could be covered.

Thermodynamic solar

Another alternative would be to install thermodynamic solar systems in this area to produce electricity or for the combined production of electricity and heat. The advantage of thermodynamic solar systems is that in them, unlike what happens with photovoltaics, it is possible to program and modulate, within certain limits, the production of electricity and that they can operate for a greater number of hours than with photovoltaics.
Considering a ratio between the surface of the ground and the capturing surface of the mirrors equal to 3, one could think of installing a capturing surface equal to 5,000,000 m2 with which about 1,500 GWh of electricity and 3,000 GWh of thermal energy could be produced.
An amount of energy greater than the electrical and thermal needs of the city of Taranto.

Aeolian

Wind energy is another alternative source that can be used in the areas to be reclaimed. To understand the capacities, we can think of calculating the total power of wind turbines necessary to meet the electricity needs of the city considering as the average production figure that resulting from the ratio between wind energy produced and installed power in Apulia region and equal to 1,714 kWh / kW.
By dividing the electricity requirement by this value, a total wind turbine power of 845.13 MW is obtained.
Given this value, the number of turbines needed will depend on the power of each individual turbine.
Considering turbines with a power of 2,500 kW, 100 kW or 10 kW, we obtain, respectively, a number equal to 272, 6,797 and 67,972.
At this point, it is sufficient to calculate the surface available for each type of turbine to understand if the area in question is suitable or not to accommodate that number of turbines.
For each of the 3 powers considered, for each turbine an area equal to 55.178 m^2, 2.207 m^2 and 221 m^2 is obtained. That is, each turbine would be inside squares with sides equal to 235 m, 47 m and 15 m.

Biomass

Once reclaimed, the areas now occupied mainly by Ilva and the refinery, could be exploited both to produce and to treat biomass for energy purposes.
There are many biomasses that could be cultivated in this area for energy purposes, from hemp, to arundo, to miscanthus, and the same area could host the plants where to treat this biomass, the organic fraction of municipal solid waste and sewage sludge from waste water and thus obtain gaseous or liquid fuels such as biomethane, hydrogen, oil or ethanol and stabilised organic substance to be used as a soil conditioner or fertiliser.
Taking biomethane into consideration, to get an idea of the quantities that could be produced, we consider the cultivation of arundo, the treatment of the organic fraction of municipal waste and sewage sludge.
According to literature data, about 11,500 m^3 / ha of biomethane can be obtained from arundo every year which, multiplied by the surface of the areas in question, result in a total annual production of 17.25 Mm^3 of biomethane per year.
As regards the organic fraction of municipal solid waste, an average percentage of this fraction is estimated equal to 35.4% 251 which, given the production of municipal solid waste in 2014 equal to 108,658 t 252, entails a quantity of this fraction equal to 38,468 t per year. The specific production of biomethane obtained in operating plants is approximately 78 m^3 / tFORSU so that from the anaerobic digestion of the organic fraction of municipal waste collected in the city of Taranto, approximately 3 Mm^3 of biomethane could be obtained.
Finally, biomethane can be obtained by treating the sewage sludge of the treatment plants of the city of Taranto. From literature data, the annual biomethane production of the treatment plants is equal to about 10 m^3/abeq which, multiplied by the residents of the city of Taranto, result in a biomethane production equal to 2 Mm^3 per year.
From these components it is therefore possible to obtain an annual quantity of biomethane equal to 22.24 Mm^3 per year equal to just over 50% of the domestic consumption of methane recorded in 2014.
The biomethane thus obtained could be used to power a combined cycle power plant obtaining about 117 GWh of electricity every year equal to 10% of the electricity required by the city of Taranto, or to feed it into the network to cover both the thermal needs of the domestic and service sectors (178.7 GWh of thermal energy) and the consumption of buses in the city public transport service (8.12 GWh of mechanical energy).
This biomethane could also be used both to directly power fuel cells to produce electricity and heat and to produce hydrogen with the steam reforming process and thus be seen as a hydrogen storage system. Taking into account that stoichiometrically in the steam reforming process, 1 kg of hydrogen is obtained from each 2.67 kg of methane, up to 6,000 t of hydrogen could be obtained from biomethane produced from biomass every year.

[251] *Municipality of Taranto - " Industrial plan for environmental hygiene services for the municipality of Taranto. Service Contract" - June 2014*
[252] *ISPRA - "Urban waste report. 2015 Edition "- October 2015*

PART 2 - PROPOSAL

The de-carbonisation of Taranto

A) Energy

The strategic role of energy planning

The development of intelligent systems for the de-carbonisation of energy in agriculture, industry, services, transport, allows us to plan a renewable future and therefore to change society.

Energy efficiency, renewable sources and smart grids

In the energy field, future is based on medium-long term planning that promotes the intelligent use of new technologies and a stronger awareness and responsibility of institutions and individuals. Today this programming must clearly identify the forms of a transition to a different energy model; despite the intensification of the efforts by the technical-scientific community, a shared definition of this model has not been reached yet. It is however certain that it must deal with the interaction between electricity, thermal and transport consumption in an innovative and unified way, and must consider the different options on networks and storage as a priority to create the flexibility necessary for a coherent penetration of renewable energies and, above all, become an integral part of a new economic and social model.
The last barriers placed against a de-carbonisation of energy and economy seem now universally outdated, even if there is no sharing and so no certain strategy on timing and road-maps for a definitive progressive abandonment of fossil fuels. Ultimately, we need to rethink and redesign the energy system on both the production and consumption sides and we need rules to follow for a complete and definitive abandonment of the methods and procedures of a model that is no longer sustainable. However, there are common elements that, in the absence of an organic framework, outline the characteristics of the profound changes we face (energy communities, smart cities, energy union and the common energy market, etc.) and from an operational point of view some programmatic lines that can be considered a starting point have been set: revision of the tariff structure to lower the costs of the bills, innovation of the networks to intensify the development of distributed generation, overcoming the logic of the large production plants favouring the development of districts local environmental energy, incentives for energy efficiency. The large energy networks integrated with those of telecommunications and transport are the backbone of the revival of the country, in terms of growth and employment. The energy-environmental sector can support all the other productive sectors: construction, agro-energies, manufacturing, virtuous closure of the waste cycle and therefore it must be integrated with them[253]. The industrial world, especially SMEs, must actively participate in the modification of the industrial system converted into the technologies of the new model in terms of employment and production. The first change is that of the operational involvement of each individual in energy programs and decisions. Changing the energy model means changing society, because it defines a new role for the individual, so he/she must be positively and voluntarily forced into a more conscious and active attitude both as a consumer (smart users) and as a producer (prosumers). Awareness raising of local communities on the subject of energy would allow the achievement of a high degree of energy safety in the supply, obtaining significant results from an environmental point of view, saving in terms of energy bills, and in any case re-founding of the society as a whole on the basis of renewed more responsible interpersonal relationships[254]. Many studies describe the unexpressed potential of Italy in the energy sector, starting from the estimate of the energy efficiency market, intended as the amount of investments potentially necessary to achieve the objectives of the EU Climate-Energy package. Our country, although presenting a rather mature supply chain, is characterized by an ineffective economic and financial framework[255] [256] .

[253] *Livio de Santoli, A. Consoli, Territorio Zero, Minimumfav, 2013*

[254] *Livio de Santoli, Le Comunità dell'Energia, Quodlibet, 2011*

[255] *The potential of energy as a driver of development deals with the world of business, trade unions, institutions, structurally involving them all on issues concerning: the ICT tools connected with energy services, the tools to consider sustainability as a competitive advantage (energy diagnosis, efficiency in production processes, environmental sustainability as a key element in assessing company decisions) and business models of energy service operators (new players in the market of energy efficiency and innovative financing and contract tools).*

[256] *Mariana Mazzucato, Lo stato innovatore, Laterza, 2014*

The legislative instruments for energy efficiency and renewable sources

After the entry into force of Legislative Decree 102/2014, which incorporates the provisions of the EU on the subject of energy efficiency in buildings, the latter represents a priority also in our country, in line with the SEN National Energy Strategy (2013). Since the results are very scarce, despite the enormous potential of the energy efficiency sector, what should be the strategic lines for a finally effective programming? We could summarize them in some programmatic points, which must find space in a national strategic document.

- A road map towards a reduction in energy consumption. In 2040, demand is expected to be around half of the potential expressed by the renewables[257] and the current decoupling between growth and consumption is now consolidated, as the example of China is fully demonstrating[258].
- A powerful electrification of the national energy system. A significant increase in the use of the electric vector is expected in the near future, become an element of environmental sustainability as it can be integrated with all primary energy sources, especially renewable ones. It is a vector that allows energy efficiency and savings applications even in domestic, quantitatively relevant uses. It also has a high degree of compatibility with all ICT technologies and can be perfectly integrated with distributed generation.

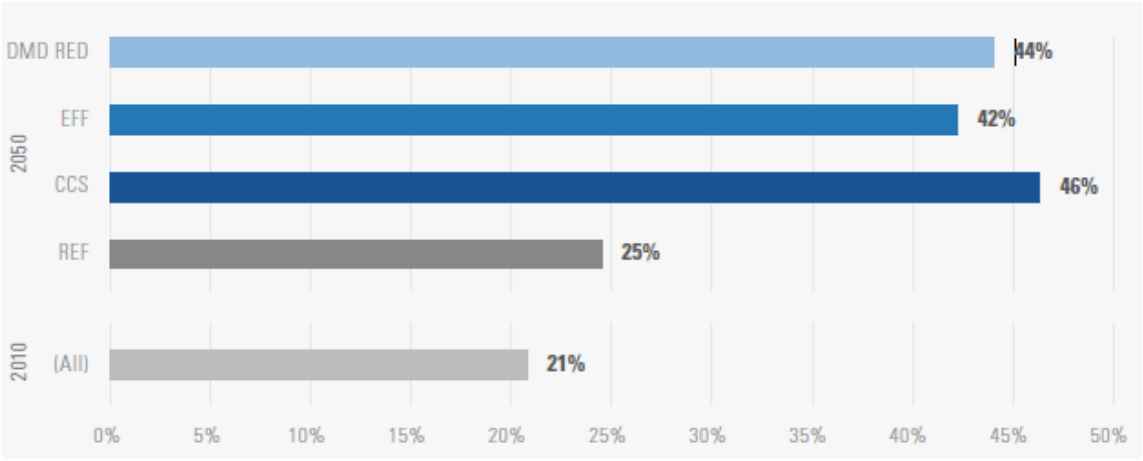

Figure 1 - Forecast of electrification of final consumption in the various scenarios (42-46%), ENEA, Pathways for a deep decarbonisation of energy, 2015

- A rapid evolution of storage systems. Starting from the last decades of the last century, the electrochemical storage sector has taken on vitality above all thanks to the adoption of nanotechnologies to characterize the electrode materials, which have given way to radical technological innovations: lithium ion, sodium sulphur, sodium chloride - nickel, etc. Modular storage systems have recently been introduced into the market starting from 10 kWh of capacity recently designed for residences to 100 kWh with low costs. Furthermore, we still have to explore the accumulation potential of the hydrogen vector.
  In addition to making wind and photovoltaic programmable, the accumulations will significantly change the current situation, also in terms of risk: the extreme event that the regulation will have to solve will no longer be the blackout, but the burnout (that is avoiding that too many accumulations introduce energy into the network at the same time).
- The development of sustainable mobility (electric and hydrogen especially in its form of gaseous mixture)
- The connection of energy networks with computer networks (Virtual Power Plant VPP, the use of the energy cloud, Internet of Things).
- The completion of the program based on distributed energy generation and a progressive (2020-2050) de-carbonization of energy in all the macro-sectors of consumption (electricity, thermal energy, transport). It is now a fact that the share of renewable energy in total consumption (and in particular in electricity demand) has reached very high levels (respectively around 20% and 35%), and this without a substantial change in the energy structure that should be radically modified for an even more incisive development of renewables. It is also an objective fact the rapid decrease in the hours of operation of traditional power

257 *Cfr ENEA, Pathways for a Deep Decarbonisation in Italy, 2015*

258 *Cfr. WEO World Energy Outlook, 2015*

plants (reduced on average to 2700 hours / year) due to the inexorable penetration of distributed energy generation: between 2007 and 2013 there was an increase in the systems of self-production equal to + 100%.

The development of intelligent systems for energy

The current energy model is based on the use of fossil sources (coal, oil, gas) and on infrastructures capable of transporting these sources over great distances. A fundamental characteristic of the model is the centralization of electricity production in large thermoelectric power plants, entrusting the reliability and flexibility of the entire system to the favourable characteristics of oil in terms of energy density (about 10 kWh / kg). Flexibility, in particular, refers to the availability of the fossil source to meet the demand exactly when and where it is formulated.
Is it possible to create an equally, if not more, flexible model based on renewable energy which is typically non-programmable and which generally assumes low energy density values? Many studies have recently been carried out on the characteristics that a completely renewable system must have[259], on the effects that this system has in terms of energy security and mitigation of greenhouse gas emissions and on the operating methods of its penetration consistent with the progressive modification of networks[260] [261]. On the other hand, in the formulation of operational proposals, there are not many integration hypotheses required by the ***smart grids*** systems among ICT, ***smart metering,*** storage systems, with district heating systems and district cooling and CHP and micro-cogeneration CHP (***Combined Heat and Power***), or with applications involving the production of fuels with electricity (***power-to-gas)***[262] or innovative mobility systems. But even when the areas of ***smart grid*** are connected to the concepts of ***smart cities,*** this happens almost exclusively for the electricity grid and for individual buildings, while they should be considered in a unifying framework, as well as required by international standards, concerning all requests for thermal, electric and energy necessary for transport. While the thermal and electrical sectors can be integrated using technologies such as CHP, large-scale heat pumps (to provide thermal energy on district heating or tele-cooling networks) or thermal and electrical storage systems, the reflections to be made for the transport sector cannot be based on current solutions (even those that use bio fuel or biomass) because they require a complex inter-sectoral approach (***Smart Energy Systems*** SES)[263].
The energy model without renewable sources requires that the annual quantities of energy produced (from primary sources) and used by the macro consumption centres of heating, electricity and transport use systems[10] conceptually sketched following incremental changes in the degree of energy efficiency:
the traditional basic system, in which energy requests are met by thermal power plants and fossil sources (gas, fuel oil) through heat generators (heating) or directly from fuels (transport);
the system that uses CHP systems, in the event that they provide all the necessary electricity and part of the heating;
the system that completely uses CHP systems, in the event that not only electricity but also all heating (for example through the use of electric heat pumps) is provided to macro consumption centres. In this configuration (in all three cases) the transport system continues to use only refined petroleum products. In these models, however, improvements in terms of overall efficiency can produce progressive reductions up to about 25% in terms of fossil fuel consumption. Furthermore, in these models it is possible to integrate up to 25-30% of energy from renewable sources so that there are no negative influences on the electricity network [264] due to the typical fluctuations of non-programmable sources. As is known, the use of renewable sources is progressively more marked in terms of fossil fuel consumption, which leads to a significant improvement in terms of energy efficiency.

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259 *For example see Lund H, Mathiesen BV. Energy system analysis of 100% renewable energy systems – the case of Denmark in years 2030 and 2050. Energy 2009/5; 34:524–31; Cosic´ B, Krajac˘ic´ G, Duic´ N. A 100% renewable energy system in the year 2050: the case of Macedonia. Energy 2012; 48:80–7; Peter S, Doleschek A, Lehmann H, Mirales J, Puig J, Corominas J, et al. A pathway to a 100% renewable energy system for Catalonia. Institute of Sustainable Solutions and Innovations; 2007. http://www.isusi.de/downloads/Solar_Catalonia_2007_en.pdf; Connolly D, Mathiesen BV. A technical and economic analysis of one potential pathway to a 100% renewable energy system. Int J Sustain Energy Plan Manage 2014:1; Connolly D, Lund H, Mathiesen BV, Leahy M. The first step towards a 100% renewable energy-system for Ireland. Appl Energy 2011;88:502–7.*

260

261 *Lund H, Andersen AN, Østergaard PA, Mathiesen BV, Connolly D. From electricity smart grids to smart energy systems – a market operation based approach and understanding. Energy 2012;42:96–102.*

262 *See for example: Lund H, Østergaard PA. Electric grid and heat planning scenarios with centralised and distributed sources of conventional, CHP and wind generation. Energy 2000;25:299–312; Østergaard PA. Transmission-grid requirements with scattered and fluctuating renewable electricity-sources. Appl Energy 2009;76:247–55; Østergaard PA. Regulation strategies of cogeneration of heat and power (CHP) plants and electricity transit in Denmark. Energy 2010;35:2194–202; Jentsch M, Trost T, Sterner M. Optimal use of power-to-gas energy storage systems in an 85% renewable energy scenario. Energy Proc 2014.*

263 *B.V. Mathiesen, H. Lund, D. Connolly, H. Wenzel, P.A. Østergaard, B. Möller, S. Nielsen, I. Ridjan, P. Karnøe, K. Sperling, F.K. Hvelplund, Smart Energy Systems for coherent 100% renewable energy and transport solutions, Applied Energy 145 (2015)*

264 *Lund H, Andersen AN, Østergaard PA, Mathiesen BV, Connolly D. From electricity smart grids to smart energy systems - a market operation based approach and understanding. Energy 2012;42:96–102.*

Combined generation, hydrogen and smart grids

Furthermore, the introduction of the combined micro generation of electricity and thermal energy for local uses, and of large-scale heat pumps would allow an even more significant use of renewable electricity sources (40%) without penalizing the overall efficiency of the system. This is true even if the transport system continues to use only refined petroleum products. Higher portions of energy from renewable sources involve substantial changes in the structure of the energy model and must also allow for the inclusion of portions of thermal renewables consistent with overall energy demands. If the penetration of non-programmable renewable energy must be able to approximate 100%, appropriate energy storage technologies [265] capable of creating new forms of flexibility also on a large scale must be carefully chosen.
In distributed energy generation, the large thermoelectric power station is replaced with a series of smaller power plants located in the area; the electricity storage systems must be able to support the insertion of renewables and, in a transition phase, it must also be designed and built on a large scale to serve the main electricity grids. At the moment on a large scale (100 MW and above), there are only two storage technologies, pumping water in basins for the subsequent production of PHES hydroelectricity (with yields of the order 85%) and the compressed air CAES (with yields of 65%), but other solutions are available on the market especially of medium and small scale, and are the subject of studies to increase efficiency and reduce costs (electrochemical batteries, flywheels, hydrogen produced from renewable electricity for thermal energy production). On the side of the transport consumer sector, specific studies have recently been conducted to identify forms of electrical storage in electric mobility consisting directly of cars (the so-called vehicle-to-grid mode, V2G[266]), or in which hydrogen is proposed in a mixture with methane (hydro methane, H2NG) as a fuel for vehicles but also for micro-CHP[267].
The use of hydrogen will become increasingly important as the system's share of renewable electricity increases, also because in addition to the thermal requirement through combined production systems (power-to-gas), through the electrolysers it is possible to meet that of the transport sector too, thanks to biomass fuels[268]. The development of the model must not be limited to the only, albeit relevant, aspect of electricity, but the thermal sector must also be considered, combining the macro sectors of heat consumption, electricity and obviously also including transport. A first option to combine electricity and heat (or cooling) is to consider heat pumps (also on a large scale) and CHP used in district heating networks in which appropriate thermal storage systems 269 are included. The energy sources that can be used in a transition phase towards the new distributed model will obviously use biomass and biogas for thermal uses (cogeneration, district heating but also local uses for industry and farms), in a local area of use for the enhancement of territorial resources. This strategy obviously includes the local heating / cooling systems which must immediately provide for an ever-increasing electrification of (civil and industrial) users facilitated by suitable pricing and community obligations towards nZEB (nearly Zero Energy Buildings) buildings.
In particular, the programs must include the great potential associated with a redevelopment of the existing building on an urban and sub-urban scale. In particular, it is necessary to consider the provisions regarding the reduction of consumption resulting from the thermo-physical improvement of the building envelope (EPBD directive, Energy Performance of Building Directive), the share of energy from renewable sources assigned, the energy efficiency of the plant systems and interconnection with adjacent buildings to intelligently manage self-produced energy surpluses / deficits (net Zero Energy Buildings) in a contextual way. In the transport sector, an electrification phase as wide as possible must be managed, not only for a penetration of increasing shares of electric renewables, but also for the improvement in terms of efficiency of electric vehicles such as to guarantee a significant reduction in the corresponding use of fossil fuel. In the first phase, it is necessary to focus on the gradual replacement of private cars with electric cars up to the threshold of 25-30% at full capacity[270]. The remainder will be guaranteed, always electrically, by bio methane, bio-methanol and synthesis gases. Bio methane is a gas derived from biogas which has undergone an upgrading process (refining and purification) bringing the concentration of methane CH4 to exceed 98%.
Like natural gas (fossil methane), bio methane can be used as bio fuel for motor vehicles, be introduced into the national distribution network and transported and stored for the subsequent production of energy even in places very far from the production site. The use of bio methane constitutes the technological frontier of biogas producers, with a high degree of efficiency, since it would be possible to cover at least 10% of national gas consumption in the medium term through the production of 7-8 billion cubic metres per year of agricultural bio methane. Considering that Italy imports 70 billion cubic metres natural gas per year, bio methane is essential to reduce Italian energy dependence already in the short to medium term.

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265 *Stadler I. Power grid balancing of energy systems with high renewable energy penetration by demand response. Utilities Policy 2008;16:90–8.*

266 *Lund H, Kempton W. Integration of renewable energy into the transport and electricity sectors through V2G. Energy Policy 2008;36:3578–87; Pillai JR, Bak-Jensen B. Integration of vehicle-to-grid in the western Danish power system, 2011;2:12–9*

267 *B. Nastasi, L. de Santoli, A. Albo, D. Bruschi and G. Lo Basso. RES Availability Assessments for Eco-fuels Production at Local Scale: Carbon Avoidance Costs Associated to a Hybrid Biomass/H2NG-based Energy Scenario. Energy Procedia 81 (2015) 1069–1076; L. de Santoli, G. Lo Basso and D. Bruschi. Energy characterization of CHP fuelled with hydrogen enriched natural gas blends. Energy 60 (2013) 13–22.*

268 *Juul N, Meibom P. Optimal configuration of an integrated power and transport system. Energy 2011;36:3523–30.*

269 *Østergaard PA. Comparing electricity, heat and biogas storages' impacts on renewable energy integration. Energy 2012;37:255–62.*

270 *Connolly D, Mathiesen BV, Ridjan I. A comparison between renewable transport fuels that can supplement or replace biofuels in a 100% renewable energy system. Energy 2014;73:110–25.*

Until the 1970s, commercial methanol was obtained by synthesis (CO + H2) or by natural gas (methane). With the energy crisis and the need to disengage from traditional energy sources, the production of bio-methanol has spread starting from biomass subject to gasification treatments or following complex reactions that occur through the treatment of waste substances by biological means. Synthesis gas can today be obtained from hydrogen produced by electrolysis using renewable input electricity. The resulting energy model is based on the intelligent management of networks and storage that can optimise the energy system, making the loss of flexibility deriving from the use of electric renewables irrelevant. Then it is possible to implement in the ***smart grid*** technology all the three components at a time, with an electric ***smart grid***, a thermal one, and a gas related one (biogas, bio methane, hydrogen). From their combination with the technologies available for thermal and electrical storage it is possible to foresee a scenario with 100% renewable energy[10]:

an electric ***smart grid***, capable of connecting electric RES (especially wind and photovoltaic) to heat pumps and electric vehicles with the use of electric storage;

a thermal ***smart grid*** (district heating and cooling) to interconnect the heating sector with the electrical one. The cogeneration and micro-cogeneration systems will be part of this grid, and must include thermal storage systems. It may include a series of local energy production components for buildings, always in a scheme that provides for the interconnection of these buildings with each other;

a ***smart grid*** of gas to connect the heating sector, the electricity sector and the transport sector, capable of integrating users with production in a smart way, making use of suitable storage systems. Based on these infrastructures, only by referring to coordination among the combination of the different smart grids and the respective storage systems it will be possible to assign the distributed generation of energy and the use of renewable sources a definitive role in an innovative and different model.

A new energetic model at the dawn

The creation of a system that refers to the ***smart grid*** is now possible using some tools already present in the existing regulatory framework, but which need support measures and regulatory adjustment consistent with the objectives of energy planning as described above. They are tools that highlight the technical feasibility of a new model and among these the ones briefly described below can be mentioned.

The role of the 'energy aggregator'.

The figure of the ***energy aggregator*** has been defined but it is necessary to identify operating modes, according to the provisions of Legislative Decree 102/2014 transposing the European Energy Efficiency Directive. The aggregator (consortium of operators in the local area, utilities, traders) has the task of interposing between energy consumption and distribution, managing all the systems, participating in the electricity market on behalf of the individual operators and, subsequently, governing its production in order to meet contractual commitments. The aggregator is a ***collaborative and participated Commons***[271] and its activity will also concern the active management of the demand[272]. The functions of the aggregator also include active demand management. It is therefore possible to create aggregations capable to absorb the effect of the stochasticity of some renewable sources on distributed electricity generation as the number of integrated plants and their territorial distribution grows, so as to make the characteristics of the production not dissimilar (in terms of quality and quantity) to those of traditional production[273]. The addition of back-ups with electrochemical or thermal storage systems would make the offer even more programmable.

The distributed micro-cogeneration

The diffusion of micro-cogeneration plants (<50 kW) and small cogeneration plants (50 kW - 1 MW) is very limited on the Italian territory despite the great potential of the sector; it mainly uses biogas (81.3%) and natural gas (8%) and is made almost entirely by internal combustion engines with heat recovery. To allow significant exploitation of the great potential, the technical and economic conditions provided for by the on-site exchange (SSP) and dedicated withdrawal (RID) regulations for the introduction into the network of energy deriving from a small-scale cogeneration plant require an important revision. Regardless of the transfer mechanism considered, the situation of maximum advantage corresponds to the instantaneous on-site self-consumption of all the electricity produced: in this case, in fact, if the configuration is attributable to an Efficient User System (SEU), the consumed electricity is not subject to any tariff. If, on the other hand, the configuration was not attributable to a SEU, all the electricity consumed would be charged by the general system charges (but not by the transport tariffs).

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271 *J, Rifkin, La Società a Costo Marginale Zero, Mondadori, 2014*

272 *L. de Santoli, F. Mancini, Verso una utenza attiva nell'evoluzione del sistema elettrico nazionale, AiCARR Journal n.30, February 2015*

273 *GB Zorzoli, Per un nuovo mercato elettrico, http://www.free-energia.it/2015/01/convegno-free-de-vincenti-convegno-free-entro-febbraio-dm-fer-non-fotovoltaiche/*

Heat metering.

The decrees implementing the EU directive on efficiency require the protection of each user to allow him to be an active part in the energy model, through a real awareness of what he consumes and a concrete capacity for direct intervention. The spirit of the provisions is not only to install a thermoregulation system for each housing unit (which allows the user to adjust the desired temperature in each room) or an energy metering and measurement system to allow a proportional division of expenses. Indeed, it is not enough for intelligent metering systems to provide end customers with information on the actual time of use, but this must be done directly, without intermediation by market operators, be them companies that sell or distribute energy. It is widely believed [274] that direct availability (through displays or interfaces) of the measurement data for end customers is essential to allow full awareness of their consumption in order to adopt energy saving logics. In fact, the stated goal is to obtain, through the knowledge of individual consumption and the ability to manage energy, greater user empowerment such as to induce more virtuous behaviour and to reduce energy waste. In this sense, it is extremely important that we define both the metrological requirements of the heat measuring devices and their verification and approval methods.

Quantification of current energy needs by sector and type

Consumption evaluation - agriculture, industry, services, transport

The energy requirement of the city of Taranto is quantified using Terna data for the quantification of electricity consumption, ISTAT data for the quantification of methane gas consumption and data by the Ministry of Economic Development to quantify the fuel consumption for automotive and of methane gas.
In this chapter we will try to divide this data by the various sectors as well as by type.
As regards electricity, total consumption relative to the national, regional and provincial levels are shown in the following table.

	Totale GWh	Pro capite kWh
Italia	291.083,5	4.787,9
Puglia	17.050,9	4.168,8
Prov. Taranto	6.040,7	10.266,9

Table 31: Total and per capita electricity consumption

From the comparison of the per capita data, it can be seen how the electricity consumption in the province of Taranto is more than double the national and regional ones.
As regards electricity natural gas consumption at national, regional and provincial levels, the data are shown in the following table.
Also in this case the per capita consumption of methane gas relative to the province of Taranto is higher than the national and regional data.
Consumption relating to automotive products at national, regional and provincial level is shown in Table 3 below.

	Benzina		Gasolio motori		G.P.L.	
	Totale t	Pro capite kg	Totale t	Pro capite kg	Totale t	Pro capite kg
Italia	7.899.394	129,9	24.692.840	406,2	1.564.226	25,7
Puglia	398.960	97,5	1.475.348	360,7	73.071	17,9
Prov. Taranto	51.862	88,1	157.470	267,6	6.403	10,9

Table 32: Total and per capita consumption of transport products

In the case of automotive products, on the other hand, per capote consumption in the province of Taranto is lower than both national and regional values. Starting from these values and considering the presence of ILVA, the current energy needs related to the city of Taranto have been estimated for each sector and are shown in Table 4 below, whose calculations will be better highlighted in the following paragraphs.
As can be seen, the industrial presence in Taranto entails a significant increase in the per capita consumption of electricity and methane with a value, compared to national and regional values, equal to 6 times for electricity and 4 times for methane, while for fuels the values are lower.
The comparison between the per capita values expressed in kWh is better highlighted in Chart n.1.

[274] *See AiCARR Comment (8 October 2015) to Government Act n.201. The end customer must be directly involved in the temperature regulation and metering system, but also in the distribution of heat, without prejudice to the need to guarantee continuity in the measurement of the data and as far as the costs resulting from the assignment of the measurement, distribution and counting task are reasonable.*

	Totale	Pro capite
En.Elettrica	4.982,7 GWh	24.664,9 kWh
Metano	1.158,2 Mmc	5.733,4 mc
Benzina	17.806,8 t	88,1 kg
Gasolio	54.067,4 t	267,6 kg
G.P.L.	2.198,5 t	10,9 kg
Gasolio agricolo	3.512,1	17,4

Table 33: Current total and per capita energy consumption in the city of Taranto

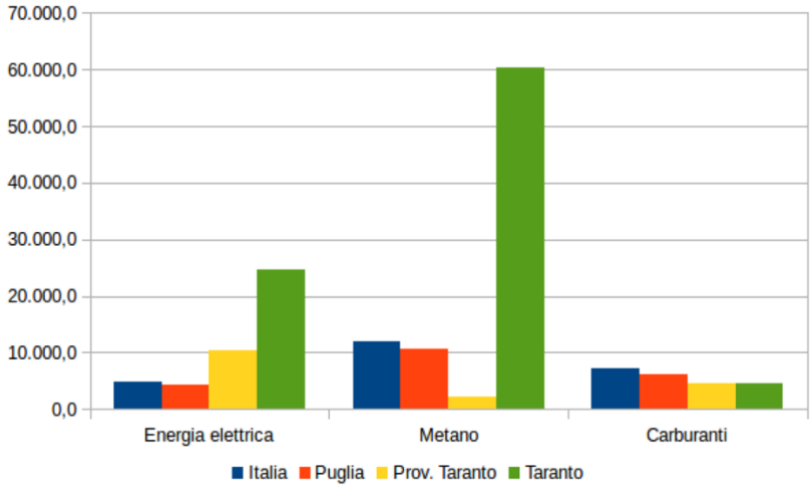

Chart n.6: Comparison of current energy consumption per capita

In the following paragraphs, consumption will be divided by sector: domestic, service, production, transport and other.

Residential home sector

The current consumption of electricity in the residential domestic sector is estimated starting from the per capita values of regional and provincial Italian domestic consumption. These values are shown in the following table.

	Totale GWh	Pro capite kWh
Italia	64.255,0	1.056,9
Puglia	3.988,5	975,2
Prov. Taranto	598,2	1.016,7

Table 34: Total and per capita domestic electricity consumption

As we see the figure of per capita consumption in the Taranto province is in line with the national and regional levels. Taking this figure as the per capita value of the city of Taranto, the total electricity consumption can be estimated as equal to **205,4 GWh**.
In addition to electricity consumption, methane consumption must also be assessed. To do this, the data provided by Istat on the consumption of methane gas for domestic use and per capita heating of the provincial capitals will be used. Unfortunately, these data are updated to 2011. For 2011 the per capita consumption of methane gas in the city of Taranto was **198.1 m ^{3}** which, taken as the figure for 2014, corresponds to a total consumption of **40.0 mm ^{3}**.
The summary of current energy consumption in the domestic sector, considering a higher calorific value of 10.5 kWh/Sm^3 for methane, corresponding to the 38.1 MJ /Sm^3 value indicated by the AEEGSI, are shown in the following table.

	Totale GWh	Pro capite kWh
En.Elettrica	205,4	1.016,7
Metano	420,1	2.079,6

Table 35: current energy consumption in the domestic sector

Service industry

The consumption of electricity and natural gas will also be considered for the service industry, and for electricity the consumption will be divided between public and private.
Methane consumption can be inferred by subtracting the consumption of methane gas for the provincial capitals supplied by Istat from the consumption data provided by the Ministry of Economic Development.
The per capita consumption of methane gas from the distribution network in the province of Taranto is equal to **206.3 m ^{3}**; if this value is also taken as a reference for the city of Taranto, we just have to subtract the per capita consumption of methane gas for domestic use to obtain the consumption data relating to the Service industry of the city of Taranto. Doing the relevant calculations, this value is equal to **8.3 m ^{3}** which corresponds to a total consumption of methane gas for the tertiary sector equal to **1.7 Mm ^{3}**.
The electricity consumption of the Italian, regional and provincial service industry is shown in the following table.

	Totale GWh	Pro capite kWh
Italia	98.951,4	1.627,6
Puglia	4.574,2	1.118,4
Prov. Taranto	665,0	1.130,2

Table 36: Total and per capita service electricity consumption

As you can see, the regional and provincial data are quite similar and are lower than the national figure. For the city of Taranto, the overall figure will be assumed to be equal to the per capita value of the Province of Taranto. With this figure, the total electricity consumption for the Service industry of the city of Taranto is equal to **228.3 GWh.**

Public Sector

To evaluate the current electricity consumption of the public Service industry, the values provided by Terna and grouped under the item *Non marketable services* which includes the items *Public administration, Public lighting and Other non marketable* are taken into consideration.
The national, regional and provincial data of these items are shown in the following table.

	Totale GWh	Pro capite kWh
Italia	19.655,5	323,3
Puglia	1.073,5	262,5
Prov. Taranto	196,5	334,0

Table 37: Total and per capita public service electricity consumption

As we see the figure of per capita consumption of the Taranto province is higher than both the regional and the national level. Assuming this value as relating to the city of Taranto, a total electricity consumption of **67.5 GWh** is obtained.
The breakdown of these consumptions into the various items included is shown in the following table.

	Totale GWh	Pro capite kWh
Pubblica amministrazione	33,6	166,6
Illuminazione pubblica	20,3	100,6
Altri Servizi non Vendibili	13,5	66,8

Table 38: Breakdown of electricity consumption in the public service sector

Private Service Industry

Electricity consumptions in the private tertiary sector are those reported by Terna as ***Marketable services*** which includes the following items: ***Transport; Communications; Business; Hotels, Restaurants and Bars; Credit and insurance; Other marketable services.***
The national, regional and provincial consumptions of these items are shown in the following table.

	Totale GWh	Pro capite kWh
Italia	79.295,9	1.304,3
Puglia	3.500,7	855,9
Prov. Taranto	468,5	796,3

Table 39: Total and per capita private service electricity consumption

Unlike the public Service industry, the per capita consumption of electricity in the private Service industry of the Province of Taranto is lower than both the national and regional figures. Assuming this value as relating to the city of Taranto, a total electricity consumption of **160.9 GWh** is obtained.
The breakdown of the total and per capita consumption of electricity in the various items included in the category ***Marketable services*** is shown in the following table.

	Totale GWh	Pro capite kWh
Trasporti	7,9	38,9
Comunicazioni	8,8	43,5
Commercio	45,4	224,7
Alberghi, Ristoranti e Bar	20,3	100,6
Credito ed assicurazioni	3,3	16,3
Altri Servizi Vendibili	75,2	372,2

Table 40: Breakdown of electricity consumption in the private service sector

Once the data of the electricity and methane gas consumption of the Service industry have been obtained, the energy consumption of the various items can be obtained, which is shown in the following table.

	Totale GWh	Pro capite kWh
En.Elettrica	228,3	1.130,2
Pubblico	*67,5*	*334,0*
Privato	*160,9*	*796,3*
Metano	17,6	87,0

Table 41: Service industry energy consumption summary

Industrial production sector

In assessing the current energy consumption of the city of Taranto, it is useful to include the consumption caused by Ilva too. In fact, the data we have refer to the consumption of the province and, having to follow the same method used previously, that is to consider the provincial per capita data as characteristic of the city of Taranto, we should subtract the data relating to Ilva and other large Taranto plants first; otherwise they would be spread among all the inhabitants of the province and the consumption relating to Taranto alone would be underestimated.
To begin with this analysis we consider the national, regional and provincial electricity consumptions reported by Terna under the item ***Industry*** which are shown in the following table.

	Totale GWh	Pro capite kWh
En.Elettrica	228,3	1.130,2
Pubblico	*67,5*	*334,0*
Privato	*160,9*	*796,3*
Metano	17,6	87,0

Table 42: Total and per capita productive sector electricity consumption

As can be seen, in fact, the average per capita consumption figure of the Province of Taranto is 4 times the regional and national figure.
If we analyse the overall figure of electricity consumption in the Province of Taranto, it can be observed that of the total 4,712.8 GWh, 4,087.3 GWh are consumed by the steel industry and 342.2 GWh by Refining and coking plants. These two contributions of electricity consumption are totally attributable to Ilva and the petrochemical of Taranto and therefore it is correct that they are subtracted from the provincial data. In this way, the provincial electricity consumption of the production sector will be 283.3 GWh equal to 481.5 kWh per capita. Taking this value into account, the electricity consumption of the production sector without Ilva and the petrochemical sector of the City of Taranto drops to **97.3 GWh.** And considering Ilva and petrochemical consumption, it can be seen that the electricity consumption of the productive sector of the city of Taranto is equal to **4,526.8 GWh** equal to **22,408.0 kWh** per capita. Therefore the per capita consumption of electricity in the production sector is strongly influenced by the presence of Ilva and the petrochemical industry to the point that the figure is 11 times the national and regional figure.
A similar observation will be made for the consumption of methane gas. The data of the Ministry of Economic Development for methane gas consumption in 2014 are shown in the next table.

	Totale GWh	Pro capite kWh
Italia	122.505,0	2.015,0
Puglia	8.085,0	1.976,7
Prov. Taranto	4.712,8	8.010,0

Table 43: Total and per capita productive sector methane gas consumption

Also for the consumption of natural gas it is observed that the per capita data of the province of Taranto is equal to almost double the regional one and triple the national one.
Of this consumption, that of the thermoelectric sector is totally attributable to the Taranto thermoelectric plants that serve Ilva, while to establish the rate of consumption of natural gas of the industrial sector to be attributed to Taranto, it will be necessary to process the data taking as reference the average sector consumption in the other Apulia provinces.
The average per capita consumption figure of the other Apulia provinces is equal to 80.1 m^3. Assuming this value as relating to the Province of Taranto, it is found that the consumption of methane gas in the industrial sector purified from the consumption of Ilva is equal to 47.3 Mm^3, by subtracting this value from the total data, a consumption of 590.7 Mm^3 of methane gas is obtained. This value is compatible with the data reported in a 2007 report of the Ilva plant [275] in which the consumption of methane gas from 2000 to 2005 results to be between 550 Mmc and 400 Mm^3.
Assuming for Taranto an average per capita consumption of methane gas for the industrial sector equal to the average of the other Apulia provinces and equal to 80.1 m^3 as mentioned above, we obtain a total consumption without the Ilva consumption equal to 16.3 Mm^3. Therefore the total consumption of methane gas for the city of Taranto is **607.0 Mm ^{3}**, corresponding to **3,004.6 m ^{3}** per capita.
The summary of gas consumption in the city of Taranto is shown in the next table.

	Industriale	Termoelettrico	Totale	
	Totale Mmc	Totale Mmc	Totale Mmc	Pro capite mc
Italia	13.581,5	17.902,5	31.484,0	517,9
Puglia	918,5	2.230,2	3.148,7	769,8
Prov. Taranto	638,0	410,7	1.048,7	1.782,4

Table 44: Methane gas consumption in the productive sector in the city of Taranto

The overall consumption of the city of Taranto in the production sector expressed in energy terms is shown in Table 16.

[275] *Annex D.10 "Energy analysis of the plant", February 2007*

	Totale Mmc	Pro capite mc
Totale	1.017,7	5.037,6
Industriale	*607,0*	3.004,6
Termoelettrico	*410,7*	*2.033,0*

Table 45: Productive sector methane consumption in the city of Taranto

Transports sector

The energy consumption of the transport sector is estimated starting from the data released by the Ministry of Economic Development on the sales of petroleum products for automotive use both in the road and motorway network and outside the network.
Also in this case a comparison will be made between the national, regional and provincial data to highlight any differences and then this latter data will be averaged for the provincial population and used as a characteristic figure also of the city of Taranto.
The 2014 national, regional and provincial automotive fuel sales figures are shown in the following table.

	Benzina		Gasolio motori		G.P.L.	
	Totale t	Pro capite kg	Totale t	Pro capite kg	Totale t	Pro capite kg
Italia	7.899.394	129,9	24.692.840	406,2	1.564.226	25,7
Puglia	398.960	97,5	1.475.348	360,7	73.071	17,9
Prov. Taranto	51.862	88,1	157.470	267,6	6.403	10,9

Table 46: Total and per capita sale of oil products for automotive

As can be seen, the per capita fuels consumption of the province of Taranto is lower than both the regional and national data. Taking the provincial per capita consumption as a reference for Taranto, the fuel consumption of the city of Taranto can be assessed as shown in Table 18.
Once the fuel consumption data have been estimated, it is possible to determine both the value of the total energy contained in the fuels and that of the mechanical energy that internal combustion engines can develop. These values are reported respectively in the following tables.

	PCI MJ/kg	Totale GWh	Pro capite kWh
Benzina	43,6	215,7	1.067,54
Gasolio motori	43,3	650,3	3219,1
G.P.L.	46,1	28,2	139,4

Table 47: Total energy contained in the fuels consumed in Taranto

	Rendimento	Totale GWh	Pro capite kWh
Benzina	0,30	64,7	320,3
Gasolio motori	0,38	247,1	1.223,3
G.P.L.	0,27	7,6	37,6

Table 48: Mechanical energy developed by internal combustion engines in Taranto

Agricultural sector

As for the agricultural sector, the data on the consumption of electricity and agricultural fuel will be used and hence the consumption related to Taranto will be assessed.
The national, regional and provincial electricity consumption data provided by Terna are shown in Table 51.
Please observe, the per capita consumption of the Province of Taranto is higher, albeit slightly, than both the regional and national data. To evaluate the consumption relating to the city of Taranto alone, the provincial per capita consumption data

will be used, from which it can be deduced that the electricity consumption of the sector for the city of Taranto is equal to **22.2 Gwh**.
As for the consumption of agricultural diesel fuel, national, regional and provincial data are shown in *Table* 52.
From these data it can be seen that the per capita consumption of agricultural diesel in the Province of Taranto is almost half the regional and national consumption. Using the provincial per capita value, it is possible to estimate an agricultural diesel consumption for the city of Taranto equal to **3,512.1 t**.
With these data, the energy consumption of the agricultural sector of Taranto is obtained, which is shown in *Table 53*.

B) Consumption without waste

Circular Economy: closing the cycle of consumption without waste.

The circular economy can be defined as the virtuous closure of the cycle of consumption without waste and therefore, as recently confirmed by the European Commission, the new frontier of zero waste according to a logic of community and short supply chain, two essential concepts in a Rifkinian perspective that characterise the third industrial revolution. But let's proceed in order.
Since 2008, the European Union has adopted a strategy regarding the closure of the waste cycle aimed at the progressive elimination of waste through a rigorous and hierarchical application of the rule of the three 'R' (Reduction, Reuse, Recycling). But before illustrating the definitions of the circular economy of the European Commission and before proceeding to the projection on Taranto of the planning of a circular economy as a production and distribution cycle " in support of sustainable growth", it is advisable take a step back and go to what can be considered the genesis of the Circular Economy theory.

Circular Economy and sharing economy.

Jeremy Rifkin refers to the Circular Economy already in "The Access Economy" in which, referring to the need to respect the principles of sustainability and conservation of the natural resources of the biosphere, introduces new economic models (typical of the ***sharing economy*** in which citizens increasingly prefer access to ownership of goods and services in a social market economy with which he will deal more widely in his later works). In this vision, matter and objects are reused and recycled repeatedly, a principle taken up at the theoretical level in the subsequent "The Third Industrial Revolution" and at the practical level by the manifesto-book Territorio Zero, towards a society with zero emissions, waste and km" [276]; in his latest work "Society at Zero Marginal Cost" Jeremy Rifkin places Circular Economy at the basis of the new emerging economic paradigm of the Third Industrial Revolution, underlining how the "linear" economy (the one that empties mines to fill landfills and creates the plastic islands in the Pacific Ocean) is typical of the exploitation of resources of the second industrial revolution, while the Circular Economy is establishing itself as the model of exploitation of resources and industrial design of the Third Industrial Revolution, that of the Internet of the Things having as a focus the "***Prosumer*** " as a key element to preserve the biosphere starting from the respect for common goods through the so-called " ***Collaborative commons*** " introduced in the subtitle of the same work. Indeed Rifkin explains that
... if the technological platforms of the First and Second industrial revolution have favoured the breaking of the countless ecological interdependencies of the planet by harnessing them for the benefit of free trade and personal profit, the Internet of Things platform that characterizes the Third industrial revolution reverses the process. What makes the Internet of Things the disruptive technological reality for the organisational modalities of economic life is that it helps humanity to reintegrate itself into the complex choreography of the biosphere and that, in doing so, it considerably increases productivity without however compromising the ecological balance that rule the planet. Using the resources of the earth to a lesser extent and more efficiently and productively in a circular economy and making the transition from fossil fuel based energy to renewable energy are two key elements of the emerging economic paradigm. [277]

The Genesis of Circular Economy

Many people trace back the original meaning of the Circular Economy to the definition provided by the Ellen Mac Arthur Foundation *(http://www.ellenmacarthurfoundation.org/circular-economy)* as an economy designed to be restorative and regenerative, in order to maintain the utmost usefulness and value of products, components and materials at all times of the production cycle, distinguishing between technical and biological cycles where the former are designed to circulate high quality materials without entering the biosphere, while the latter guarantee the return of biological nutrients into the biosphere in a safe way. In reality, although it can be said that the concept has many fathers, the Mac Arthur Foundation itself has no difficulty in admitting

276 *Angelo Consoli and Livio de Santoli and various authors,* ***Territorio Zero*** *Minimum Fax edition- 2012*
277 *Jeremy Rifkin,* ***La società a costo marginale zero*** *Mondadori editore - 2014 , page 30*

that the true forerunner of the concept of the circular economy is the Swiss architect and industrial analyst Walter Sthael who clearly introduces the "concept" for the first time in the report produced on behalf of the European Commission entitled "The potential for replacing the workforce with energy" dated 1976. [278]

It is in this report that many of the concepts are introduced which will subsequently give rise to some of the main theoretical references of the circular economy such as:

1. "Cradle to cradle" focuses on the importance of a design capable to create goods whose life cycles make reuse, repair and re-design possible;
2. The concept of "Biomimicry" highlights the need to study the best "ideas" of nature and then imitate these designs and processes to solve human problems
3. "Industrial Ecology" criterion that focuses attention on the ways in which materials and energy flow through industrial systems and aims at creating closed cycle processes in which waste is seen as input, thus eliminating the concept of undesirable by-product;
4. The 21 founding principles of the Blue Economy insist that the solutions are determined by the local environment and its physical and ecological characteristics;
   5 The Zero Waste system introduced by Paul Connett who introduced the 10 steps towards zero waste and the fourth "R" (after Reduction, Reuse, Recycling, also the "R" of Redesign). [279]

The new European strategy: from "waste" to resources.

Starting from all these works, the European Commission has developed a particular sensitivity on the issue of waste that has produced what has been considered the most advanced legislation in the world, the Waste Directive 98/2008, currently in force. In view of its review, the European Commission has begun to question how to introduce the virtuous path to zero waste in European legislation. The answer came in 2014 when a communication (first step towards the approval of a legislative provision) was presented on the Circular Economy as a new frontier towards Zero Waste following a series of preparatory meetings between Jeremy Rifkin and the then European Commissioner for the Environment Janesz Potocnik. This communication was subsequently withdrawn by the newly established Juncker Commission, and re-presented in a new formulation which formed the basis of the European consultation process in which CETRI-TIRES also participated in agreement with a series of other organisations such as Slow Food, ARCI and active citizenship with which a special Alliance for the Circular Economy (ACE) was set up. Please consult: http://cetri-tires.org/press/2015/e-nata-lalleanza-per-leconomia-circolare-verso-una-societa-a-emissioni-rifiuti-e-km-zero/) Let's see the cornerstones on which the new European circular economy strategy is based.

From the linear economy to the circular economy: the "package"

The transition from a linear economy to a circular economy is an environmental and economic need that must be implemented with some urgency. A sustainable and efficient use of our resources is necessary to safeguard the resources of our planet, reduce Europe's dependence on imports and create new "green" jobs.
In fact, it is considered that the loss of precious materials is a constant in our economies. In a world where the demand for finite and sometimes scarce resources continues to increase, competition intensifies and the pressure on these resources degrades and weakens the environment more and more, Europe can reap economic and environmental benefits from the adequate use of these resources. Since the industrial revolution, the development of our economies has taken place under the banner of "take, produce, throw away", according to a linear growth model based on the assumption that resources are abundant, available, accessible and disposable at low cost. It is an increasingly widespread opinion that this model compromises Europe's competitiveness.
The transition to a more circular economy is at the heart of the resource efficiency agenda established under the Europe 2020 strategy for smart, sustainable and inclusive growth[280]. Using resources more efficiently and ensuring the continuity of this efficiency is not only possible, but can also bring important economic benefits.
In circular economy systems, products retain their added value as long as possible and there is no waste. When a product reaches the end of its life cycle, resources remain within the economic system, so that they can be reused several times for production purposes and thus create new value. To move to a more circular economy, it is necessary to make changes in the set of value chains, from product design to market and business models, from methods of transforming waste into resources to consumption methods: this implies a real systemic change and a strong innovative impulse, not only in terms of technology,

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278 *(https://www.ellenmacarthurfoundation.org/circular-economy/schools-of-thought/performance-economy).*
279 *"The Zero Waste Solution: untrashing the planet one community at a time" by Paul Connett e Jeremy Irons, Chelsea Green Publishing – 2013.*
280 *COM(2010) 2020 e COM(2011) 21.*

but also in terms of organisation, society, financing methods and policies. Even in a highly circular economy, some element of linearity remains, since the demand for virgin resources does not stop and residual waste is produced which must be disposed of.

The industrial sector has already recognised the great opportunities linked to the increase in resource productivity. It is estimated that a more efficient use of resources along the entire value chain could reduce the need for material inputs of 17% -24% by 2030[281], with savings of about 630 billion Euros per year for the European industry[282]. According to studies commissioned by companies and based on product-level modelling, by adopting approaches based on the circular economy, European industry could make significant savings on the cost of materials and potentially raise the EU's GDP to 3.9% [283], through the creation of new markets and new products and thanks to their value for companies.

The European Resource Efficiency Platform[284], which brings together governments, businesses and civil society organisations, is a high-level initiative that urged action to progress towards a more circular economy, more focused on reuse and recycling of high quality and much less on primary raw materials.

With the *Roadmap to a resource-efficient Europe*[285], presented in 2011, the Commission proposed an action framework and stressed the need for an integrated approach in many strategic and multi-level areas. The main elements of the roadmap have been further developed in the general environment action program (7th EAP)[286].

The adoption of models more based on the circular economy makes it possible to foresee a much brighter future for Europe's economy, which could thus adequately face the current and future challenges posed by pressure on resources and the growing insecurity of supplies: to enhance resilience and competitiveness, it is undoubtedly necessary to re-use the materials used and still usable for production purposes, reduce waste and limit dependence on uncertain sources of supply. By helping to decouple economic growth from the use of resources and their impact, the circular economy offers sustainable and lasting growth prospects.

Resource productivity in the EU grew by 20% in the period 2000-2011, a phenomenon which however may be partly due to the effects of the recession. If this trend remains constant, by 2030 there will be a further increase of 30%, with the consequent increase in GDP of almost 1% and the creation of more than two million jobs more than the status quo[287]. Efforts to increase resource productivity will go hand in hand with other objectives of existing Union policies, such as reducing greenhouse gas emissions, more efficient use of energy, sustainable reindustrialisation of the European economy and security access to raw materials, and will make it possible to lighten environmental impacts.

To promote resource efficiency, there are several already tested measures that have shown they can give excellent results if applied more systematically. We are also working on other fronts to ensure that these changes generate employment, as illustrated in particular in the Communication on Green Employment[288] and the Green Action Plan for SMEs[289].

Establishing a favourable strategic framework

Markets are an important factor in resource efficiency and the circular economy, as materials and energy are currently the main cost items among the factors of production for many companies. The change already triggered by the markets, however, collides with a series of obstacles that stand in the way of effective and efficient management of resources. Waste prevention, environmentally friendly design, reuse and similar measures could save EU businesses € 600 billion net, that is 8% of their annual turnover, while reducing total annual greenhouse gas emissions by 2 -4% [290]. For this to happen, however, obstacles to the market that prevent these measures from realising their potential must be overcome.

Resource productivity can benefit businesses in many sectors, but in Europe it will also be accompanied by the rapid growth of eco-industry markets, which is expected to double between 2010 and 2020. At the international level it would be necessary to improve resource efficiency in various industrial sectors.

Current infrastructures, technologies and business models, together with rooted behaviours, keep our economies "tied" to the linear model. Often, companies do not have the information, confidence and ability necessary to adopt solutions based on the circular economy, nor are they favoured by the financial system, where it is not easy to find the means to invest in improving efficiency or in innovative business models, a type of investment perceived as more risky and complex, which discourages many traditional investors. The development of new products and services is also hampered by consumer habits. All these obstacles

281 *Meyer, B. et al., Macroeconomic modelling of sustainable development and the links between the economy and the environment, 2011.*
282 *Europe INNOVA, Guide to resource efficiency in manufacturing: Experiences from improving resource efficiency in manufacturing companies, 2012.*
283 *Ellen MacArthur Foundation, Towards the Circular Economy: Economic and business rationale for an accelerated transition, 2012.*
284 *http://ec.europa.eu/environment/resource_efficiency/re_platform/index_en.htm*
285 *COM(2011) 571.*
286 *OJ L 354 dated 28.12.2013, page 171.*
287 *Cambridge Econometrics et al., Modelling the Economic and Environmental Impacts of Change in Raw Material Consumption, 2014.*
288 *COM(2014) 446.*
289 *COM(2014) 440.*
290 *AMEC et al., The opportunities to business of improving resource efficiency, 2013.*

tend to persist in a context where prices do not reflect the real costs of using resources for society and where policies do not give strong and coherent signals to stimulate the transition to a circular economy.
Building on the feedback obtained from the main products, materials and value chains, the Commission, in collaboration with stakeholders, will prepare a framework that favours the emergence of the circular economy, using measures that combine smart regulation, market-based tools, research and innovation, incentives, information exchange and support for voluntary initiatives. This framework will be conducive to the sustainable revival of European industry and will be based on the participation of consumers and businesses, in particular SMEs. At the international level, the EU should establish close cooperation, both multilateral and bilateral, with other partners, in order to ensure maximum dissemination of the circular economy principles.
The Commission intends:
- to analyse the main shortcomings of the market and of the governance system that hinder the prevention of waste and the reuse of the materials contained therein more in depth, taking into account the heterogeneity of the types of materials and their use, to help establish a framework strategy promoting the efficient use of resources at EU level.

Design and innovation at the service of a circular economy

In circular economy logic, the products are designed in such a way as to predict their destination from the outset once they become waste and innovation is at the centre of the entire value chain, instead of looking for viable solutions at the end of the life cycle. This can be accomplished in various ways, for example

- reducing the quantity of materials needed to provide a certain service (lightening),
- extending the useful life of the products (durability),
- reducing the consumption of energy and materials in the production and use phases (efficiency),

reducing the use of dangerous or difficult to recycle materials in products and in production processes (replacement), creating secondary raw material markets (recycled materials) (through standards, public procurement etc.), designing products that are easy to maintain in good condition , to be repaired, modernised, rebuilt or recycled (environmentally friendly design), developing the services for consumers necessary for this purpose (maintenance, repair services, etc.), stimulating consumers with incentive and support measures in favour of reducing waste and their correct separation, by encouraging separate collection systems that minimize recycling and reuse costs, by promoting the grouping of activities to prevent by-products from becoming waste (industrial symbiosis) and by encouraging consumers to move towards rental services, loan or sharing instead of purchase, to broaden and improve the choice of products while looking at their interests (in terms of costs, protection, information, contractual conditions, insurance aspects, etc.).
Important starting point is the design of the production processes, products and services: the products can be rethought to be used longer, repaired, modernised, re-manufactured or, in the end, recycled, instead of being thrown away; production processes can be conceived taking greater account of the possibilities of re-use of products and raw materials, as well as the regenerative capacity of natural resources; it is possible to introduce innovative business models that establish a new type of relationship between businesses and consumers.
The diagram below illustrates the circular economy model by schematising the main phases, each of which offers opportunities in terms of cost cutting, less dependence on natural resources, an impulse to growth and employment, as well as containment of waste and harmful emissions for the environment. The phases are interdependent, as the materials can be used in cascade: for example, companies exchange by-products, products are refurbished or re-manufactured, or consumers opt for product-service systems. To ensure the optimum functioning of the system should be avoided as far as possible that resources are brought out from the circle.
Some EU policies and instruments already offer means and incentives in line with the circular economy model. The waste hierarchy, on which European waste legislation is based, is gradually leading to the adoption of preferred solutions, namely prevention, preparation for reuse and recycling, and discourages landfilling. The policy on chemicals is aimed at progressively suppressing extremely problematic substances. For energy related products, some environmentally friendly design measures include durability and recycling obligations. The bio economy strategy [291] promotes the sustainable and integrated use of biological resources and waste flow for the production of food, energy and bio products. Climate policy provides incentives for saving energy and reducing greenhouse gases.
A common and coherent Union framework which is conducive to the circular economy will ensure that all these elements are added to the objectives of Horizon 2020, to meet the challenges of research and innovation[292].
To support design and innovation for a more circular economy, the Commission intends to:
- demonstrate, within the framework of the EU research and innovation program (Horizon 2020), the benefits of moving to a circular economy at European level, through large-scale innovative projects focusing on cooperation within chains value and among them, stimulating the development of skills and supporting the commercial application of innovative solutions;

[291] *COM(2012) 60.*
[292] *There attached*

- establish a strengthened partnership to support research and innovative policies in favour of the circular economy;
- facilitate the development of more circular models for products and services, in particular through a more coherent product policy, and strengthen the application of the eco-design directive by giving greater emphasis to the criteria relating to the efficient use of resources, also for priority product groups included in the 2015-2017 work plan; is
- encourage the adoption of the cascade principle in the sustainable use of biomass, taking into account all sectors that use biomass, so that this resource can be used in the most efficient way possible.

Unlocking investments in circular economy solutions

The EU and the Member States should encourage investment in the search for innovative solutions and the adoption of the circular economy and, in the context of the reform of the financial system, should remove the obstacles to the private financing of initiatives that promote an efficient use of resources. The Commission's recent proposals on disclosure of non-financial information [293], long-term financing [294] and occupational or occupational pension funds [295] contain provisions that require that relevant environmental information are communicated to investors and the investment risks inherent in the scarcity of resources and climate change are taken into account.
To reduce the risks for investors, some innovative financial instruments are currently being developed, such as the natural capital financing instrument of the Commission and of the European Investment Bank. Public-private partnerships (PPPs) are also valuable tools to encourage private intervention and investment in the efficient use of resources. The SPIRE public-private partnership (***Sustainable Process Industry through Resource and Energy Efficiency***) and the joint technology initiative 'Bioindustrie' actively contribute to the pursuit of circular economy objectives.
It is also up to policies to send the right signals to encourage investment in resource efficiency by removing counterproductive subsidies and shifting the tax burden away from work on pollution and resource use. The progress made by Member States in the area of environmental taxation reform is examined in the European Semester for economic policy coordination.
To unlock investment in the circular economy, the Commission intends to:
- use the promising elements identified in the framework of the round table on the financial aspects of resource efficiency [296], including innovative financial instruments, in order to take into account resource issues in the accounting rules of companies, clarify responsibilities of financial institutions in the field of sustainability (fiduciary obligations), develop methods for the "stress test" of resources for the use of enterprises, and study the possibility that the bond market constitutes an additional channel for financing focused projects on the efficient use of resources;
- prepare guidelines on the possibilities offered by the new public procurement directives in the field of green public procurement (GPP), as well as a recommendation on monitoring the results achieved by the Member States against the indicative target of 50% green public procurement [297], support innovative tools, such as pre-marketing and public procurement of innovative products and services, and promoting the creation of networks of public authorities around the issue of green public procurement; and
- integrate the priorities of the circular economy more closely into EU funding strategies and encourage Member States to use the European funds available to finance circular economy programs and projects, in particular through the European Structural and Investment Funds.

Mobilising businesses and consumers and supporting SMEs

Businesses and consumers are the main actors in the transition to a more circular economy. Decisions taken upstream and downstream of the value chain need to be better coordinated so that producers, investors, distributors, consumers and recyclers receive not only consistent incentives but also equally distributed costs and benefits. Market mechanisms must be used to ensure that resources are also distributed in the most efficient way and, where appropriate, to correct market failures or bottlenecks on the innovation front. In addition to developing secondary commodity markets and ensuring their smooth functioning, conditions need to be created that allow entrepreneurs to exploit new potential markets related to the circular economy and ensure that the necessary skills base is available on the labour market. Consumers must be better informed about the ecological credentials of the various products so that they can make choices that are fully aware of the facts.
The European Resource Efficiency Platform identified [298] major business opportunities at different stages of the "circle" for reintroducing materials into the production process, in the various segments of the original supply chain or in other supply

[293] *COM(2013) 207.*
[294] *COM(2014) 168.*
[295] *COM(2014) 167.*
[296] *MEMO/13/110.*
[297] *COM/2008/400.*
[298] *http://ec.europa.eu/environment/resource_efficiency/documents/erep_manifesto_and_policy_recommendations_31-03-2014.pdf*

chains. The indications of the Platform are based on successful initiatives that could be developed on a larger scale and more widely, including:
in the production phase, sustainable procurement rules, voluntary programs managed by industry and retailers, industrial symbiosis to find markets for by-products;
in the distribution phase, the "product passports" mentioned in the recommendations of the Platform, aimed at improving information on the resources contained in the products and on the way in which they can be repaired or recycled; and
in the consumption phase, collaborative consumption models, based on loan, exchange, barter and rental, and product-service systems intended to enhance the underutilised goods or resources (for example, cars, tools, houses).
In the current pilot phase of the process to determine the environmental footprint, illustrated in the Commission communication ***Building the single market for green products*** [299] stakeholders are trying to agree on a common way of measuring the environmental impact of products and organisations. After this phase, the Commission will assess whether the agreed methods give satisfactory results that can be applied to existing instruments or to new instruments aimed at improving the environmental performance of products.
These measures should be applied on a larger scale to ensure a favourable context and a level playing field that allows existing and new companies to adapt to the great world trends about resources, the most virtuous companies to be rewarded, the new entrepreneurs to develop tomorrow's solutions and experiment them on the market, and consumers to have credible information. The process launched under the European Consumer Agenda[300], in which various stakeholders participated, stressed the need for effective tools against misleading and unfounded environmental claims.
The active population must be equipped with the skills necessary to ensure an effective transition that generates employment[301]. The Green Employment Communication [302] creates the right framework to exploit the job creation opportunities offered by a more circular and resource efficient economy. National, regional and local authorities, as well as the social partners, also play an important role in developing targeted and coordinated support, in the form of investments, infrastructure, technology and skills, in particular in response to the needs of SMEs. They are also able to direct consumers towards more sustainable products and services, and encourage behaviour change.
To mobilize consumers and companies, in particular SMEs, the Commission intends to:
- make use of the results of the pilot phase of the environmental footprint initiative, which will run until 2016, to define how to use environmental impact measurement in the design of products and processes and how to ensure better consumer information on environmentally sustainable choices;
- foster broad stakeholder cooperation through coordination and support actions under the Horizon 2020 program and its instruments, in particular the European Institute of Innovation and Technology, the European Structural and Investment Funds, the eco-innovation action plan, the green action plan for SMEs and the European consumer agenda;
- to rely on the commitments of the subjects joining the European Innovation Partnership concerning raw materials, which are directly linked to resource productivity;
- support job creation and skills development through better policy coordination, in order to direct European funds towards programs and projects that support green growth, improve information and monitoring, including through the process of European semester, and work in collaboration with the social partners, education and training institutions and other bodies; and
- encourage exchanges of good practice at international level.

Modernising waste policy and its objectives: waste as a resource

In the circular economy logic, the circle closes with the transformation of waste into resources. The general and specific objectives set by European legislation have been instrumental in improving waste management: they stimulate innovation in the recycling and reuse sectors, limit the quantity of waste disposed of in landfills, reduce the loss of resources and encourage changes in behaviours. In the European Union, however, the waste produced by every citizen in one year still touches five tons, of which just over a third is properly recycled.
The Union has declared its political will[303] to reduce waste production, recycle waste to make it an important source of raw materials for the EU, recover energy only from non-recyclable materials and eliminate landfilling almost completely. A more ambitious waste policy will bring significant benefits in terms of growth and jobs, at relatively low or zero costs, while helping to improve the environment. As regards world markets, an ambitious waste policy should stimulate innovation and help make EU companies even more competitive in the provision of waste management services and offer new market opportunities to EU exporters.

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299 *COM(2013) 196 and Recommendation 2013/179/UE of Commission.*
300 *COM (2012) 225.*
301 *COM (2012) 173.*
302 *COM (2014) 446.*
303 *7° PAA.*

Setting quantitative waste targets for a transition to a recycling society

There has been significant progress in Europe in transforming waste into resources and promoting sustainable ways of managing waste, such as recycling. However, the situation varies considerably from one Member State to another: in six countries the landfilling of municipal waste has already been abolished, with percentages that in the last twenty years have gone from 90% to less than 5% and a recycling rates of up to 85% in certain regions, while in other countries over 90% of waste is still landfilled and less than 5% recycled.

Strong political signals are needed to ensure the long-term predictability needed to attract investments and trigger changes, so that materials such as plastic, glass, metals, paper, wood, rubber and other recyclable materials are reintroduced into the economy as secondary raw materials at competitive prices. The definition of precise recycling targets for the period up to 2030 will ensure this predictability and separate collection at source, accompanied by reliable methods of calculating recycling percentages, will guarantee quality recycling and will contribute to the development of secondary raw materials markets of equal quality. To this end, it is necessary to specify the method of measurement to be used to evaluate what is actually recycled, since some Member States currently declare as recycled waste what is simply collected waste, ignoring the important losses of materials that occurred between these phases. Landfilling of all recyclable waste will be banned by 2025 and Member States should endeavour to virtually eliminate this practice by 2030. Energy recovery, also through waste-to-energy plants and bio fuels, will offer solutions for non-reusable and non-recyclable waste and therefore it will be necessary to better exploit the existing capacity in the EU, distributed unevenly across its territory, and to take measures to avoid excess capacity.

These measures will create more than 180 000 direct jobs in the EU by 2030, which will add to the 400 000 which are estimated to result from the implementation of existing waste legislation[304]. These measures will satisfy between 10% and 40% of the EU's demand for raw materials, while helping to reduce greenhouse gases by 40%, a goal that the EU has committed to achieve by 2030 and which would be equivalent the reduction of 62 Mt of CO_2eq per year.

To increase the economic, social and environmental benefits of improved municipal waste management, the Commission proposes to:

- increase the percentage of municipal waste reused and recycled bringing it to at least 70% by 2030;
- increase the percentage of recycled packaging waste to 80% by 2030, with intermediate targets of 60% by 2020 and 70% by 2025, with targets for certain materials;
- prohibit the landfilling of recyclable plastic, metal, glass, paper and cardboard and biodegradable waste by 2025, and ask Member States to commit themselves to abolish landfilling almost completely by 2030 [305];
- further promote the development of quality secondary raw materials markets, also considering the opportunity to introduce end-of-life criteria for certain materials;
- specify the calculation method to be applied to recycled materials to ensure quality recycling.

Simplifying and better implementing waste legislation

The targets set leave a certain margin of discretion to Member States on how to achieve them. However, implementation of waste legislation at national level can be simplified and further improved, and existing disparities can be reduced.

The Commission, after classifying Member States on the basis of waste management in 2012 and drawing up specific roadmaps and recommendations for the countries that achieved the least satisfactory results, intends to continue to devote particular attention to those States that are furthest from their objectives, trying to remedy promptly, in concert with them, the weak points found in the implementation.

Economic measures have proven to be decisive for improving waste management at national level, in particular taxes on landfilling and incineration, punctual tariff systems (PAYT- *pay-as-you-throw*) and extended producer responsibility schemes, or measures to incentivize local authorities to promote prevention, reuse and recycling. The landfill ban also proved effective. The introduction of minimum Union requirements for extended producer responsibility schemes will help reduce costs and eliminate the obstacles faced by producers who have to comply with multiple national schemes in the EU.

European funds can support Member States' efforts to achieve integrated waste management, including infrastructure for separate collection, reuse and recycling. Landfilling or incineration alone should no longer benefit from subsidies in the future. In order to make the most of the waste management capacity available in the EU, planning and information exchange should be improved and, where appropriate, the increase in shipments of waste within the EU to more modern and efficient plants at least provisionally tolerated.

There is still scope for streamlining and further facilitating data collection and reporting at national level, as well as for making the data more reliable and homogeneous throughout the EU. The adoption of common indicators will facilitate monitoring and comparison of Member States' performance[306].

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[304] *SWD(2014) 207.*

[305] *A percentage of "residual" waste is not recoverable and can therefore be placed in a landfill, as there are currently no alternative solutions. This percentage should not exceed 5%.*

[306] *For example, four methods are allowed to calculate the recycling target for municipal waste, which give very different results (about 20% difference).*

Measures to pursue further simplification of waste procurement and ensure its effectiveness and efficiency will build on efforts already made to reduce the administrative costs of waste policies, such as, for example, the exemption for certain SMEs from the collection obligation or a mandatory computer system for exchanging data on shipments of waste.
To ensure that simplification and improvement of implementation allow to take full advantage of EU legislation, the Commission proposes to:

- eliminate overlaps between waste targets and harmonise definitions;
- Significantly simplify reporting obligations for Member States, in particular by better defining and rationalising the methods for calculating municipal waste, landfilling and packaging waste targets;
- allow Member States to dispense SMEs or businesses that collect and / or transport very small quantities of non-hazardous waste from the general authorization or registration requirements of the Waste Framework Directive;
- introduce the annual reporting obligation through a Single Desk to which all waste data can be transmitted, adapt waste statistics to the needs of Union legislation on the matter and compare national methods with Eurostat standards;
- require the development of computerised data monitoring systems and the verification of data by third parties in the Member States;
- establish a rapid reporting procedure for Member States to take appropriate measures to achieve the targets within the set deadline;
- define the minimum operating conditions for extended producer responsibility schemes which could be further specified at national level or in guidelines drawn up by the EU, and promote the use of economic instruments in the Member States; and
- promote direct investments in waste management solutions that are at the top of the waste hierarchy (prevention, reuse, recycling).

Addressing specific problems in the waste field

Ad hoc strategies are needed to address the problems posed by certain wastes in terms of loss of resources or environmental impact.
Waste prevention: the top priority for all phases of the circular economy is to ensure that less waste is produced. Member States, in accordance with the requirements of the Waste Framework Directive, have recently adopted waste prevention programs, which are currently being examined by the European Environmental Agency. Following this review, the Commission intends to launch initiatives to promote good practices in the field of waste prevention in the EU.
Marine litter: marine litter pollutes the beaches, damages marine life and creates a long-term problem, since the costs of remediation are huge. The 7th EAP recommends the adoption of a general quantitative reduction target on a Union scale, supported by different measure according to the sources of pollution.
The application of all the measures foreseen in all the revised EU waste legislation would reduce marine litter by 13% by 2020 and by 27% by 2030. The introduction of a specific reduction target for 2020 would be a clear signal for Member States that are currently developing measures to achieve a "good ecological status" of marine waters by 2020, a target set by the Framework Directive on the strategy for marine environment, and would lead to the drafting of marine waste action plans under the four regional maritime conventions. This objective can also be achieved thanks to other measures adopted at EU level, which in particular complement the results of the ongoing evaluation of the directive on port collection facilities[307]. A second phase of the reduction target will be devised in due course, based on a more in-depth analysis of the reduction potential of other sources of land and sea pollution and taking into account the commitment made at the Rio + 20 conference, that is significantly reduce marine litter by 2025.
Construction and demolition waste: the markets for recycled materials are essential to increase the recycling percentage of construction and demolition waste. A building design that takes into account the management of construction and demolition waste, together with the increase in recyclability and recycled content of building materials, are elements that will appear in a framework for assessing the environmental performance of buildings, as highlighted in the Commission communication "Opportunities to improve resource efficiency in construction"[308].
In addition, under the rapid reporting system proposed here, Member States' performance will be monitored with a 70% recycling target by 2020 and, if necessary, measures such as increasing landfill construction and demolition waste taxes, or, to improve the quality of recycled materials, additional waste separation obligations in large demolition works.

[307] *2000/59 /EC Directive.*
[308] *COM(2014) 445.*

Food waste: It is estimated that up to 30% of the food produced worldwide is lost or wasted. The Commission is exploring the possibility of presenting specific proposals to reduce this type of waste.

Hazardous waste: the adequate management of hazardous waste continues to pose problems and the data regarding the effective treatment of part of this waste flow are incomplete. First of all, data logging and traceability mechanisms will be enhanced through the introduction of computerized registers to identify the capacities and bottlenecks in the management systems of this type of waste in the Member States. Data collection could also be applied to other types of waste, following the example of several Member States where this practice already exists.

Plastic waste: Plastic production in the EU is expected to increase at an annual rate of 5%. Only 24% of plastic waste is recycled, while those disposed of in landfills are close to 50% and the rest is destined for incineration. The public consultation on plastic waste conducted by the Commission in 2013 [309] highlighted an important potential for more sustainable use of plastics and a strong desire to eliminate landfilling for this type of waste, as well as the need for better design of plastics and related products. The recent Commission proposal authorising Member States to impose restrictions on the use of plastic bags [310] and the proposals to increase recycling and to abandon landfilling, contained in this Communication, are important initiatives to improve the plastic waste management.

Recycling of essential raw materials: all raw materials are important, but essential ones are particularly important because their production is concentrated in a few countries and many of them are characterised by low substitutability and low recycling percentages. The Commission promotes the efficient use and recycling of these materials under the Raw Materials Initiative [311] and the European Innovation Partnership on Raw Materials.

Illegal shipments of waste: the Commission will endeavour to ensure compliance with Union legislation on the matter, in particular Regulation (EC) no. 1013/2006 relating to shipments of waste, recently modified to strengthen inspections.

Recycling of phosphorus: phosphorus is a vital resource for the production of food products, but it presents serious risks in terms of security of supply and its use generates waste and losses at every stage of its life cycle. On the basis of the consultative communication on the sustainable use of phosphorus[312], the Commission is preparing the framework for future action.

To address the problems posed by certain types of waste, the Commission:

- proposes to try to reduce **marine litter** by 30% by 2020, for the ten types of waste that most commonly pollute beaches, as well as for fishing gear abandoned at sea, and to adapt priorities according to the four EU marine regions;
- plans to adopt measures to stimulate the markets for recycled materials deriving from **construction and demolition waste** and intends to introduce, at EU level, a common framework for assessing the environmental performance of buildings;
- proposes that Member States develop national **food waste** prevention strategies and endeavours to ensure at least a 30% reduction by 2025 of food waste in the manufacturing, retail / distribution, catering and hospitality services and households;
- plans to develop a viable registration system at least for **hazardous waste** in all Member States;
- in parallel with the proposal to reduce the use of light plastic bags, proposes to ban the disposal of **plastic** by landfill by 2025;
- proposes that Member States include measures relating to the collection and recycling of waste containing significant quantities of **essential raw materials** in their national waste management plans; and
- it is pondering the development of a strategic framework for **phosphorus**, in order to encourage recycling, improve market conditions and integrate the sustainable use of phosphorus into Union legislation on fertilizers, food, water and waste.

Setting a target relating to the efficient use of resources

In the 7th EAP, Member States and the European Parliament agreed that the European Union should define the indicators and set targets for the efficient use of resources, and assess whether it is appropriate to foresee a main indicator and target within the European semester. After a wide series of consultations, the ratio of GDP to raw material consumption (RMC) was chosen as a possible indicator of the resource productivity target[313].

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309 *COM(2013) 123.*
310 *COM(2013) 761.*
311 *COM(2011) 25.*
312 *COM(2013) 517.*
313 *The RMC is a global indicator that measures (in tons) all resources in materials used in the economy, taking into account the use of resources contained in imports. It is currently available for the EU and some Member States. Countries for which this indicator is not yet available can use the internal material consumption indicator in the meantime.*

A realistic target aimed at increasing the productivity of resources, agreed by the European Union and the Member States, would attract the interest of politics and allow to exploit the currently unexplored potential offered by the circular economy to create sustainable growth and jobs and make EU policies more coherent. It would be a balanced way to ensure this consistency and encourage initiatives.
According to forecasts, even in the unchanged scenario, the EU should anyway increase resource productivity by 15% between 2014 and 2030; by adopting the appropriate policies that promote the transition to a more circular economy as indicated by the European Platform on resource efficiency, this percentage could double, to the benefit of the sustainable dimension of growth, as well as employment and GDP[314].
This increase in resource productivity would result in an increase in competitiveness for businesses[315], who must be able to rely on accessible and predictable supplies whose costs sometimes form an important part of their cost structure[316]. The consequence would be not only immediate profits, but also longer-term strategic benefits, as the increase in world demand increases the price of resources and its volatility. A more efficient Europe in the use of resources will more easily achieve its goal of reindustrialisation.
Although not binding and set at EU level, a resource productivity target would encourage Member States that have not yet achieved such a target at national level to put in place measures that take into account the use of resources. This would result in more balanced measures which, taking into account all the economic, social and environmental consequences, would fill this gap.
States could freely choose the most convenient mix of policies and actions in economic and environmental terms, in line with the more general strategic objectives, and to this end they could take advantage of a series of good practices, proven as such but not yet widely distributed, to adapt to needs and situations. A review of the Europe 2020 strategy is currently underway[317], which also includes a public consultation aimed at gathering all opinions on its results. The Commission therefore considers that any decision on the introduction of a general resource productivity target should be taken in the context of this review, taking into account the results of the public consultation and the recommendations of the European Platform on the efficiency in the use of the resources.
For policy makers to be aware of the global pressure on the environment caused by the use of resources, other indicators need to be taken into account, in particular relating to water use and limited land resources. Since 2013, Eurostat has published a scoreboard on the efficient use of resources, an integral part of the Europe 2020 strategy indicators[318]. This scoreboard is used to monitor the implementation of the ***roadmap towards a resource-efficient Europe***, highlight the interdependence of resources and involve stakeholders more closely in measuring social progress, beyond what is shown by GDP.
To exploit the potential inherent in the efficient use of resources in the context of sustainable growth,

- the Commission will take into account both the recommendations made by the European Platform on resource efficiency regarding a general objective of efficient use of resources, and the outcome of the public consultation organized in the context of the review of the Europe 2020 strategy;
- in parallel, the efficient use scoreboard used to monitor indicators of use of resources other than carbon and materials (in particular, land and water) will be expanded; and
- national statistical institutes will have to develop a common method recognised within the European statistical system for calculating national consumption of raw materials.

As known, on December 2, 2015, the European Commission published a package of proposals on the circular economy to help European businesses and consumers make the transition to a more circular and stronger economy, where resources are used in a more sustainable way.
The transition from a linear economy to a circular economy is an environmental and economic need that must be implemented with some urgency. A sustainable and efficient use of our resources is necessary to safeguard the resources of our planet, reduce Europe's dependence on imports and create new "green" jobs.
This is a very important legislative proposal as it sets legislative objectives and obligations on waste management to all Member States, including recycling targets for municipal waste (such as packaging, organic waste, etc ...), separate collection obligations, clear requirements on extended producer responsibility, eliminate incinerators and landfills as much as possible.
The Directives under revision are as follows:
Proposal for a DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL amending Directive 2008/98 on waste

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314 *SWD(2014) 211.*
315 *The RMC is the indicator chosen by stakeholders to measure the use of resources, because it also takes into account the resources contained in both imported and nationally manufactured products, and therefore allows a fair comparison between the efficiency levels of both types of products.*
316 *Recent studies in the steel and aluminium sectors indicate that raw materials represent 30% to 40% of the cost structure of these sectors, that is a more important share of labour costs.*
317 *COM (2014) 130 of 19.3.2014, report on the Europe 2020 strategy for smart, sustainable and inclusive growth.*
318 *http://epp.eurostat.ec.europa.eu/portal/page/portal/europe_2020_indicators/ree_scoreboard*

ANNEX to the DIRECTIVE Proposal of the EUROPEAN PARLIAMENT AND THE COUNCIL amending Directive 94/62/EC on packaging and packaging waste
ANNEX to the directive proposal of the European Parliament and the Council amending Directive 94/62/EC on packaging and packaging waste
Proposal for a DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL amending Directive 1999/31 on waste landfills
Proposal for a DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL amending directives 2000/53 / EC relating to end-of-life vehicles, 2006/66 / EC relating to batteries and accumulators and to waste batteries and accumulators and 2012/19 / EU on waste electrical and electronic equipment
The European Union Action Plan for the circular economy is a legislative package which is currently under discussion at the European Parliament where the Hon. Bonafè was rapporteur, who submitted 4 reports one for each package proposed by the Commission (i.e. Waste, Packaging, Landfills and Electronics) which are available at [319]

Consumption: overcoming the linear model of Taranto

The biological resources of the planet, vital for the socio-economic development of humanity, have allowed the emergence of an awareness of the enormous global value of biodiversity. The threat to species and ecosystems, however, has never been greater than today.
Human activity has led to the extinction of species with impressive speed over the past hundred years. The consideration of these data has put in place various political mechanisms aimed at environmental supervision, study and protection in recent decades.
The emergence of environmental issues as a major theme of national and international policies has called for the need for a global government for planetary environmental issues (greenhouse effect, acidification, reduction of the ozone layer, protection of biodiversity). The integration of the objectives of protecting resources and environmental quality was also of fundamental importance both in the national and local territorial and economic policies and in the production strategies of the economic groups.
Within the United Nations, the UNCTAD (United Nations Conference on Trade and Development) is the main reference point for the integrated treatment of trade, development and related topics and in the areas of investment, finance, technology, entrepreneurship and Sustainable Development. Created in 1964, UNCTAD promotes the process of integration of developing countries into the world economy. The Organization is based in Geneva and currently brings together 194 countries. [320]
The fundamental "meetings" worldwide took place with the "United Nations Conference on the Human Environment" in Stockholm "in 1972. On that occasion 113 nations met to draw up an action plan with 109 "recommendations" and for the adoption of a Declaration containing 26 principles on human rights and responsibilities about the environment.
Twenty years later, in 1992, nations landed in Rio de Janeiro with the "United Nations Conference on Environment and Earth Summit Development". Representatives from governments from 178 countries, more than 100 heads of state and over 1000 non-governmental organizations participated. For the occasion, 2 conventions and 3 declarations of principles were signed.
Appointment postponed in 2002 to Johannesburg for the "World Summit on Sustainable Development". On this occasion, through the Implementation Plan, the commitment to promote the principles for sustainability, defined ten years earlier in Rio de Janeiro was confirmed, as well as defining sustainable development as a form of integration between social, environmental and economic development, was reaffirmed. [321]

The negative counter trend of Taranto

In recent decades, and with more and more "acceleration", changes in the structure of the economy, the expansion of new technologies and the development of environmental policies, have made it possible to consolidate a reduction of absolute environmental load equal to 4% in developed countries, and especially in Europe.
Over the past few years, therefore, the quality of the "environmental problem" has improved in most regions of developed countries thanks to the regulation of water and atmospheric discharges and the disposal of waste. However, there are important areas that appear to be completely exempt from these regulations. The city of Taranto could not miss the appeal as a "negative best practice", counting companies with high polluting rates such as ILVA, the AGIP refinery and the Cementir cement plant.
As already widely specified in the initial phase of the study, Ilva releases a quantity of dioxin equal to 8.8% of the European total into the atmosphere, in the total absence of pollutant monitoring systems.

[319] *http://cetri-tires.org/press/2016/economia-circolare-ecco-le-relazioni-del-parlamento-europeo/*
[320] *Source: http://www.esteri.it/mae/it/politica_estera/economia/cooperaz_econom/unctad.html*
[321] *Source: http://www.difesambiente.it/uomo_ambiente/conferenze_tutela_ambientale.aspx*

Data on deaths from cancer, in Taranto, have more than doubled from 1971 to 1996. The results of the Local ASL (Local Health Agency) Prevention Department, for the period 1998-2001 in the Ionian province, record about 1,200 annual deaths, data which, for lung cancer, place Taranto among the areas of Southern Italy with the highest incidence, higher than the national average . 98% of the benzo(a)pyrene produced in the industrial area comes from the Ilva coking plants.
The solution lies mainly in the awareness that Taranto can live without Ilva! Thinking about new steel production methods that respect the environment, health, work and people.
Here we will propose transformation projects of the 4,000,000 square meters of the hot area into a new area that will enhance its extraordinary environmental resources. The torn space overlooks the Mar Piccolo from which it will finally be possible to give space and impetus to the tourist resource of Taranto with a maritime vocation, benefiting from serious planning both of an environmental and working nature.

An alliance to encourage circular economy businesses

The Zero Waste Law Movement, the CETRI - European Circle for the Third Industrial Revolution together with the Slow Food Italy Association have formed an alliance for the ACE Circular Economy, to fully integrate it into the distributed and sustainable production processes of the Third Industrial Revolution in view of the definition of the new Circular Economy Directive. [322]

The proposals

Towards Zero Waste We take back part of the proposals contained in the popular initiative law proposal "Zero Waste Law" n. 1647,[323] which already contains elements of innovation that go towards the "circularity" in waste management, to list the main points that can reverse the current European management model through legal provisions containing prescriptions and technical specifications to trigger the "towards zero waste" process. The punctual realization of these proposals in a given territorial area presupposes the creation of new stable enterprises (and the enlargement of existing enterprises) and jobs at a rate of 10/15 times more than the jobs created for the traditional disposal of same volumes of waste materials. Re-use banks, repair shops, second-hand shops and creative recycling shops are able to double the above increase. In other words, burning a piece of furniture or disposing of used sanitary landfills produces 20 to 30 times the jobs that would be created if those goods were put back into circulation as objects and 10/15 times more if those objects were put back into circulation as recycled materials.

Incentives and disincentives established by legislation on a European scale

A. Given that the basic principle of the Circular Economy is the drastic reduction of virgin raw material to be found for industrial and manufacturing production needs, it is clear that priority must be given to the phases of prevention - reuse - recycling and recovery of material, and effectively making the disposal phase minimum until its elimination, through:
   - the introduction of a purpose tax or "Waste Tax" to the incineration and co-incineration (with or without energy recovery) and to the disposal into urban or special landfill plants. This provision for incineration and co-incineration plants must be accompanied by the elimination of any incentive regime on any electrical or thermal energy recovered from the combustion processes due to the antagonistic effects caused by both the relative destruction of materials and the consequent harmful effects on the environment and public health deriving from toxic particulate emissions and the production of by-products in the form of special hazardous waste to be sent to special landfills subsequently.
   - In addition, an explicit "moratorium until 2030" which prohibits the construction of new incineration or co-incineration plants must be clearly included in the new European directive, since the related industrial depreciation plans for this type of plant require at least fifteen years for the recovery of the invested capital. Don't forget that for the realisation of these plants halter contracts are stipulated with the municipal administrations of the "deliver or pay" type which represent the total objective impediment to the progress of the recovery of materials through separate collection and recycling.

B. **Encourage the recovery of materials at all levels**
   It is therefore necessary to introduce an effective regulatory system that gives a strong impulse to the phase of recovery of material derived from separate collection and recycling with:

[322] *Source: integrally extracted from http://cetri-tires.org/press/2015/e-nata-lalleanza-per-leconomia-circolare-verso-una-societa-a-emissioni-rifiuti-e-km-zero/*
[323] *Source: filed with the Italian Parliament on 30 September 2013 http://www.camera.it/leg17/126?idDocumento=1647*

- The introduction of a modification to the hierarchical principle of treatment foreseen in the directive 98/2008/ EC in which the material recovery must be separated and placed before the energy recovery, which must be a separate and subordinate phase to the Recovery of material provided only for fractions of infectious risk medical waste and placed just before the Disposal phase. Review the definition of "energy recovery" defining it as recovery of the intrinsic energy of the material in the form of certified fuel by-product to be released for consumption but not as a by-product of thermal incineration processes from which energy can be obtained indirectly. It is proposed to repeal for this purpose any calculation system that attributes multiplicative factors to the efficiency of the actual electrical or thermal energy produced by the incineration, classifying as disposal plants the incineration plants that have an effective general efficiency below 90%.
- It is therefore proposed that the incineration is also excluded for the non-recyclable differentiated fractions called "Dry Residue", which today constitute in weight a variable share from the 8 to 15% of heterogeneous materials composed mostly of mixed plastics, in which the material recovery operations are already practiced in industrial selection and mixing plants with industrial waste for the production of "plasmix" or granulate composed of heterogeneous plastics as secondary raw material certified for recycling;
- Therefore we propose the introduction of the obligation of separate collection of the "at home" type by 2020, which is the only method that guarantees a high percentage of purity of the collected materials, determining the certainty and responsibility of 'producers', providing a transition period for the conversion from the various different collection systems of road or proximity type.
- The "home" separate collection method will also allow the generalised introduction of the "punctual" tariff system, with which the general "polluter pays" principle would be implemented and defined, which is already in use in many EU countries today and which allows also the creation of a user database that can be consulted online and the collection of reliable data in relation to the quantities produced and sent for recycling and the detection of anomalous transfer phenomena in addition to the elimination of tax evasion and tax avoidance due to relative census of utilities.
- **A public governance system for the circular economy.** The introduction of a European system of circular economy governance through a specific shared administrative reform. For this purpose, it is necessary to create government-level ministries and departments of the circular economy that direct and coordinate the various policies for the achievement of the common goal, based on the model that was created in the French region of Nord-Pas de Calais where a Department for the Third Industrial Revolution was created which has a division specifically designed to promote the circular economy with integrated upstream collection and extrusion activities and industrial use downstream also through digital manufacturing (3D printing).

C. **The need to introduce an effective incentive system that can give impetus to the management phase of the recycling of the differentiated fractions is stressed:**

- the creation and management of a network of infrastructures for selection by specific type of recycling, with industrial platforms distributed and decentralised on the basis of the principle of "self-sufficiency and proximity" to the places where waste is produced. The construction and management of the plant network with a special incentive system could be financed by the same "Waste Tax", in relation to the temporary phase of the incentive itself, and should provide for the establishment of "territorial areas of management" of about 200 thousand inhabitants to favour the same "self-sufficiency of short supply chain systems", aimed at reducing costs and polluting loads deriving from large plants and a massive connected road transport system, to develop systems of small and medium entrepreneurship and local employment connected to the territory of belonging.
- **The local districts of digital manufacturing for short chain recycling:** Creation of a network of local districts for "short supply chain" recycling, new territorial supply chains dedicated to the recycling of damaged products in an irreparable or no longer useful way from which it is possible to obtain secondary raw materials to be used for the production of new objects. For example, think of the recovery of plastic or aluminium materials to obtain the raw material to be used to produce objects with 3D printing, promoting real local districts of digital manufacturing to shorten the recycling supply chains and to bring the raw material into local distributed production processes as only 3D printing guarantees. This creates savings on transportation because only the bits that instruct the printer travel and create many new activities close to the places of consumption instead of a few ones concentrated in a production area hundreds, if not thousands kilometres away.
- **Post-carbon agricultural and food models:** In accordance with the practices promoted by Slow Food, and by its Founder and International President Carlo Petrini, it is not enough to adopt short and distributed food models instead of centralised ones based on intensive agro-industrial cultivations, but it is also necessary to promote sustainable practices in terms of energy and waste. No waste or pollution should be produced in

a farm. For this reason it is necessary to promote a major European project for the de-carbonization of European agriculture in which not only chemicals used as fertilizers, herbicides and pesticides are limited, which should be replaced with agricultural supply chain products such as manure, guano and compost, but the use of fossil energy sources should also be abolished and replaced with systems integrated in agricultural processes (e.g. photovoltaic irrigation, solar refrigeration, biogas from zootechnical sewage etc). The principles of the circular economy apply to the agricultural sector through these virtuous practices inspired by the basic philosophy that the sun provides all the energy to the human being both for the maturation of agricultural products through photosynthesis and for agricultural activities through thermodynamics. As regards decarbonisation, the issues relating to the decarbonisation of agriculture are addressed in the chapter on energy, with particular reference to the one of Taranto.

- **Strict rules for the responsibility of industry on EU scale:** The industrial producers from whose goods and products non-recyclable and non-compostable fractions are generated will have to be subject to a series of stringent rules with respect to the principle of "extended liability" which set obligations regarding the implementation of collection and recycling systems in the commercial circuits of sale with economic charges, or alternatively their liability to the "Waste Tax", the environmental taxation derived from the "polluter pays" principle, commensurate with the social and environmental cost of disposing of their share of urban waste.
- In addition to the incentive for production, it is proposed to provide for a specific tax regime with respect to the marketing of products derived from re-use and recycling, providing for VAT to be subjected to a 0% rate for the goods sold or donated deriving from re-use carried out at public municipal facilities, rate 0% for agronomic compost derived from the treatment of differentiated organic fraction or rate between 0%> 4% for products made with secondary raw material derived from recycling of inorganic fractions.
- We propose the introduction of a specific "empty to lose tax" of at least 0.10 € per piece, paid by the industrial users of beverage containers that do not provide for the passage to the system of the "returnable empty" with connected institution of the "consumer deposit" equal to at least € 0.20 per piece. This system has already been successfully introduced in various European countries but it needs to become a common and shared element across the EU.
- We also propose the creation of a European secondary raw materials exchange (MPS) with market values and daily prices on the main European markets, with the adjustment of the national environmental contributions (CAC), paid by the national consortia to the municipalities for collection activities and to the industrial platforms of the individual countries for the selection and packaging activities, which must be referred to the value indicated by the European MPS Exchange as an amount. - The ban on incineration or landfill of any material deriving from urban separate collection or from separate collection of special waste must however be established.

D. Provide a European funding plan on waste prevention and to finance activities and support networks for the reduction and reuse of assets:

- a general activity of sustainable industrial re-design with respect to the professional activities of scientific research on materials and new technologies and of re-design to extend the life of products which require the replacement and repair of components that overcome the current programmed obsolescence model;
  - New consumption models to finance the start-up or de-taxation of a European commercial network for the sale of bulk products, "on tap" products with a refill container, for the production of "concentrated" refills;
- the practice of unpacking by consumers to be carried out at all shops with the obligation of the managers to recycle the materials left;
- new cultural projects for training and information, communication and promotion of the Circular Economy provided by the EU directly to the circuit of virtuous Municipalities (with minimum standards to be established) to be assigned to schools and non-profit organisations and to environmental volunteering for the activities to be carried out in urban communities;
- provide for the construction of a European infrastructure network of Reuse and Repair Centres or multitasking Eco-parks, managed in public or private areas or structures but with financial support purposes with a minimum return share towards social solidarity and with the prevalence of activities with economic relevance to favour the financial autonomy of the structure by managers and operators;
- create a special "brand" in the promotion of commercial consumer goods based on products derived from reuse in which virtuous communities can recognise us. In order to correctly inform European consumers on the certified origin of these particular consumer goods, it is proposed to use a brand with the "Second Life" logo, open source and freely downloadable from the CETRI website of the La Sapienza University of Rome;

E. The fossil energy sources, especially oil, must no longer be seen as a fuel to be used to produce energy but as a precious raw material necessary to produce objects helping to satisfy needs and improve life, while energy production must take place by exploiting renewable sources such as sun, wind, water, geothermal energy, which do not take away natural resources from the planet.

Circular economy in Taranto

The circular economy, "is a generic term to define an economy designed to be able to regenerate by itself. In a circular economy, the flows of materials are of two types: biological ones, capable of being reintegrated into the biosphere, and technical ones, destined to be revalued without entering the biosphere"[324].
Therefore a system in which all the activities, starting from extraction and production, are organised in such a way that someone's waste becomes resources for someone else. In the linear economy, instead, once consumption is over, the cycle of the product ends and it becomes waste, forcing the economic chain to continually resume the same pattern: extraction, production, consumption, disposal. A model that focuses on the sustainability of the system, in which there are no waste products and in which materials are constantly reused.
The circular economy involves the design from the beginning of a more virtuous system: first of all, it envisages that renewable energy sources are used in a massive way (central element of sustainability); that there is a great passage of information between the different economic subjects. We also need a strong capacity for innovation and products designed efficiently, which last over time and which in their entirety or in their individual parts can be recyclable or reusable in other forms.
For example: bottles should be made in a way that makes reuse easier, rather than recycling. A mobile phone should be constructed in such a way as to make it simple and inexpensive to recycle its parts and recover rare materials. These products should also have affordable prices for the consumer.
All this could bring with it the end of the so-called "planned obsolescence of products", one of the mechanisms on which the linear economy is based.
The incentives to produce on the model of a circular economy are savings on production costs and the acquisition of a competitive advantage. Prolonging the productive use of materials, reusing them and increasing their efficiency would serve to strengthen competitiveness, reduce environmental impact and gas emissions and create new jobs. [325]
Currently, in Europe the circular economy sectors (repairs, recycling and waste management, rental and leasing activities) employ about 3.4 million people. Of these, 1.2 million work in the repair of machinery and equipment, 400 thousand in the repair of computers and other consumer goods, 700 thousand in the collection and treatment of waste, 300 thousand in the recovery of materials and waste, 100 thousand in shops of second-hand products and 600 thousand in rental and leasing activities. With the current growth rate, by 2030 there will be 1.2 million new jobs, with a reduction in unemployment of around 250 thousand units. However, if there is a further boost with policies that favour the circular economy, there will be 3 million jobs and 520,000 unemployed less. [326]

Virtuous closure of the waste cycle

In the linear economy, resources transformed into consumer goods by human labour become waste. [327]
In the Circular Economy, on the other hand, natural resources become materials that are continuously recovered to enter new cycles of use or production and therefore they almost never become waste but feed the local economy, significantly reducing the import of virgin raw materials and the related environmental costs, lowering the production costs of goods and services and raising employment levels.
This fundamental principle is the basis of this project for the construction of a European network for the Circular Economy which took its cue and motivation from the public consultation process issued by the E.C. in April and concluded on 20 August in relation to the request for innovative proposals with respect to the new Circular Economy Directive, subject to withdrawal by the president of the E.C. Junker of the previous package of Commissioner Potockin, judged to be impracticable with the announcement of its relaunch.
In fact, a document was produced and registered with the European Commission which, starting from the principle outlined above, elaborates a series of detailed "shared proposals" about the new methods of management and treatment of the materials that represents the new frontier of the "Zero Waste" model which in Italy found its maximum expression in the Zero Waste Law movement, about the distributed energy production towards self-sufficiency and the Zero Emissions model of Cetri/ TIRES, as well as the short food production chain and distribution towards the Zero Kilometre model of Slow Food Italia.

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[324] *According to the definition given by the Ellen MacArthur Foundation. Source: http://www.ilpost.it/2014/07/05/economia-circolare/*
[325] *Making its proposals on recycling, EU has estimated that 580 thousand new jobs would be created in member countries. Source: http://www.wrap.org.uk/sites/files/wrap/Economic%20growth%20potential%20of_more%20circular%20economies.pdf*
[326] *Source: http://www.recyclingpoint.it/europa-3-milioni-di-nuovi-posti-di-lavoro-in-15-anni-con-l-economia-circolare/*
[327] *In the Laudato Si Encyclical, the Pope calls it "Economy of waste"*

"Waste" is nothing more than products that have reached the end of their commercial cycle; they are reusable and recyclable several times, depending on the materials, and careful management of the cycle and recycling of waste products can help drastically cut pollution and greenhouse gas emissions, while creating tens of thousands of jobs. [328]
Following the hierarchy indicated by the European Union in the field of waste management, associated companies have been working for years in a circular economy perspective, with criteria of effectiveness, efficiency and protection of the environment, paying maximum attention to all phases of the cycle, from prevention in waste production, to separate collection, to the phase of recovery of material and energy up to disposal, with the aim of a virtuous closure of the cycle that minimises the use of the landfill throughout the national territory.
After the withdrawal of the previous circular economy package, the Commission had announced its willingness to review the proposal by the end of 2015 in a more complete and ambitious key. The Commission's communication draft Closing the loop - An EU action plan for the Circular Economy, leaked at the end of October, however appears much less ambitious than the previous one, also in light of the latest rumours regarding recycling targets and reduction of disposal in rubbish dump. It also appears to be not very effective from the point of view of the instruments put in place at an economic level, both in the production and in the consumption of goods and in the waste management phases.
In particular, there are limits in the approach of the production phase in terms of tools aimed at inducing the reduction or at least the rationalisation of the use of raw materials, a fundamental prerequisite in a circular economy logic (quantitative waste prevention) with measures which risk being qualitative only (e.g. eco-design aimed at recyclability).
In the waste management phase, on the other hand, there is a strong downsizing - compared to the previous package - of the important tool of extended producer responsibility. [329]
The circular economy approach must be primarily oriented towards avoiding the waste of resources and the actions must concern all types of waste, urban and special, liquid and solid, hazardous and non-hazardous.
Other important axioms on which it rests are to reduce landfill disposal to the point of limiting it only to those wastes that are in no way recoverable; foresee and implement effective actions for prevention and reuse; manage organic waste: separate collection, biogas / biomethane and compost production; maximize recycling (not just packaging but materials); start recovering what is not recyclable; prepare extended producer responsibility schemes; define criteria for the End of Waste.
In the COM (2014) 397 final, the European Commission aims to develop the REP schemes [330] and define their minimum operating conditions within all Member States. In particular, support to waste pollution prevention initiatives is considered important and we suggest that the REP:
becomes mandatory also for already regulated flows (such as packaging and WEEE);
ensures total coverage of waste management costs (including those of information to the holders, those of collection and treatment) and the re-placing on the market of secondary raw materials;
where the procurement costs of raw materials are lower than those of secondary raw materials, it is considered necessary to introduce subsidies to rebalance the market and direct it towards environmentally preferable solutions;
becomes an instrument of Life Cycle Assessment - LCA.

Territorio zero reports the following analysis:

We have said it, the structural crisis is a direct consequence of the negligence, laziness and incompetence of politics in dealing organically and with a strategic vision with the great themes of contemporary society. The devastation of the territories and natural resources and common goods are the consequence of a process of deresponsibilisation of the ruling class and the lack of political participation that has led to the affirmation of an extremely unequal consumer society.
And another direct consequence of the inadequacy of the political class to deal with strategic issues with the necessary long-term breath is the de facto expropriation of the local communities of their ability to control their economic destinies, their security of access to energy, agriculture, water, common goods. We can no longer act by compromise, we must encourage the emergence, from local levels, of a different political class, which refers to the holistic vision of the Zero Territory manifesto, a political class that is an expression of civil society and is therefore able to plan the future properly.
Let's start from waste. The example of waste is the most obvious symbol. The concept of waste was born with the second industrial revolution and represents the difference between what is produced and what is consumed, a difference that is directly connected to our degree of satisfaction.
In postmodern capitalist logic, the act of perfect consumption cannot bring satisfaction except instantaneous, that is, "goods should satisfy immediately and satisfaction should cease immediately, as soon as the time necessary for consumption has run out". In the consumer society, the act of consumption can even be eliminated because it is not indispensable, until paradoxically reaching full waste and ultimately replacing the consumer society with a "civilisation of waste". The problem of waste production cannot simply be solved with adequate disposal technologies; the issue has also a cultural nature. Any provision resulting from consumer logic can never be a solution because it is intended to act only on the effects and not on the genesis of the problem. Also in this case, it is necessary to call into question the local authorities, the small and medium-sized company linked to the territory, but above all to start from the responsibility of the individual.

[328] *Source: http://cetri-tires.org/press/2013/chiusura-virtuosa-del-ciclo-dei-prodotti/*
[329] *Source: Ecofiscality and circular economy - Policies and tools for waste and resource management. Utilitalia Hearing 13th Senate Commission*
[330] *Extended Producer Responsibility*

The concept that links the responsibility of a community to that of industry in the waste sector is all in the strategy proposed by Paul Connett known as Zero Waste, which proposes alongside community practices (reuse, recycling, repair) those of the industry (design and manufacture of products and packaging), all aimed at the drastic reduction of waste. It is possible to summarize the Zero Waste strategy, reworking it for the energy part, in the following phases:

• structuring of a collection system that increases the quantity of differentiable material, optimizing its quality and at the same time decreasing the quantity of waste produced;

• incentives for the reuse of recycled material, the repair of objects and the stimulation of lifestyle choices that reduce the percentage of waste;

• support for the design and production of totally recyclable, reusable and repairable products;

• enhancement of the organic part of the waste from an energy point of view through the production of biogas. It has been calculated that the effective application of the aforementioned points would allow a reduction of undifferentiated waste up to the 15% share of urban waste.

Fortunately, Paul Connett's work influenced and inspired the waste directive (2008/98) of the Parliament and of the European Council of 19 November 2008 (transposed into the Italian national system in April 2010 and entered into force in December of the same year).

The European directive promotes those virtuous practices at local level which, through programs for the prevention of waste production (article 29), firstly lead consumers to consume less and favour products with low-volume packaging, so as to produce less paper-like waste, plastic, boxes, bulky packaging, etc.

Secondly, it dictates precise rules for the reuse of objects and products that have not yet completed their utility cycle, and which therefore could be repaired instead of disposed of, thus recovering the intrinsic energy of the products themselves which, when returned to the cycle, allow to save energy to produce new ones.

Also with regards to recycling, it is established what to collect, rework, market and reuse, starting from materials previously considered as waste.

The rules laid down by the directive have multiple advantages, not only on the environmental level but also on the social one:

• the quantity of waste to be disposed of can be reduced;

• the withdrawal of raw materials from the natural environment can be reduced;

• the energy consumption deriving from the transformation of raw materials can be reduced;

• local authorities can be allowed to earn money by selling recycled material to industries that process it or by producing energy. For this reason it is necessary to study strategies to close the waste cycle applicable at local level that follow European principles, and at the same time to focus on the interrelation between energy and waste both in terms of reducing energy consumption (as required by the directive) and of energy production according to residual principles.

All of this fits fully into the socio-economic structure of the Energy Communities. In fact, the objectives that can be achieved are those proper to decentralisation and diffusion in the territory:

• the creation of a new social model for waste management which means local self-sufficiency and virtuous behaviour;

• the realisation of economic savings for citizens through a mix of: waste tariff, gas and electricity bills, waste and waste disposal costs;

• the implementation of energy recovery policies (electrical and thermal energy produced from biogas, which represents a zero-emission source).It will be essential to take into account also and above all the socio-economic impact of these policies, considering the advantage both in terms of employment and of creation of economic activities. Finally, let's remember, an important role must be assigned to participatory processes to allow citizens to intervene in decisions concerning the closure of the waste cycle, with the relative consequences in terms of democracy, security and legality.

Local administrations will easily obtain more independence through technologies useful to rethink those energy strategies that comply with European directives and will be able to aim for *a new - and finally sustainable - socio-economic system.* It implies commitment, of course, but local authorities can realise today the transition conditions towards zero waste as long as they follow paradigms that definitively leave aside the use of landfills and incineration.

Mandatory returnable empty

The returnable empty is a system that allows the reuse of the packs, thus avoiding that they end up in landfills. It is a form of recycling with multiple economic and environmental advantages.

When we talk about cans or plastic packaging, the term we use is empty to lose, it is still recyclable materials (aluminium and PET) but which have a greater weight on the environment than glass bottles, the returnable empty.

Disposable empties are usually disposable materials, although some companies produce disposable empties that could actually be reused, see the case of Nutella jars, they are still made of glass (and potentially disposable voids) but there is no recovery mechanism, except for the creative recycling carried out individually by citizens and the glass-shaped Nutella jars).

Only in rare cases does the phrase "returnable empty" accompanies PET bottles, usually they are given in the separate collection of plastic but some manufacturers have experimented the direct reuse of plastic bottles. It has been observed that a PET bottle can be reused up to 20 times.

The economic advantages include the fact that a glass bottle, with the returnable empty system, can be reused up to 40 times in order to save precious resources such as raw materials and energy. The returnable glass bottles can be returned by the consumer and then refilled about 30 to 40 times, in reality a bottle, in ideal conditions, can face up to a maximum of 50 cycles of use, after which it can be recycled as glass. A new glass bottle contains 60 to 80 percent recycled glass.

Among the environmental advantages of the returnable empty the first advantage is the saving of virgin resources and the energy saving connected with the production of new bottles. Industrial production processes cause damage to the environment, in the case of glass bottles, we speak in particular of air and water pollution.
A second advantage is related to the lower production of waste.
A third environmental advantage lies in the cuts of freight transport: most companies use the returnable empty with their products and with deliveries to customers-distributors, in this way long transport is avoided and consequently also the connected CO_2 emissions.
Typically, those who buy the returnable empties products pay a deposit that is paid back upon return. A practical example: a user buys a drink that pays 1.25 Euros including a glass bottle. When the user decides to return the bottle, the sum of 25 cents (served as a deposit) will be returned.
In Germany, the returnable empty system is widespread in city culture. There are people who collect beer bottles to be presented at the supermarket to get the deposit back. In this context, another environmental benefit provides cleaner roads and public areas!
The deposit that the customer pays usually amounts to 15 - 25 cents per "empty bottle". The "empty" must be returned clean and the user must take care not to damage the bottles. If the bottle is damaged it can no longer be returned and must be differentiated with the collection of glass. [331]

All food products (and not) of the short chain must be promoted with all possible means. The bulk or 'on tap' products can be purchased at the numerous specialised shops in Italy, but also in the organic stores, in some supermarkets, in any market as regards fruit and vegetables, and directly from agricultural producers.
This guarantees numerous advantages from an economic and environmental point of view, especially for consumers, but also for companies.

Creative recycling new frontier of the circular economy [332]

There is an aspect of waste recycling that is made especially for Italian creativity and entrepreneurship. It is creative recycling. Everyone is good at industrial recycling of aluminium. And of iron, wood, paper ... But try to make a necklace with PET bottles or a bag from old scrapped car belts. And above all to sell them at Eataly for 50 Euros. You only win this challenge if you are 1) Italian, 2) heirs of the Florentine or Roman Renaissance artisan workshops. This is the case of eco-artisans who for a year have diverted the attention of gourmets who frequent Eataly Rome at the Ostiense Terminal, towards books transformed into bags, crown caps in Roman and Greek jewellery, old cars into pop icons and above all, plastic , lots of plastic, transformed into jewels, ornamental furnishings, lamps, furniture. That same plastic that can rightly be considered the true queen of environmental instability, which we find in islands of hundreds of square km in the oceans and in the food chains of fish. That plastic becomes the basis for a new creative entrepreneurship. The cleaning of the coasts, the collection and transformation of these ecological horrors become the production chain of a design which has in itself the poetry of transformation.
And fortunately, there are more and more people joining this thinking today. And these people search each others and meet to make critical mass. Because recovering, creating and producing it's not enough; we must also propose. I am convinced that there is a world that asks to be changed out there: lifestyles, consumer behaviour, production models. Those who, engage in the process of change like us, must have an identity and a place to make alternative demand and supply of a less rapacious, more ethical and above all "circular" economy meet. We met and gathered in a network, "R(h)OME MADE", which with its 10 sustainable brands, exchanges experiences and shares circular economy projects. R (h) OME MADE debuts in the EATALY ROMA Store, with the Atelier, a meeting place between supply and demand, a showroom for the promotion of new models for the use of the product and the sale of artistic designs born from secondary materials, pilot project of contamination between quality and km.0 creations and citizenship education to the beauty that is generated by non-waste.
But the idea of recycling the materials comes from afar. It comes from a pre-consumerism era in which materials were scarce because the systems of extraction and transformation of natural resources had not yet undergone the quantum acceleration that (unfortunately) impressed them on the second industrial revolution, the era of oil, in which hyper-consumerism that transforms all citizens from users into machines to consume has been brought to paroxysmal levels, bringing to the catastrophic situation

[331] *Source: http://www.ideegreen.it/come-funziona-il-vuoto-a-rendere-53465.html*
[332] *Written with Laura Buffa, Eco designer and digital artisan responsible for the Roman consortium for creative recycling R(h)ome Made*

of today the consumerist ideology screwed into the deadly spiral of the linear economy (extract, produce, consume, throw), which empties the mines and fills the landfills. An ugly world!

The one of Laura Buffa and the ecological craftsmen, on the other hand, is a beautiful world: the world of the Circular Economy. The works done by Laura and her eco-craftsmen colleagues and exhibited in the atelier space on the second floor of Eataly, where the toys recycled by the children have been added periodically, are worth a visit and also a philosophical reflection on how human ingenuity can keep alive by assigning new functions to objects otherwise destined for destruction according to the crazy logic of the current waste cycle
In the circular economy of R(h)ome Made, sublime examples of how the tradition of Renaissance artisan workshops, combined with the digital economy, can make economy and create income, subtracting material from the landfill, and putting it back into circulation in the form of objects that acquire value thanks to creativity and human ingenuity: from plastic bottles that Laura Buffa transforms into precious jewels and lamps, to tin cans that Gianluca Esposito transforms into surreal

eighteenth century rats; from the slides of the seventies and the disused zips that DIAMANIA transforms into necklaces and earrings, to the mother-of-pearl necklaces and bracelets made with pieces of scrapped CD by Anna Retico, from the always new fashion garments with the Santarella fabrics, to the bags made with scrapped car seat belts for BeltBag by Francesca Patania, from the Roman gold jewels obtained from old crown caps of Alecci and Di Paola beers, to the old furniture renewed in the most crazy colours and shapes by OfficinaMove, from the covers of the old books integrated into lady handbags, to packaging materials transformed into Strabilia jewellery and furnishings.

Decalogue of the circular economy at local level

1) Ecological products

The products that are most commonly sold on tap, even in supermarkets, are detergents. In the shops of ecological and bio products we find quality on tap detergents, which are respectful of the environment also from the point of view of the composition, and not only for the absence of packaging. Just buy a reusable bottle for detergents and you will no longer have to worry about disposing of the packs.

2) Healthier food

Most of the stores specializing in the sale of bulk products deal with food of biological origin, grown without using pesticides. We will therefore be able to purchase healthier and more sustainable food also from a production point of view. The purchase of raw materials is very convenient, starting, for example, from natural flours.

3) Less packaging

The production of industrial food encourages the creation of increasingly complex packaging to protect products, but very often too bulky and unnecessary. Reducing packaging means saving money and limiting transport costs, with consequent limitation of polluting emissions along the roads and throughout the production chain.

4) Economic savings

Products sold loose or on tap are usually cheaper than packaged products. This happens because the consumer buys only the raw material, food or detergent, he/she needs, without having to pay for the packaging, the realization of which can also affect the final price by 10%. An Italian family, according to a survey by Federconsumatori, can save at least 64 Euros per month and up to 700 Euros per year by choosing on tap products to replace packaged ones. The economic benefits also concern companies, which will save on transport, on waste disposal costs and on the production of packaging.

5) Local products

The purchase of bulk products can take place not only in specialized shops or in some supermarkets, but above all directly from producers, for example as regards fruit and vegetables, cereals or legumes, but also rice, pasta or oil. Just go to your trusted direct grower with fruit boxes, cardboard boxes and cloth bags. Thus, in addition to reducing waste, we will support local economy.

6) Reducing waste

Following a sustainable and ecological lifestyle also means trying to reduce the amount of waste produced daily at home and in the family. Food packaging has a very short life and makes up most of our waste. Moreover, not all wraps are recyclable (for example, most cookie packs). It is therefore better to buy loose products or the raw materials necessary to prepare them at home.

7) Co_2 emissions

Choosing bulk and on tap products allows you to reduce the environmental impact and CO2 emissions of your shopping. In fact, it will be possible to identify the best products to buy, which will come from sustainable supply chains as regards detergents, and from natural crops as regards food. The absence of packaging itself indicates that no polluting emissions have been produced for their realization.

8) Vegetable origin

In the stores of on tap products where household detergents, detergents and cosmetics for the personal care are found, the vegetable origin of the raw materials used for their production is often guaranteed. This means that the surfactants and the ingredients chosen for their realisation will be of plant and natural origin and not petrochemical, therefore more respectful of the environment.

9) Less waste

Loose and on tap products guarantee maximum freedom of purchase for consumers. In fact, we will be able to purchase the exact amount of a cleaning and food product that we need from time to time, paying for it by weight and without spending anything more. It is also an excellent strategy to limit any type of waste and better organise your shopping.

10) Space and practicality

Both the companies that offer bulk products and the consumers who decide to buy them have numerous advantages, especially from the point of view of space and practicality. The companies, by using larger packs, and not packaging for each single portion, will gain space in the warehouse, while consumers will be able to better organize their pantry and reuse glass jars and bottles of other products, choosing the appropriate dimensions according to the need (for example, with differences for

products to keep on hand and for those to be kept in the pantry).[333]

Promotion of bulk and short-chain products (food and non-food)

With regard to the short chain, however, we mean a large set of production-distribution-consumption configurations, such as direct sales on the farm, farmers' collective shops, farmers' markets, the various forms of buying groups. By examining these configurations we realise that it is not easy to give them a unique definition. In fact, the concept of short supply chain incorporates at least three dimensions of proximity: geographical proximity, social proximity and economic proximity. [334]

The extraordinary recovery of popularity of farmers' markets and other similar forms of direct sale of agricultural products, recorded in recent years, certainly arouses surprise and deserves some reflection.

The neighbourhood food markets have long been one of the main sources of supply of fresh products (fruit and vegetables, dairy products, meat and fish) for city dwellers, but their importance has rapidly diminished due, on the one hand, to evolution of the food industry and the advent of large-scale distribution, on the other of the change and differentiation of lifestyles and consumption and the role of women within the family.

At the moment there seems to be a coexistence of a commercial dimension within which the food supply is very wide, of standardised quality, flattened on more or less known brands (shopping centre / hypermarket) and a dimension based on personal relationships and high quality products (farmer's market, organic and typical products shops, solidarity purchasing groups).

Although it may seem like a return to old habits, in reality the phenomenon of farmers' markets assumes distinct features from the classic local market. In fact, changes have taken place in this last formula, so that the banks managed by the farmers themselves are increasingly rare; on the contrary, "merchants" prevail, who sell goods purchased at larger distribution structures (general markets, agri-food centres).

These subjects therefore become further intermediaries in a chain that can no longer be defined as short. Furthermore, the current farmers' markets, as they are organised, present an added value from a social and cultural point of view that traditional city markets do not have, as they are often an opportunity for sharing and exchanging information.

Often, in fact, jointly with the sale of agricultural products, events, demonstrations and moments of reflection are organised, in order to provide information to consumers and encourage knowledge and communication.

Both for pure survival and for offer diversification strategies, direct selling represents an opportunity to guarantee a safe income or to increase and integrate that deriving from primary production. For example, there is an opportunity to find a commercial outlet for products from companies located in marginal areas or very small producers, such as those who cultivate for self-consumption, who periodically have surpluses to sell or to increase the added value of primary goods for those who also carry out a transformation activity.

From an economic point of view, the characteristics of seasonality and territoriality that distinguish direct sales allow savings in terms of production costs.

Materials banks, time banks and the second life brand

To face the old-fashioned banks in which the financial world was the main player, new banks were born to put money in second order and to enhance exchanges of skills in addition to disused materials and objects.

It was 1997 when in Italy, with the Ronchi decree to promote a sustainable waste management, the strategy known as the "5 R" was introduced: Reduction, Reuse, Recycling, Re-collection, Recovery.[335]

These concepts applied in particular to the integrated management of waste, fundamental, together with other factors, to guarantee an adequate environmental sustainability, should spread today more than ever, starting from the new generations.

Over 50% of the objects that are disposed of in landfills or incinerated could lengthen their cycle, efficiently exploiting the intrinsic energy they contain (i.e. the energy that was used to produce them). A huge amount of clothing, furniture, appliances, electronics, computers, mobile phones, bags, suitcases, building frames and much more could be put back into circulation, often with minimal repairs, or simply in the state in which they are sent to landfill. [336]

To do this, it is necessary to put in place a social organization inspired by the Zero Waste strategy with re-use banks, markets dedicated to second-hand products, repair laboratories, barter centres, in short, through the creation of a reuse culture, supply chain and community.

It is not just a matter of supplying used products to the less well-off, because many of these objects can also find space in the homes and lives of people who are not necessarily poor, but who wish to enter a new cycle of consumption free from the concept of waste.

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[333] *Source: http://www.greenme.it/consumare/eco-spesa/11736-prodotti-sfusi-perche-comprare-alla-spina*

[334] *Galli, Brunori, 2013*

[335] *Source: http://www.econote.it/2014/08/28/le-5-r-dei-rifiuti/*

[336] *http://cetri-tires.org/press/2013/second-life-il-progetto-di-filiera-del-riuso-per-le-comunita-a-rifiuti-zero/*

So used televisions, second hand clothes, furniture that have already had a first home can enter a second life. From here the name of this project called SECOND LIFE.
CETRI-TIRES has developed a brand to be used voluntarily to report all the products that enter this new life cycle and all citizens who have the sensitivity to enter a community of reuse and lighten the weight of their consumption on the environment.
As far as the Time Bank is concerned, instead we could start by saying that it is a system in which people exchange activities, services and knowledge with each other. Defining it therefore as: "a free association between people who organise themselves and exchange time to help each other especially in small daily needs". It is a "place where the now lost habits of mutual help typical of good neighbourly relationships are recovered. Or the usual help exchanged between members of the same family or groups of friends is extended to previously unknown persons." [337]
Time banks are organized as credit bodies where transactions are based on the circulation of time rather than money. The biggest difference is that interests are never accrued either passively or negatively! The only obligation you have is the balancing of the account.
Like all other associations, the time banks are regulated by articles of association and by the statute. As required by national and regional laws, they must be registered. Each new member who joins the Association immediately reads both the Articles of Association and the Regulations which contain both the association's constitutional rules and the methods for joining. There is a national association of Time Banks [338] which shows that there are also 5 throughout Puglia including one in Taranto which is called TEMPO DEL FARE (TIME OF DOING)[339]
The "basic rule that applies in all the banks of the time is the exchange." Synonymous with mutual convenience, exchange presupposes, by its very definition, that the subjects who enter into a relationship are active. Consequently, unlike in Volunteering (which is based on the gift of help to those in need of assistance), "the solidarity that circulates in the Time Banks is not one-way. It is mutual and equal. The time exchanged is measured in hours and the hour is 60 minutes for everyone, regardless of the profession, the social class they belong to or the economic conditions of the individual people. "In this sense, the Time Banks achieve an almost perfect egalitarianism.
They serve to satisfy material and immaterial needs. Among the first ones, those related to the daily organisation of the lives of people and families prevail; among the second, the need for company and to expand the network of friendships. Banks, in fact, are places of socialization, which also favour the sharing of knowledge.
The list of aids that are exchanged and measured in hours is very long. It can be divided into two large areas: the first, the prevailing, is made up of minute services that concern the conduct of daily life (shopping, cooking, laundry, relations with public bodies, children, the elderly people, the free time with friends ...); the second, very widespread also because it promotes socialization, concerns the exchange of knowledge, that is, the bartering of knowledge that individual people possess.
This second type of exchange puts on the same level knowledge existing on the market (computers, languages, painting, photography ...) and knowledge "out of the market", in the sense that they are not attributed economic value.

In general, the purposes for which the TB are organised can be summarized as follows:

- promoting exchanges of services aimed at satisfying both practical needs and needs for cultural enrichment and expansion of social relations;
- facilitating the reconciliation of paid work times with those of family care work,
- enhancing skills and vocations that would otherwise risk remaining unexpressed thus supporting ways of strengthening personal self-esteem;
- organising moments and spaces for meeting, communication, intergenerational and intercultural exchange;
- contributing to the overcoming of conditions of isolation, solitude, cultural and social marginalisation.

Time banks represent a mine of skills, collective goodwill skills that can be enhanced in a Third Industrial Revolution economy also through the connection with the reuse banks and with the GAS.

Community Compost, integration among Farmer Market, G.A.S. Retake and volunteering for the urban " retake"

Quality composting is a controlled aerobic stabilisation process of the organic material selected from RU. Synthetically it is an industrial technique through which the natural process that any organic substance undergoes, due to the effect of the microbial flora, is controlled, accelerated and improved, which allows to obtain a biologically stable product that presents a mixture of humidified substances (the compost) to be used in agronomic activities. This process may possibly be preceded by an energy

[337] *Source: http://bancadeltemposmc.weebly.com/cosegrave-la-banca-del-tempo.html*
[338] *http://www.associazionenazionalebdt.it/*
[339] *http://www.tempodelfare.it/*

recovery through anaerobic digestion which allows the recovery of gas (methane) which benefits from green certificates. In this case, however, the digestate should be subsequently processed through composting.

Over the years, composting has definitively established itself within the integrated and sustainable management of waste, increasingly acquiring, over time and in case law, a priority role in the hierarchy of interventions.
In this context, as well cited in the Communication of the European Commission "Roadmap to a Resource Efficient Europe", composting arises and even more for the next few years, not only as a technique for the treatment of organic waste compared to other forms of management but as a tool of fundamental importance for an efficient use of resources (among the objectives of eco-innovation).
Also in Italy, as in several other countries, it is an essential element of any integrated waste management system. This type of treatment represents one of the few eco-technologies validated in terms of the possibility of improving the management of environmental resources and enhancing the variety of biomasses, as well as recovering organic substances to be destined for agriculture, such as the Mediterranean one, which strongly needs it.
The organic fraction present in urban waste represents the main problem to be treated as it is the first component of the waste produced by weight (34%). If we look at the production of individual family users, thus excluding the users assimilated to urban ones, the organic fraction is 70%; it constitutes the largest percentage, almost 24% by weight, of all separate waste collection.
Composting can be performed on various scales and with the use of different techniques. Without prejudice to the fact that priority should be given to aerobic composting and the redistribution of organic carbon on land at risk of desertification also for climate change, on an industrial scale the wet fraction collected in a differentiated manner can be processed with different types of treatment (heaps, bioreactor etc.).
An analysis of the distribution of composting plants in Italy shows a significant difference between the North and the Centre-South. The potential contribution of home composting is fundamental in the integrated urban waste management system, as 33% of the Italian population lives in single-family homes.
Currently, the most modern approaches to the topic are opening new spaces that suggest actions aimed at the treatment and recovery of waste, to be carried out as close as possible to the production sites, through small plants of negligible impact.
In this context, a very promising sector has opened up between industrial and domestic composting for the introduction of an intermediate sector: that of community or neighbourhood composting.
This step in the management of organic waste allows to introduce an additional "eco-innovative" path in the system, as through this technique it is possible to respond to the targeted needs of many local realities, contributing, in addition to reduce waste and environmental impacts, to enhance the on-site reuse of compost and increase the chances of a behavioural change for citizens as it can further stimulate more aware lifestyles. [340]
The system is based on the use of small "electromechanical machines" where the aerobic process is maintained and accelerated by the continuous supply of air.
This technique has considerable potential for cases such as an isolated community, a hamlet, an apartment building, a canteen, a hotel etc.
These machines pose new technical and regulatory problems and therefore require a necessary and adequate monitoring. There are few products on the market, but in Sweden there are already hundreds of community composters installed also in condominiums.[341]
The so-called G.A.S. go in the same direction

G.A.S. (Solidarity Purchase Groups) are groups of families residing in the same neighbourhood, or sometimes even in the same condominium, which organize themselves to collectively make their purchases, coming directly into contact with small producers in the area.

Unlike normal purchasing groups, GAS are inspired by the principles of critical consumption, equity and solidarity, environmental protection. Therefore they choose those producers who can guarantee, in addition to quality, also the minimum environmental impact, through organic crops, returnable empty packaging, use of local raw materials. In addition, GAS

[340] *Considering a production of waste equal to 530 kg / inhabitant / year it is estimated a production of organic and green waste of 220 Kg / inhabitant / year. A family of 4 people can produce around 650 kg of organic waste every year. Source: http://www.rifiutizerocapannori.it/rifiutizero/wp-content/uploads/2013/12/compostaggioDicomunit%C3%A0.pdf*

[341] *Source: http://www.enea.it/it/pubblicazioni/EAI/anno-2013/n-5-settembre-ottobre-2013/il-compostaggio-di-comunita*

members focus on socialization and sharing, creating meeting opportunities that are not limited to the purchase and sharing of goods, exchanging information and ecological practical knowledge to be carried out in common (preparing food at home, helping with renovations etc ...).

In practice, the groups, after gathering information on the producers and having visited their companies, prepare a list of goods for collective purchases; each family draws up its own "shopping list" which, added to the others, constitutes an order to be sent to the reference producers. The goods are then divided among the families and each pays its part. Through this technique it is possible not only to save money by purchasing healthier and quality products, but also to support small local producers. There are also different forms of aggregation: some GAS are formed in association, others prefer not to give themselves a precise organisation. There is a national network of Solidarity Purchasing Groups [342]

The most important advantage that derives from participating in a GAS is knowing really what you eat and buy, spending "the right" and having the awareness that the money will be used according to criteria of equity and justice. The positivity of a similar experience gives rise to reflections on how to further improve a world in continuous development such as that of GAS: "participating in a solidarity purchasing group is a possibility to create a small economic world on your own" clearer and fairer, which, by force of circumstances, is immeasurably more disorganized than the great traditional economic world ". [343]

"Taras" Community currency

Taranto could take inspiration from some already existing experiences illustrated before to put in circulation the wealth produced by the work and ingenuity of the citizens even if they do not have the necessary initial capital. One with TIRES and its experts who are developing parallel currencies within the European programs Dyne and Daije[344] is available to provide all the IT technical support.

Experience from prof. Eric Toussaint, co-author of Territorio Zero and coordinator of the Commission for the review of Ecuador's immoral debt on behalf of President Correa, and currently in charge of the debt review by the Greek Parliament is also available. [345]

Also prof. Stefano Sylos Labini, co-author of the proposal of the Tax Currency, as a member of the Scientific Committee of the CETRI could be called to make his skills available for the elaboration of the Taras.

Finally, CETRI has ongoing collaborations with various experts and owners of Block Chain experiments both at Italian and European level and could certainly involve them in the elaboration of the Taras currency[346]

The secret of these additional monetary circuits lies in the fact that there is no interest on the credit requested, and this mechanism prevents money from being created from money. This type of complementary currency does not bear fruit which means that it loses value over time and this makes its accumulation not convenient while encouraging it to be spent and therefore makes it circulate. Reverse the mechanism of the official currency, which, being fruitful, increase spending. In other words, complementary money returns to the initial function of money, that is, the means of obtaining various utilities, goods and services, rather than an end in itself as it currently is. Through the Euro system, States request money from the ECB which, as a private entity, requires interest on the money lent, even if formally impossible to return because the States do not manufacture money. The perverse apparatus will never allow debt relief and this shows how all nations are, in fact, kept under the absolute control of the major world banks.

By choosing alternative (or complementary) currency, no company depends on a stock exchange index and no market is subject to fluctuations without control; which is why no State can be rated by a rating company, downgraded and then bankrupt.

However, we talk about complementary currency and not alternative currency. This is necessary because unfortunately these models cannot exist without the euro. The sales made within the circuits are fiscally equivalent to the sales in Euro and therefore the same billing procedure must be followed, including the calculation of VAT. The income in complementary currencies must necessarily be integrated into normal company accounting, and it goes without saying that VAT, taxes and contributions must be paid in Euros. [347]

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342 *http://www.economiasolidale.net/*

343 *http://www.greenme.it/consumare/eco-spesa/921-i-gas-gruppi-di-acquisto-solidale*

344 *https://www.dajie.eu/*

345 *http://cetri-tires.org/press/2015/ce-un-piano-alternativo-per-la-grecia-il-piano-toussaint/*

346 *www.tibex.net*

347 *Source: http://www.sardiniapost.it/economia/sardex-risponde-allarticolo-repubblica-non-evasori/*

This complementary coin for Taranto obviously has to be re-named according to the historical references of Taranto in order to become evocative of its Spartan origins. For example, it could be called "*Spartan*" or "*Falanto*" from the name of the Spartan founder of the city. And it could function as a system of circulation of value for the sharing economy, re-use banks, agricultural GAS, time banks and the whole local sharing economy chain. In this sense it is appropriate to carefully evaluate the connection of the parallel currency with the activities of the Open Source School (SOS) to prepare the professions and professional figures of the collaboration economy. The Complementary Currency must serve as a link between the various pieces of the digital, circular and sharing economy and be accepted in the second-hand buying and selling circuits, in the GAS, in the services of the time banks, and in the sharing economy services (transport, housing etc.)

Economy of functionality, hydrogen, 3D printing and innovative start-ups

While in Italy the debate on sustainable mobility languishes in the contrast between "ecological" and electric diesel, in the rest of the world many companies are gearing up to bring hydrogen technologies to the market both for storage and for mobility and as educational tutorials to spread the new energy paradigm distributed and accessible to all according to the model imported in Puglia by the University of Hydrogen, inaugurated in Cala Corvino (Monopoli) by Jeremy Rifkin himself in 2008, who has always promoted hydrogen technologies also on the didactic plan as a practical demonstration of the new TRI energy paradigm. This is not an isolated case. Experiences of this type proliferate around the world among social market companies and educational activities. Among these, the Horizon Fuel Cell leading and pioneering company of which we have interviewed the director of European operations Kamil Jelinek, to get a more precise picture of the actually functioning model they put in place for the creation of an economy of hydrogen technologies. This model is particularly interesting in a Post ILVA scenario in Taranto, where it could also be imported in view of the hydrogen mobility project on the port co-financed by MISE.

The goal of this company is to combine the "educational" section with technologies based on a post - fossil energy model. The company was founded in Singapore in 2003 and is active in 5 countries through international branches.

The company's mission is to bring fuel cells to the market at competitive prices and much higher efficiencies than traditional ones, helping to remove the obstacles that stand in the market for the supply of hydrogen. The company began with demonstration products (hydrogen toys such as cars), as a springboard towards more complex applications.

Horizon has quickly established itself as the largest small fuel cell manufacturer (below 1 kW) in 65 countries, and is now planning to land on the 5 and 10 kW fuel cell market. Currently, horizon's technological platform includes, in addition to small-sized polymer cells, hydrogen production systems from electrolysis, hydrolysis and reforming, and compact and suitable hydrogen storage systems suitable for the market of batteries for electronic devices.

This allows us to intervene on the market with original commercial products such as hydrogen batteries for telephones, ipads and computers, models of hydrogen-operated toys (cars and airplanes), "island" generator sets for the beach or camping, hydrogen components (stacks, stabilizers) and particularly important, metal hydride hydrogen cartridges (all innovative products with great potential in the energy and educational market of the future, and therefore potential candidates to be protagonists in the post-ILVA economy of Taranto both for the domestic and international market.

It is in fact an extremely effective technology for storing hydrogen but which until now has discouraged consumers with excessive prices, but which today finally arrives on the market at affordable prices.

Simultaneously this innovative start-up, after realising the "educational" potential of hydrogen technologies, decided to develop teaching products to help students of different ages understand the problems of the new energy model and began to develop educational packages made available to the public with the *open source* formula through free download (the page to which they can be downloaded is: http://www.horizoneducational.com/didactic- material /).

In practice, the start-up begins to provide free courses and to earn only on the sale of accompanying teaching technologies (demonstrative hydrogen technologies, such as the so-called STEM KIT which includes top products such as micro hydrogen generators from wind power, electric mobility, micro hydrogen generators from solar sources, polymeric micro fuel cells and much more.

But the product of greatest effect is certainly the i-H2go hydrogen car (here the demonstration video https://www.youtube.com/watch?v=EiFkBPbjFTs) which despite being a toy, is a concentrate of very high digital technology with self-produced hydrogen refills from renewable sources, driving system with remote control that can be installed on a mobile phone with a special app, and gyroscopic control.

Another product with an infinite potential market is the battery pack to recharge hydrogen phones with metal hydride cartridges. Through these technologies, students acquire the knowledge that renewables put energy in their hands and that, compared to fossils, they are simple, clean, and at the same time surprising technologies. Students fully and effectively discover the key principles not only of solar thermodynamics of the photo electronic conversion of solar energy, of kinetic energy generated by wind or sea, but also the fundamental principles of electro-chemistry, physics, engineering physics and electronics. Each product has a precise object: electrolysis, energy conversion, electrical circuits, mechanical engineering. So they learn the future of energy today. The pedagogical aspect of these demonstration packages is twofold. First of all, we realize the very serious limits of fossil energy especially in relation to the current energy demand. Secondly, we discover the advantages of using renewable energies, learn the real effects of climate change, update on the latest developments in solar technologies available on the market, learn how ecosystems work. 360-degree environmental energy training based not on futuristic and unrealistic dreams, but on existing technologies that are freely available on the market. It is important to establish partnerships between start-up companies in Taranto, and world leading companies such as Horizon so that products and services related to technologies are developed, possibly in the form of the Technology Park inaugurated by the TRI experiment in Nord Pas de Calais in France regarding digital energy The collaborative networks of the Third Industrial Revolution. The task of promoting and preparing a new infrastructure of the Third Industrial Revolution to create a new economic dynamics falls on public and economic authorities, so Jeremy Rifkin describes the new infrastructures that citizens must interconnect, and create an infrastructure of information, energy and all things; a technological infrastructure that is intrinsically free of cost of ownership and distributed among all. To do this we need a new organizational model, therefore it becomes necessary to allow each citizen to access their potential energy - understood as access to resources and technological knowledge for the procurement of resources, and the production processes that follow. A model where producers and users interact in a collaborative, open and exchanging way.

TRI in Communications

The current model based on information property *(IP = Intellectual Property)* is replaced by the sharing model, transparency contrasts with traditional secrecy of decision-making process, the common interest of the community and the territory is opposed to the self-interest of the individual-consumer.
The validity of the free information model and the free exchange of knowledge as a public domain is an established and accepted fact: thanks to the F.O.S.S. *(Free & Open Source Software)* and to the free development of its potential, in the last 20 years technology has allowed the world to make a leap forward of unimaginable proportions, making radical changes in many production processes and creating totally new ones, thanks above all to the free sharing of knowledge and tools that were produced thanks to it. The Languages and Protocols used in the F.O.S.S. are protected by licenses such as the GNU GPLv3, and the Creative Commons Licenses *(CC):* For the majority of programs, licenses are designed to hinder the user's freedom to share and modify it. On the contrary, the GPL is intended to guarantee the freedom to share and modify free software, in order to ensure that the programs are "free" for all their users. ... from the Manifesto of the GNU GPL (General Public License) And it is precisely on the free access to information and on the possibility of redistribution of information that we pay attention in this Technical Table, because when communication is not free but rather controlled, the deriving process will be slowed down in the development and dissemination of results, which could instead be made available for the benefit of all citizens.

The 3 Levels of Communication

We can reduce any communication model to a scheme composed of 3 distinct, complementary and fundamental levels for the success of the communication itself:

- the physical level, that is, the transport of information
- The Code level: the Protocol, the Language, the Software used
- The level of information itself, i.e. the content transmitted

It is essential that at least 2 out of 3 levels are free of control and ownership, otherwise any information will always be controlled and will be exposed to exploitation and improper use.
In order for the communication process to be kept independent, the language level - the code used - must be kept free and in the public domain.
The physical level must also be owned by the individual and the community, a common good like other public infrastructures (a road, a bridge, a railway).
The management of communication with the Third Industrial Revolution distributed model not only makes it possible to make all people the owners of the communication network, but also makes the infrastructure more economic and efficient. The MESH Networks follow the #TRI**model** and are able to provide broadband connection to a large number of users.

Network status and threats to information freedom

The World Wide Web Foundation, headed by Tim Berners Lee, the "father" of the World Wide Web itself, has released a report - the WebIndex - which classifies the maturity level of the Web in the various countries, and the general status of the network. The parameters on which the ranking is built are:
level of infrastructure (spread of broadband in the territories)

- freedom of content
- social impact
- economic impact
- political impact

From an economic point of view, the main obstacles to the spread of broadband are costs: these costs absorb about 50% of the average monthly income in thirty countries (out of the 61 monitored in the report).
Regarding politics, it is important to underline that as many as 30% of the countries monitored suffer from more or less serious restrictions on access, and in about half of them there are growing threats to the freedom of the press and information. MESH networks allow to overcome both problems, guaranteeing security and localized management of communication flows, an open source environment freely adaptable to the needs of the communities, and competitive costs compared to large ISPs - with quality of connection equal to FTTH / FTTC connections.
MESH technology with OpenSource protocols is a mesh technology for "peer-to-peer" intelligent networks, which eliminates central control, making the nodes free to communicate with each other. The more nodes make up the network, the greater the reliability and stability of the entire network.

Main advantages of MESH:

- Each node is intelligent and self-configuring
- The system is dynamic & scalar
- As the number of nodes increases, the stability of the network increases
- The system uses the main market standards (IEEE, IETF 802.11 a/b/g/n)
- The system is less expensive than just wired equal solutions.
- Uses ETSI standards free frequencies (unlike WiMax)
- A single broadband technology for everything (video surveillance, Internet, VoIP, services) 100Mbit/s UP/DOWN (sync).
- No Lock-IN effect (being an OpenSource protocol you are not bound to the manufacturer)

Other advantages of MESH networks are:

- the scalability of the networks in the territories
- great versatility of use
- low management costs
- the intrinsic possibility in the infrastructure itself of being able to create public, high-speed intranets, operating regardless of connection to the global Internet
- the control, management and continuous safeguarding of common goods (public spaces, monuments, collective goods, etc.)

Mesh technology is ideal for creating large network infrastructures (Backbones), intelligent and resilient networks, real **Smart Cities** for **Smart Communities**.
First on a neighbouring or local area scale and later at municipal level, Taranto can become the host of an experiment of smart community technologies based on MESH networks progressively developing the network of intelligent and self-configuring nodes, also taking advantage of the existing ones (e.g. trawls for lighting).

Free software: the energy of ideas [348]

But you cannot have free networks and proprietary software. Proprietary software is a factor of economic underdevelopment and cultural lag. It prevents the circulation of ideas and consequently of wealth. Finally, it puts sensitive and personal data at risk. In addition to network neutrality (guaranteed by MESH networks), the issue of free software must be considered in a TRI

[348] *Developed in collaboration with prof. Cono Cantelmi*

community. Today there are open operating and constantly evolving systems (Linux based) able to guarantee a service far superior to the private and also public user (but above all public, because the money spent on Microsoft licenses or other proprietary licenses is money subtracted to kindergartens, assistance to the elderly, schools, hospitals and urban decoration).
We must therefore understand the question of computer programs well because if we make the wrong choice we risk compromising the development of ideas in a certain territory, while with the right choice the ideas will undergo a strong acceleration.
Free Software, An Opportunity for the Free Software Community: the energy of ideas in the sharing economy.
There is a clean, unlimited and inexhaustible energy source: ideas. No "Commons" will ever be more free and diffusive of ideas and no resource will ever be less rival and competitive.
In the information society, ideas are manifested in all their diffusion by not meeting any physical limit and managing to contaminate peoples and people from all over the globe. But what we don't see, what is the necessary tool to allow the virality of ideas is the fundamental element of the whole computer system: the software.
The set of commands and codes written by human hand (source code) manages the operation of the machines (computers, routers, servers etc ...) which make it possible to connect to the network from anywhere on the planet and access an infinite amount of information through the web. Software is the middle element between man and technology and represents the mechanism for controlling the circulation of ideas.
The importance of this tool is such that one would think that it is in the public domain in its constitutive characteristics and operating principles. But no!
The international laws that govern the protection of the software do not allow anyone, outside the software manufacturer, to know how it is written and reserve the right holder a series of faculties on computer code (reproduction, copying, modification, distribution, translation, etc ...).
In brief, only the owner of the software can know what the computer program he has created is doing when someone uses it and no one is allowed (under penalty of severe penalties) to go and put his nose on it: this is proprietary software .
We are surrounded by proprietary software. Every click, every " ***Like*** ", every sharing that we put in place with cheerful ease on our PCs or social networks is made through proprietary software that controls everything we are doing.
Unconsciously, billions of citizens enter billions of sensitive and personal data into proprietary platforms that are managed by software that belongs to a small number of international monopolists, giants of the ITC sector.
The software is the middle tool that is interposed between the physical layer of the system (PC, server, router, cables) and the cultural layer of the common (the web and the infinite possibility of exchanging ideas and information at zero or close to the zero cost). This is why its control is fundamental for the economic interests of the majors in the industry.
The common citizen is a defenceless and unaware victim of the greatest media machination developed ever. He contributes with diligence and cheerfulness to fill these immense containers of information that tempt multinationals so much and does it spontaneously: nobody forces us to use that PC or that social network but we do it!
The citizen, therefore, is seen as a passive / receptive subject of the omnivorous mechanism of marketing and advertising and his/her data are invaluable in providing him with a customized, individualized advertising product. The computer is yours, you trust it, it can't lie to you. Yet….

Have you ever wondered how it is possible that the advertising of the latest generation smartphone appears while you are chatting with your best friend and you are saying him that your mobile phone has broken? A case? A coincidence?
None of these: simple business!
Is there an antidote to the totalitarian control of ideas and information set up by the ICT monopolists?
Free software is the answer.
While proprietary software belongs to a company or its developer, free software belongs to an international community of people who have contributed and contribute to develop it daily.
How does free software come about?
We are in the mid 80's. Bill Gates was about to put Dos and his PCs on the market. Steve Jobs depopulated with the Macintosh and a strange researcher from MIT in Boston, Richard Mattew Stallman, was struggling with one of the first network printers that was used by the entire department of physics at the prestigious institute.
Stallman had been trained in an era in which computer culture was totally based on the full sharing of knowledge. No one would have ever dreamed of hiding anything from other IT developers and these pioneers prided themselves on the freedom with which they shared information with each other. Any form of secret or closure was abhorred and opposed. But times were changing.
The advent of the first personal computers led to the development of new operating systems and allowed the affirmation of some new rampant lords of the code. They pushed for legislation to be imposed which recognized their right to "close" the software and prevent its study, knowledge and modification by anyone else who was not specifically authorised.
But let's go back to Stallman and the fatal printer. The device had the bad habit of constantly jamming, losing the jobs in the print queue that could not be stored by the small memories of the time. Stallman thought it was possible to write two lines of

code that would allow the remote user to know if the printer was available at the time of printing. He proposed to the printer manufacturer to enter this code he had made, free of charge and without compensation. The response was disdainful: a threat of legal action.
Stallman sensed that the thriving proprietary software market would destroy the spirit of open sharing of ideas on which cybernetics had been built first and then computer science. He left MIT and founded the Free Software Foundation (https://www.fsf.org/?set_language=it) to defend and popularize the culture of software freedom as it was from its origins. There are four fundamental factors for a software to be defined free (free as in "free speech" and not in "free beer" often says Stallman frequently quoted by Jeremy Rifkin), these are the four fundamental freedoms:

- Freedom 0: Freedom to run the program for any purpose.
- Freedom 1: Freedom to study the program and modify it.
- Freedom 2: Freedom to redistribute copies of the program to help others.
- Freedom 3: Freedom to improve the program and to publicly distribute the improvements, so that the whole community benefits from it.

In the space of a few years, Stallman developed a legal license that would allow the freedom of the software to be guaranteed against any attempt at appropriation. The GPL General Public License is now in its third version and is in excellent health so much so that it has never been openly faced in any courtroom!
The philosophy of free software is based on the sharing of knowledge and ideas. Anyone can study the program code, copy it, modify it and freely distribute the changes to the world, with the sole obligation to leave free what has been received free without being able to modify the software distribution license.
Free software does not play bad tricks on the user, does not capture its data and secrets, does not make it a consumer but promotes awareness of the use of information technology and technologies in general. No pitfall can ever hide in a free program because hundreds of thousands of people all over the world (many of them out of pure passion but many more for work) take care to check and ensure that the software we are installing is free from malicious code. The peer review system adopted by the Wikipedia free encyclopaedia, based on freedom of access to the code, makes the study of the program accessible to everyone. This possibility is substantially denied in the case of proprietary software which remains in the exclusive availability of the owner only.
In 1991 an epoch-making event occurred for the entire free software community. A young Finnish computer scientist, Linus Torvalds,[349] developed a free operating system based on the GPL license which he called Linux.
The winning weapon of the operating system represented by the penguin has been the extreme ability to involve and compact a community of developers all over the planet that have lent their competence and creativity to put in place what is today a safe, stable and reliable operational system, able to meet the needs of all IT users.
After the community success, the world of the market also began to be interested in free software. There are several companies that have invested in open source platforms (the term open source is basically a synonym for free software but the two concepts are not entirely coincident). An example above all is Canonical's Ubuntu operating system, [350]entirely based on Linux, which represents a business model very different from the proprietary one but is not less effective. In the world of free software, in fact, the commercial subject proposes to the market based on its competence to customize the program or manage the assistance service, without the main asset being fixed on the ownership of the product used.
The advantages of using free software are manifold. First of all, it is a software that respects the user privacy and places it at the centre of the human-machine relationship. It is an aggregative and inclusive phenomenon because it allows anyone to spend their skills at disposal of the community. It is safe as the community itself takes care, with maniacal constancy, of the quality of the released code and this is a guarantee of the absence of bugs or defects in the program that can be exploited by viruses or other malicious programs to damage the system. It's free: getting a copy of a Linux operating system is practically free. It is simple as there are tens of thousands of programs available for free and most are already used by millions of users (Mozilla Firefox or Thunderbird to surf the net or manage mail, OpenOffice to write documents or spreadsheet, etc ...).
The main advantage in choosing free software lies in feeling part of a solidarity, mutuality and collective path of sharing knowledge. Thanks to free software, the tool that mediates between citizens and information becomes neutral and transparent, freeing the user from the control of monopolists.
After all, it's a matter of choices. Choosing the obvious because it is trumpeted by the media and advertising as if it were the only possible solution does not only happen in the IT sector. Choosing how to heat your home, how to power your car, how to buy and what seem forced choices but they are the result of our laziness and spiritual inertia.
It is only up to us to take back control of our lives with minimal and modest choices on an individual level which, however, can transform the future horizon of us and of those who stand by us.

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349 *https://it.wikipedia.org/wiki/Linus_Torvalds*

350 *http://www.ubuntu-it.org/*

Free software is therefore something that goes beyond choosing a PC or an operating system. It is a cultural choice and a philosophy of life that should involve everyone and open horizons of non-competitive growth and virtuous confrontation for all.

The new open schools: Studying at the time of the Sharing economy, the digital economy and the circular economy.

The Sharing Economy Schools aim at training future professionals and are innovative training projects, structured "from below", with a collaborative and free procedure.
An Open Source school has recently been opened in Puglia - Bari[351]. The concept derives from the legendary German school of the Bauhaus of Gropius founded in Weimar in 1919, a public and democratic school, a little artistic workshop and a little artisan workshop where students and teachers studied, lived and worked together, and set the standards for the architecture, art and design of the 20th century. The Bauhaus took up the same concepts from the Roycroft School, founded in the early 1900s in New York by the American writer Elbert Hubbard as a learning community named after the 17th-century British printers Thomas and Samuel Roycroft who around their typography had created a real community of artists, craftsmen, writers, and creative people who anticipated the spirit of modern makers and hackers with their creative sharing of ideas and artefacts thanks to the technological progress that in the 17th century was the printer, and today is the 3Dm printer and free software.
People, ideas and projects are welcomed in an Open Source School to share spaces, knowledge and values, halfway between the Olivetti factory and the Platonic Academy method. This creates an osmosis of experiences and skills that multiplies the value of individuals. The recipients and protagonists of the SOS activities are Makers, Hackers, programmers, computer scientists, artists, digital artisans, children, the elderly and even non-literate people, unemployed, professionals, managers, politicians, activists, administrators and simple curious, who want to share space, time and knowledge, because they understood that education is a social fact.
The school's programs are decided and modified according to the requests that come from below, from users who also become teachers. There are theoretical illustrations and practical workshops. The results and outputs of the school are all disseminated with an Open Source license and therefore available to everyone, in the belief that innovation must always be social, otherwise it is speculation on ignorance
The School in Bari is based, for example, on four pillars: research, teaching, co-living, spinoff.
The topics covered touch the fields of the sharing economy, makers and hackers and that community of digital artisans, makers, artists, designers, programmers, pirates, designers, experts in technology, science, visual arts, robotics, home automation, biology, electronics: dreamers and innovators who work together, experimenting with new models and practices of research, teaching, mentoring and co-living".

The circular economy course in the Lazio Region

Training experiences in TRI professions are multiplying in Italy. For example, the Lazio Region recently announced for 2017 a school of Circular Economy which should be structured according to the following modules: I module: The circular economy as an opportunity for development and competitiveness		**n. of hours**
1.1)	The concept of circularity The organic cycle The ways of closing the cycles The three Rs (reduction - reuse - recycling)	4
1.2)	Relationship between circular economy and sustainability The Club of Rome: from the basic scenario to the different scenarios to face global changes	4
1.3)	The transition from possession to use Redesign of products From cradle to cradle Critical raw materials Industrial symbiosis	4
		12

Objective
Skills to be acquired:
To acquire skills for
Teaching materials
Audiovisual materials, lecture notes and slides for classroom teaching.

351 *http://ischool.startupitalia.eu/education/56263-20160719-al-via-bari-la-scuola-open-source*

Self-assessment questionnaires and classroom games will be used as well as case studies that will accompany the topics covered

Methodologies and equipment:

The module will apply an experiential methodology that will alternate theoretical moments with practical and dynamic group exercises. Each activity will be followed by a debriefing during which the teacher will provide further insights on the topics covered

Video projector, flipchart

Assessment method

Module III LCA (Life Cycle Assessment) and Environmental Product Declaration (EDP)		
3.1)	The international, European and national regulatory framework The fundamental principles of the Integrated Products Policy Origins and regulatory standards of LCA The standards of the ISO 14040 and ISO 14020 series Life Cycle Inventory Analysis Life Cycle Impact Assessment Life Cycle Interpretation.	15
3.2)	Evaluations on the results of LCA Analysis and validation of the results Logistic and organisational implications Development of sensitivity analysis	5
		20
Module IV: The tools for the implementation of LCA		
4.1)	Interactivity in the application of LCA Criticality in the definition of system boundaries Choice of the degree of detail and schematisation of the system The temporal and geographical boundaries as a function of the comparison of the results obtained Problems in the classification of residual materials	10
4.2)	Inventory data quality (reading database information) Methods of data collection - Choice of reference sources and significance of the data - ELCD database	6
		16
Module V - The expert in LCA / EPD		
5.1)	The expert in LCA / EPD within companies and/or as external consultant The main functions performed and the objectives assigned The environmental product declaration on the international market Effects on the organisation of the company, on the training, health and safety of workers	4
5.2)	Use of databases and main software for LCA analysis Inventory data quality (reading database information) Data collecting methods Choice of reference sources and significance of data ELCD database The Italian network and the Life Cycle Data Network	4

Hypothesis of an open school for the sharing economy and the third industrial revolution in Taranto

One step further could be done in Taranto by launching an Open School of the Sharing economy that aims at remunerating both the tutors and the students in complementary currency that can be spent in the circuits of Taranto New Economy (Banks of Reuse and circular economy, GAS and Farmhouses, Banks of the time and related personal services).

Taranto Open School would thus become a tool to create human and professional skills for the economy of the Third Industrial Revolution. The remuneration in parallel currency would allow to provide students with an additional motivation in view of the creation of a suitable number of jobs in the various sectors (circular economy, digital manufacturing etc). Waiting to enter this production circuit, the Open Source School could grant its students not yet entered a job a sort of citizenship income in Complementary Currency, which could become an additional remuneration for those having a job not fully covered by direct business revenue. In fact, the new activities of the Third Industrial Revolution economy do not always have the initial resources sufficient to hire the necessary workers, and on the other hand, without these resources, they are unable to start. Partial or temporary remuneration through Complementary Money could offer a solution to this problem and push towards an adequate critical mass of TRI economic activities in Taranto too.

This study aims at creating a labour-intensive and low-capital-intensive Third Industrial Revolution economy in Taranto as already envisaged in the various TRI Master Plans created under the guidance of Jeremy Rifkin. It is about creating work in sectors for which the relevant professional figures do not exist yet. In this sense it is useful to imagine the structure of the School of Sharing Economy tailored to the needs of the territory of Taranto and the Ionian province. In general, courses should be structured along the following lines:

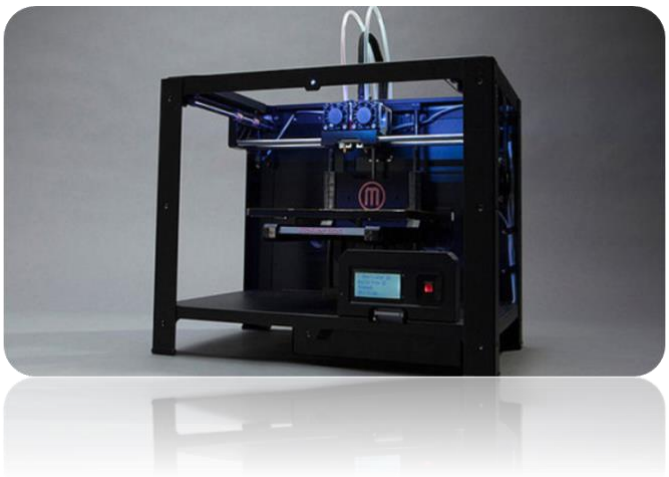
Digital company and new materials

- Smart grid energy community and hydrogen technologies
- Advanced sustainable electric/hydrogen mobility from renewable sources
- Enhancement of local agricultural resources with transformation projects with high added value

- Circular economy, circuits of reuse, repair and short chain recycling

Sustainable tourism and innovative enhancement of local natural and historical resources.
Once trained, the young people of the Sharing Economy School will be taught to carry out projects in the area prepared by the Taranto TRI.0 OBSERVATORY, and financed by funds available at local, regional and European level. These projects are inspired by experiences already underway that can be adopted as blocks on which to build the economy of Taranto in the future. Experimental start-ups could be imagined in Taranto with the collaboration of already sensitized private companies (see SERVECO) Here are the sectors in which the experiences of economics of TRI sharing are being recorded.

Digital economy and 3d printing



Starting with an analysis of the impact of the dominant economic model on business performance and on the development of territories, we will try to better understand how businesses and territories can get rid of the determining factors of the current model, and take possession of resources of the economy of the service, on which the model of the economy of functionality and cooperation is based, and therefore fit into a logic of sustainable development.
For socio-economic actors, there is no question that the current economic model no longer responds to the challenges of sustainable development. This is demonstrated by the warning signs launched at the environmental level by the scientific community which emphasizes the limited availability of natural resources.
It also shows itself incapable of responding to a series of social challenges including breathing clean air, offering healthy and balanced nutrition for all, having equal access to educational and cultural resources.
The regular increase in healthcare costs related to difficult working conditions is based on the economic tensions experienced by businesses. In this context, we are witnessing the emergence of new models, such as the circular economy, the collaborative economy, the rental model, and the economy of functionality and cooperation, which attempt to provide answers to the limits of the current model. Among these models, we intend to focus on the economy of functionality and cooperation, trying to better understand how such a model takes into account, in an integrated way, the challenges of sustainable development.
In breach with the dominant model, it will be up to the company, whatever its structure, to rethink its offer of products and services, taking into consideration the uses and useful effects of the services expected by the beneficiary.
The solutions take on configurations that favour the convergence of interests between businesses and families, entities and territories. The solutions are contracted on the basis of mutual commitments oriented towards the performance of use of the goods and towards the useful effects expected from the services.
New perimeters of action are configured through functional spheres: that is, spheres of activity that determine the sectors of activity and that allow to develop solutions in the field of housing, health / wellness, food, knowledge, mobility of goods and people. In order to be trained, the offer of solutions generally brings together actors from different supply chains, involved in cooperation processes that allow them to take charge and therefore reduce negative externalities at an environmental and social level.
Another feature of the economy of functionality is the scissor effect. In the service economy, the use of material resources decreases while the use of intangible resources increases.
The economy of functionality and cooperation is based on two axioms, the first consists for the company, in moving from the sale of a good or service to the agreement on a performance of use based on the integration of goods and services while the second consists in achieving integrated solutions of goods and services that contribute to respond to the challenges of sustainable territorial development in relation to housing, mobility, nutrition, health and knowledge.
Innovation, the continuous improvement of technologies is therefore a constant in the modern world. Every innovation cannot be separated from the presence of creative people.

3D printing is the evolution of traditional printing and owes its origins to the engineer Charles Chuck Hull. It is defined as one of the greatest innovations in the manufacturing sector since the industrial revolution that will change, and is already changing, the way of thinking about factories and making them work. [352]
Using a 3d printer it is possible to print real objects, faithfully recreating any three-dimensional model and using many different materials (such as alumide, silver, glazed ceramic, painted resin,) which, layer by layer, are applied to give the desired shape. Generally 3D printers are fast, user friendly and extremely reliable. In fact, they allow the malleability of various materials to create multiple mechanical and physical functionalities in order to best adapt them to the use that you want to make of them.
By greatly simplifying an analysis that would certainly deserve a greater level of detail, the technologies related to additive printing are essentially of two types.
The first, more commonly known as sintering, involves the solidification of powders through exposure to a laser beam that moves in 3 dimensions. It is a technology developed in the early eighties and widespread in the world of rapid prototyping and design. The major developments in this area relate to the type of powders that can be used, with a strong acceleration in terms of metal powders, and the time required for the construction of complex parts. The most evident result is the production of standard titanium parts for the production of aircraft engines.
The second one, more widespread in consumer machines, is based on filaments which are heated and melted through a nozzle and deposited on a flat surface. Three-dimensionality is obtained through a movement of the nozzle in depth, width and height.[353]

The digital businesses of the future

It is universally recognized that steel is in crisis because the new materials created by research have replaced steel products over the years, and especially carbon fibre (but not only) have replaced steel in the construction of aerial, land and naval vehicles, household appliances, construction and so on. This demonstrates the importance of the research sector to create valid alternatives to the heavy industrial model.
Probably without the American and Japanese laboratories, steel would still be a strategic material for our economy, while today, thanks to research, steel has been replaced almost everywhere and remains central only in the construction of large gas and oil pipelines (which on the other hand are no longer strategic in the new solar energy model of TRI).
The digital economy therefore becomes the key to relaunch well-being and employment in the area. Together with that of new materials, the sharing economy and the circular economy, it can create synergies that produce interesting multiplier effects on the territory both in terms of employment intensity and of creation of distributed wealth.
These are new materials, new products and new services which presuppose the emergence of a new collaborative and sharing society and are characterised by high labour intensity with low marginal costs. This means that in order to reach a scenario of full employment in these sectors, "human skills" are needed, which are not the capital intensity that characterised the heavy industry of the end of the last century. That is, local economies of scale are created instead of international financial surplus value. This type of company, very similar to the Benefit Corporation mentioned by Rifkin, can feed on the orders generated on the local market and generate enough turnover to justify the wages of the jobs necessary for the production of the aforementioned goods and services, even if probably not enough to meet the profit standards of a steel, service, energy or automotive multinational company.
By working at more moderate profit standards, i.e. those of benefit corporations and social market enterprises, it is possible to redistribute the wealth generated in the local market in the form of wages (higher wages and increased wages).
Not a small trend reversal compared to the current situation in which instead the wealth generated by the local market takes the path of abroad and tax havens because the multinationals with offices abroad and often off shore produce and distribute the goods that have the greatest demand on the market.
Furniture produced in China or Thailand and sold by the multinational Ikea produces almost no wealth on the territory. Indian potatoes or Argentine lemons sold by Auchan leave on the territory an infinitesimal fraction of the costs they generate.
Instead products such as (by way of example) the didactic models by Horizon Fuel mentioned above, or the battery packs for smart phones and tablets, or furniture produced with compressed pet, or carbon fibre containers, or in a different sector of Oculus Rift -type viewers to enrich the sensorial experience in visiting a historical or archaeological site (of which Taranto is unashamedly rich), are products with high added value that can be produced locally and locally sold.
And new products that find a strong domestic market, are in pole position to conquer the world, therefore investing in this type of innovative start-up means investing in new production and commercial models capable of conquering the world (not only theoretically: let's take the example of the Nokia small telephone company in the suburbs of Helsinki which has become one of the world leaders in mobile telephony).
Thirty years ago mobile telephony would have been considered science fiction, smart phones pure madness and the internet of things Star Trek stuff. Today they are reality and in some cases already archaeology. For the development of the digital Taranto

[352] *Source: http://nova.ilsole24ore.com/progetti/alle-origini-della-stampa-3d/?refresh_ce=1*
[353] *http://docplayer.it/2643895-Stampa-3d-una-rivoluzione-che-cambiera-il-mondo.html*

of the TRI future, it is all about imagining which products and services will be the Nokia of the future, and possibly to play in advance.

The sustainable mobility industrial chain

The University of Hydrogen, with its H2M project, represents an example of how we can play ahead of the evolution of sustainable mobility.
In the era of ILVA, having a production site capable of producing vehicles for the movement of things and people, presupposed political and economic relations of the highest level capable of creating the economic conditions for the relocation of manufacturing companies to large plants in the south (almost all went into crisis once the incentive systems were finished, see Melfi, Termini Imerese, Pomigliano d'Arco).
With the new digital technologies, and the advent on the market of electric and hydrogen cars, it is possible to get out of this vicious circle (Large industrial plants - dispossession of the territory by large economic and financial groups), and it is possible to enter a virtuous circle in which small and medium-sized local businesses can produce the same products (indeed far better products) because they are cleaner, cheaper and more efficient, such as electric cars or hydrogen vehicles) at extremely lower marginal costs and therefore at more competitive prices. For example, the Texan electric car factory Local Motors,
produced an entirely 3D printed model (designed by the Turin engineer Michele Anoè), which would never have been possible according to the industrial standards of the second industrial revolution and the very heavy petrol engine cars[354]. As the University of Hydrogen has been stating for some time, new technologies can bring into play and give substantial market shares to small and medium-sized enterprises that had been excluded from the "heavy" markets of the second industrial revolution. As the case of Local Motors just cited shows clearly, the digital vehicles of the Third Industrial Revolution can be produced by innovative SMEs which are not necessarily linked to large industrial groups.
This means that with relatively low investments it is possible to start in Puglia, with the technical assistance of the H2U Hydrogen University, [355] an eco-friendly supply chain to develop first of all a local market, and eventually, gain national and international leadership.

The new industrial recycling materials

In addition to the automotive industry, other sectors are affected by this phenomenon of lowering the threshold for access to local and international markets. An interesting sample of this type of products and services is provided by a national research centre located a few kilometres from Taranto: CETMA [356]
With this chapter we focus on identifying the economic and employment potential of this type of business of the future with new materials and new types of construction of products of various kinds and entities.
One of the 5 best projects of the 2008, 2009, 2010 calls is the "Numix" project which aims at the diffusion at European level of construction products obtained from the by-product of plastic waste selection (both from urban and industrial separate collection). The products are:
1. Expanded granules to be used as an aggregate for structural and non-structural cements in place of expanded clay;
2. Densified flakes to be used as an aggregate for mortar and / or as a raw material for expanded granules.
Another important project bears the name of PROWASTE and is part of the plastic waste recycling sector which has seen a strong increase in recent years. On the other hand, while the recycling of "pure" plastics consisting of only one type of material is well established, there are still substantial problems for the recycling of mixed plastics which inevitably turns into low recycling rates.

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354 *https://localmotors.com/3d-printed-car/*
355 *www.unihydrogen.eu*
356 *CETMA is a Research and Technology organisation founded in 1994 by ENEA at the Brindisi Research Citadel, with the aim of strengthening the innovation system in the South. It has over 90 employees among researchers, technologists, designers & innovation managers with skills in materials engineering, computer engineering and industrial design.*

At the same time, the use of heterogeneous plastics for films or components is becoming increasingly popular due to the best properties of this type of plastics during their useful life. This leads to the presence of ever greater quantities of mixed plastics in the waste flows.
Currently, most post-consumer mixed plastics are destined for landfills or incineration despite the waste hierarchy established by the Waste Framework Directive 2008/98 / EC.
Only a small percentage is mechanically recycled to produce profiles (called plastic lumber or profiles with high thickness, at least 20 mm, made 100% with recycled plastic) which are subsequently assembled to create urban and / or outdoor furniture (benches, tables, chairs, gazebos, fences, floors etc.). The low level of compatibility between the different polymers present in mixed plastic materials, together with the contamination from non-polymeric materials (especially paper) results in poor mechanical properties, and often in the need to use oversized profiles to obtain sufficient rigidity, heavy products are obtained and not particularly attractive.
Various approaches are currently used to increase the stiffness and resistance to creep of plastic lumbers, for example by adding talc, calcium carbonate or wood fibres, or by inserting iron bars. However, all these systems tend to further increase the weight of the product and adversely affect the processability of plastic.
The PROWASTE project tested the industrial application of a process innovation consisting in the introduction of glass fibre reinforcement bars in the plastic matrix during the moulding of heterogeneous plastic profiles. The parameters of the production process and the equipment necessary for the loading of pultruded products were defined during the industrialisation activities conducted by the project partners.
The result is a significant improvement in the flexural strength and creep behaviour of plastic lumbers. [357]
The ECOPLASBRICK prospect aims at creating an innovative and environmentally friendly building panel, using raw material plastic waste deriving from the sorting of solid urban, industrial, agricultural, commercial waste, and the development of a European market for the product made, initially focusing on the sub-sectors of raised floors and external cladding.
Below are listed and described (codes from 1 to 6) the most common polymers in the world of packaging. The codes used [358] are those used to identify the material for recycling purposes. Code 7 refers generically to all other types of plastics. All plastic packaging, regardless of the polymer and the coding, are always available in the separate collection.

Polyethylene terephthalate

(pete or pet - recycling code: 1)
Polyethylene terephthalate belongs to the family of polyesters. It is a thermoplastic resin that belongs to the family of polyesters, and for its characteristics of transparency, resistance and gas barrier, it is particularly suitable for the production of carbonated drinks bottles and trays.
Among the main applications:

- bottles
- films
- pipes
- trays and blisters
- containers and packaging
- labels

High density polyethylene

(hdpe - recycling code: 2)
Polyethylene (PE) is the simplest among synthetic polymers and is the most common among plastics.
It is a thermoplastic resin, obtained from the polymerization of ethylene. It is distinguished in high density (PE-HD) and low density (PE-LD) polyethylene, which has been assigned the recycling code 4. High density polyethylene is made up of linear chains, which confer greater strength and rigidity, making it therefore particularly suitable for the production of cans and rigid containers.
Most common applications are:
bottles for containing detergents or food;
toys;
plastic caps;
pipes for the transport of water and natural gas

[357] *Source: http://pdc.minambiente.it/progetti/prowaste-uso-efficiente-di-plastica-riciclata-attraverso-innovazione-di-processo-e-design*
[358] *established as SPI - Society of Plastic Industry international standard*

Polyvinyl chloride

(pvc - recycling code: 3)
Polyvinyl chloride is the polymer obtained from the polymerization of vinyl chloride and is a thermoplastic.
Most relevant applications are:

- building pipes (e.g. gutters and drinking water pipes)
- window frames
- vinyl floors
- rigid and plasticised film for packaging
- phonographic records

Low density polyethylene

(ldpe - recycling code: 4)
Low density polyethylene (also a thermoplastic) belongs to the family of polyethylene, i.e. polymers obtained from the polymerization of ethylene, and stands out because the polymer chains are not linear as in high density polyethylene (PE-HD, recycling code 2), but have ramifications, which make it a lighter, more flexible material.
It is mainly used in the production of flexible products such as films (from which bags and envelopes also derive), used both for packaging and, for example, in agriculture.

Polypropylene

(pp - recycling code: 5)
Polypropylene is a thermoplastic material that has found its widest applications in the isotactic form. Many commonly used plastic objects are made of polypropylene, starting with household items and toys, but also many rigid packaging (cans, bottles) and flexible packaging (film for automatic packaging).

Polystyrene or Styrofoam

(ps - recycling code: 6)
Polystyrene is the (thermoplastic) polymer of styrene. The expanded polystyrene (EPS) is obtained by immersing the polystyrene granule in water and adding pentane.
A large number of products are made with polystyrene: from disposable tableware to packaging.
The expanded version is present in the production of packaging and lightening, insulating, sound-absorbing products for the building industry.

Other plastics

(Recycling code: 7)
This category includes all the other polymers, for which a specific code has not been provided, or their combinations (for example a tray made up of an external layer of PET and an internal one of PE-LD). Examples of polymers used to produce packaging for which a specific recycling code has not been defined are: Polymethylmethacrylate (PMMA), Polycarbonate (PC), Polylactic acid (PLA).
The MAC Project foresees activities for the contribution for the closure of the supply chain of recycled carbon fibres obtained by pyrolysis.
World consumption of carbon fibres (FdC) is growing at constant rates, thanks to their excellent mechanical characteristics which make them an ideal raw material for producing structural parts characterised by extreme lightness, high elastic modulus and a very high ratio between the mechanical properties and their mass. Weight savings of around 40% compared to traditional metal materials, even very light, and a reduction rate of CO2 emitted during the production process which can be calculated around 20% has soon convinced anyone on the energy efficiency of these materials.
The FdC have now become part of every innovative project, from the automotive to the aerospace sector, from the motorcycle to the article for extreme sports.
The new Boeing 787 and the Airbus A350 are made of composite materials based on FdC (CFRP - Carbon Fibre Reinforced Parts) for at least 50% of their final weight, and modern military aircraft show a similar trend.
The main operators in the automotive sector, BMW is a striking example, have invested huge human and financial resources to develop completely new car projects based on these materials, reaching the point of integrating the production of FdC within their industrial organisation.

Global FdC consumption, estimated at 35,000 t in 2008, will double by this year, with an annual growth rate of 12%. Production capacity is adapting to demand, with ample room for growth.[359]
The growing use of FdC has increased the quantity of industrial waste. The most common sources of these wastes are found in the virgin fibre production lines, in the production departments of composite materials (in the pre-forming phase, in the impregnation phase and in the trimming phase) and in the storage areas of pieces that have reached the end of the their useful use.
Hundreds of tons of these products are sent to authorised landfills every year, thus wasting both their significant original cost and the cost of disposal (fig. 2).
Just to quantify some of the most eye-catching examples, we recall that for about three years now the first airplanes built with composite materials have begun to be dismantled: in the next thirty years it will be the turn of the most modern aircraft, those built largely using FdC.
From 2008 to 2025 approximately 8,500 large airplanes will be dismantled, each containing at least 20 t of FdC. In the same period, the problem of waste resulting from the wind generator industry will arise. And the automotive sector, in the United Kingdom alone, sends over 100 T per year of production waste and "end-of-life" products based on FOC to landfills.
These wastes are counted in the industrial cost and passed on to the final consumer and, in the case of military vehicles, to the taxpayer.
Most CFRP waste in the USA is sent to landfills or incinerators. The carcasses of large planes are parked forever in large "cemeteries" in the desert, or dismantled and buried. Although the latter method represents the cheapest alternative, since 2004 most of the member states of the European Union have passed laws prohibiting the landfilling of composite materials.
As regards recycling in the building sector, it should be noted that 45 million tonnes of inert waste are produced in Italy every year, that is, the scraps and remnants of construction materials or materials deriving from demolitions, constructions and excavations. Although it is (after analysis) of little or no polluting waste, and despite the fact that there are technologies that allow these materials to be recycled to return them to the construction process as aggregates (instead of gravel or earth), in Italy only 10% of construction waste is recycled, compared to 90% in the Netherlands, 87% in Belgium, 86% in Germany. In Italy there is only one virtuous region, Veneto, but almost all the others have data slightly above zero, or in any case less than 10%. Yet we need to hurry, because the European directive 2008/98/EC requires that the level of recycling of construction waste in all member countries reaches at least 70% by 2020. [360]
The report gives an interesting review of "virtuous" contracts, ie cases where a high use of recycled aggregates has been requested by the contracting bodies or proposed by the companies. From construction, but also in some cases recycling of tires used to produce "recycled bitumen".
The Legambiente Recycle Report claims that Italy has the opportunity to open a new page in the construction sector. Reducing the removal of materials and the impact of quarries on the landscape is an important issue in our country, because there are many serious wounds still open in the territories. Today it is possible to answer these problems, as demonstrated by the many countries where the quantity of extracted materials has been decreasing for years with a strong push to reuse aggregate and inert waste from recovery, as well as with landscape protection rules and activity management.
In Italy today there are about 2,500 inert quarries and at least 15,000 are abandoned, of which more than half are former sand and gravel quarries. Changing this situation by opening up a green economy strand that produces research, innovation and jobs is in the interest of the business system and of the environment.
By reaching 70% of recycling, as required by the directive, more than 23 million tons of materials would be generated which would make it possible to close at least 100 sand and gravel quarries for a year. [361]
The Macese project and the Sun-Con project deserve particular attention in this sense.
The first one involves the production of cement-based conglomerate products with recycled aggregates, innovative eco-sustainable mortars with outstanding heat-insulating properties, multifunctional paints (shielding, self-cleaning and photo catalytic) with optimized spectral response, blocks for innovative walls of lightweight concrete.
The second involves the production of products such as:

- cement conglomerates with recycled aggregates and traditional binder (Portland cement)
- cement conglomerates with recycled aggregates and recycled geo-polymer binder

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359 *http://www.compositimagazine.it/riutilizzo-di-fibre-di-carbonio-riciclate/*

360 *Source: http://www.ediliziaeterritorio.ilsole24ore.com/art/ambiente-e-trasporti/2015-11-03/riciclo-materiali-demolizione-italia-solo-10percento-ma-2020-bisogna-arrivare-70-201023.php?uuid=ACDdLsSB&refresh_ce=1*

361 *Legambiente, however, denounces the government's inertia in stimulating the implementation of Directive 2008/98/EC, although implemented by Legislative Decree 205/2010 but not followed by implementing decrees and stimulus actions to facilitate their application. Already Ministerial Decree 203/2003 envisaged covering 30% of the need for manufactured goods and goods through recycled materials, but Legambiente denounces how this almost never happens.*

Mso, the best practice of Crispiano

The MSO project is certainly one of the best practices to focus on for the restart of the territory and the province of Taranto. [362]

Make Sustainable Organization is a non-profit organization born and operating in Crispiano in the province of Taranto. MSO is an organization that has articulated a system that allows everyone to work collaboratively, has the goal of reducing CO_2 and promotes the circular economy.

One of the organization's priorities lies in creating a social enterprise capable of self-regulation and providing for common needs in a collaborative way in order to contribute to making the territory, and in broader terms the planet, increasingly sustainable.

MSO designs and manufactures tools for the Third Industrial Revolution in a collaborative way and therefore through associations.

As a first guideline, the organisation from Taranto has designed a "simplified" 3D printer to make it affordable for everyone, including all the features necessary to make the virtuous system of "Collaborative Production" possible.[363]

The collaborative economy is a flexible phenomenon that rests its construction on five fundamental pillars:

Collaborative consumption: refers to innovative platforms and realities that are gradually reworking the traditional concepts and practices of sharing, bartering , trading, renting, gifting and swapping in a peer-to-peer mode. These practices and concepts are reinvented and extended through network technologies in ways and times never made possible before. They range from huge markets like eBay and Craigslist, to peer-to-peer travel models like Airbnb, to services like Zipcar car sharing, to countless cases of food swaps, home swaps and so on. [364]

Collaborative production: These are practices in which a group of people collaborate to produce and innovate together. The most common examples are open-manufacturing and open-design. These are complementary movements that are trying to apply the principles of openness and widespread collaboration among individuals in the development of prototypes and the manufacture of material goods. The key players are the so-called Fabrication Laboratories (FabLabs), open laboratories, equipped with machinery and technological tools (such as 3D printers), born with the aspiration of allowing users to self-manufacture anything and stimulate widespread innovation. FabLabs can be used for commercial purposes, but whatever is produced within them is made available to the community of reference to improve the inclusive and collaborative process. Furthermore, in general terms, co-working and meeting places of several subjects who share skills, time and resources for work and production purposes can also be included in the definition.

Collaborative learning: They are knowledge sharing practices such as courses, conferences and scientific or educational content freely produced, shared and made available to anyone. Some examples are: Wikipedia, whose contributors are ordinary people who use a web platform to nurture collective, horizontal and accessible knowledge; MOOCs, open online courses, designed for distance learning that involves a large number of users, facilitate contact and simultaneous access to the content made available.

Collaborative finance: These are new financial instruments and alternative currencies in which the peer-to-peer dimension allows people to choose who to allocate a loan to, unlike what happens in a traditional financial institution. The types of collaborative finance range from crowd funding to crowd-sourced equity, from peer-to-peer lending to mini-bonds linked to SMEs and payments in alternative currency. As for consumption, collaborative finance is characterised by the coordination of demand (people or companies that need finance) and supply (people willing to offer resources) operated by digital platforms.

Collaborative governance: These are new horizontal and participatory governance mechanisms, at urban level or within companies. As far as urban centres are concerned, we mean the production of new and stronger relationships between citizens, public administration, private individuals and the third sector. Some examples are the processes of regulating common goods, involving citizens in defining new needs in order to find new tools to satisfy them.

The debate on Sharing or Collaborative Economy can be partially traced back to the more composite theme of social innovation, generally defined as the set of new practices and models that respond to social challenges by innovating relationships and forms of collaboration.

The Make Sustainable Organization of Crispiano places the 3D Printer as a key to Sustainable Making [365] resting the entire structure on foundational axioms such as:

DISTRIBUTED WORK: Contributing to the diffusion of the "printer" through the "printing" of its components. MSO has designed and built a "self-replicating" type printer, to allow anyone to contribute to its diffusion. It is a job to all intents and purposes that MSO promotes through the recognition of credits in favour of its members.

SUSTAINABLE MAKING: MSO REVIEWS the concept of waste by promoting it as a "raw material". From the recycling of plastic materials to polylactic acid (PLA) - obtained from vegetable fibres - ideas take shape, thanks to 3D printing. The

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[362] *Make Sustainable Organization*

[363] *Source: http://www.fondazioneunipolis.org/wp-content/uploads/2015/12/Ricerca-Economia-collaborativa-e-Cooperazione.pdf*

[364] *By virtue of this phenomenon, the collaborative economy is often identified with collaborative consumption alone.*

[365] *Source: http://www.socialprinter3d.com/frontend/*

MSO Association believes in the sustainable integration of the human being with the ecosystem in which he/she lives and in the concrete possibility to reduce CO2 emissions, which is why we promote the diffusion of this wonderful technology.
TECHNOLOGICAL INTUITION: the most ingenious idea can benefit from the power of "sharing" THROUGH a "community" of "makers" who think, innovate, improve their ideas in a shared context that increases the possibility of a project's success.
For this reason MSO has thought of a production promotion system distributed through a network of associates who communicate with each other and through their respective interconnected 3d printers.
USEFUL OBJECTS: it gives the possibility to anyone to free their imagination and ingenuity, going from an abstract idea to its concrete realisation. 3D printing has in itself this wonderful concept that can be easily achieved even independently, freeing itself from the constraints of production that have always been relegated to the industrial sector alone.
The widespread use of the 3D printer will allow to lower the CO_2 impact in the short term future, especially of the transport system, with increasing savings for families and exponential technological insights. Leaving commercial logic behind, diffusion is possible only if society becomes a social factory based on simple rules.
The association (MSO) provides annual membership fees that will allow to pay the participation of members in the productive activity of the social enterprise, intended as a real research and development centre, as well as the production of the same printers, in order to spread their technology.
The fundamental role of the platforms is to enable the exchanges that take place among users. But what makes a Sharing Economy platform or company more used than another? One of the answers lies in the company's ability to create a large community, characterised by strong bonds of mutual trust among users. Again, the community does not need to be online but it can also be physical, let's think of social streets. However, communities are increasingly enabled or strengthened by digital tools such as the internet and social networks. The company or promoter therefore has a fundamental role in activating and maintaining the community: its function is no longer to provide services or products from top to bottom, but to act as an enabler, not only by putting in contact buyers and sellers[366], but also by becoming a vehicle of reputation, trust and belonging.
The size and relevance of the community in this context opens up a series of questions about how these communities are managed and who actually controls these networks by holding the information. A critical issue is that of the "centralisation" of the networks, with the risk of creating real monopolies. This is countered by the risk of excessive "fragmentation", which can lead to the creation of numerous platforms with very low user volumes.367
The projects started and already perfectly structured by the MSO are the SOCIAL 3D PRINTER, THE RETROFIT, and the ELECTRIC GENERATOR WITH MICROTURBINE (which we briefly illustrate below) as well as the MANIFOLD and COUPLING FOR PVC PIPES.

SOCIAL 3D PRINTER

Social 3d printer is a printer that can be assembled very simply with a few screws, magnetic joints, insertions and high precision fits. The remarkable precision printing is able to reproduce fine details associated with robustness and structural solidity which translates into reliability and great print quality.
The social 3d printer was conceived to replicate its own elements in order to make each printer a clone of the previous one available for a new member.

MICROCAR RETROFIT KIT E-BIKE RETROFIT

The term retrofit means adding new technologies / functionality to an old system (car, building, etc.), so as to prolong their life. [368] For example, in the case of a car, we speak of retrofit if a catalyst is added to an internal combustion engine, or electric windows, if the central locking is installed or a petrol vehicle is converted into an electric one. [369]
The MSO kit is low cost for micro cars under 700 kg and 36 and 50kW peak power, dual engine, regenerative braking and vector driving. [370]

ROOF MICROTURBINE

There are many solutions to bring renewables into the home, installing wind turbines on the roof is one of them. Photovoltaic is not the only solution for the roofs of homes and offices, a sector that is tentatively expanding also in Italy is that of micro wind turbines. The mini and micro wind turbines allow to produce energy from the wind in small spaces comparable to those of the balcony of the house.
The wind turbines to be installed on domestic roofs, with their small size, allow easy application without sacrificing efficiency. This type of wind turbines is silent and capable of producing electricity even when the wind does not blow strongly.[371]

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366 *Peer-to-peer model*
367 *Source: http://www.fondazioneunipolis.org/wp-content/uploads/2015/12/Ricerca-Economia-collaborativa-e-Cooperazione.pdf- page 20*
368 *From 11 January 2016, the day of publication of decree 219 of the Ministry of Infrastructure and Transport in the Official Journal, this is possible. This decree is inherent to the "electrical requalification" of vehicles.*
369 *Source: http://motori.virgilio.it/auto/auto-news/retrofit-cose-come-funziona-e-quanto-costa/75310/*
370 *Source: http://www.socialprinter3d.com/frontend/*
371 *Source: http://www.ideegreen.it/turbine-eoliche-per-tetti-21853.html*

C) Tourism and agriculture of the third industrial revolution

The economic importance of tourism

We often hear that "tourism is the real oil of Italy". But beyond the metaphor is it really so? What are the numbers of this very important sector for the Italian economy? What are its effects on employment? With this article we want to give a concrete contribution to a fact-based understanding of the importance of the tourism sector in the national economy.

Economic accounting of tourism

The direct contribution of the "Travel and Tourism" sector to GDP was 66 billion Euros in 2014 (4.1% of total GDP) and growth of 1.8% is expected in 2015. To the direct impact we have to add the indirect and induced impact estimated respectively at 63 and 34 billion Euros which bring the contribution to GDP to 162.4 billion Euros (10.1% of GDP), for 2015 an increase of 1.7% is estimated. The overall contribution of the Travel and Tourism sector is more than double compared to the chemical and agricultural sectors (4.6% and 4.2% respectively).

Italy ranks seventh for the tourism sector's direct contribution to GDP in value, out of 184 countries, above the European and world average; to name a few countries Germany is at the third place, France fifth, Great Britain sixth, Spain ninth, Greece at twenty-eighth and Turkey at thirteenth. If the direct contribution is related to GDP, our country stands at 73rd position ahead of countries such as Germany, France and Great Britain.

Spending in a sector can have different impacts on GDP which depend on the added value of the sector and on the connections with the rest of the economy. In Italy, 1.4 million GDP is generated for an expenditure of one million euro in "Travel and Tourism". This impact is the most significant when compared with most production sectors, with the exception of Education (Agriculture, Mining and Chemical sector, Communication generate less than 1 million two hundred thousand Euros of GDP).

In 2014 there are more than one million direct employees in tourism, approximately 5% of total employment, including also those indirectly involved in the tourism industry, reaching 2 million and 553 thousand employed or 11.4% of the total (with growth forecast for 2015 of 1.4%).

Italy ranks 16th in the World Travel & Tourism Council ranking [372] by number of direct employees, and 61st in terms of total internal employment, ahead of France but behind Germany, Spain and Great Britain.

Tourism spending for Italian and foreign leisure, , generated 81.9% of national tourism spending in 2014, equal to 99.6 million euro compared to 18.1 for business travel expenses, for both an increase of 1.4% and 1.1% is estimated for 2015.

Ranking by direct contribution of Tourism to GDP and Employment

% GDP contribution			% Employment contribution		
36	Greece	7	24	Greece	9,4
43	Portugal	6	31	Portugal	7,4
47	Egypt	5,9	37	Germany	6,7
49	Spain	5,6	47	Great Britain	5,7
63	Turkey	4,7	54	Egypt	5,2
73	Italy	4,1	58	Spain	5
81	Germany	3,8	61	Italy	4,8
84	France	3,6	78	France	4,1
93	Great Britain	3,5		World Average	3,6
	Europe Average	3,4		Europe Average	3,6
	World Average	3,1	108	Switzerland	3
143	Switzerland	2,1	139	Turkey	2,2

Source: World Travel & Tourism Council

The economic contribution of Travels and Tourism

Nominal values	2013	2014	2015*
Foreign tourist consumption	33,4	34,8	36
National tourism consumption (includes government expenditure **)	86,1	86,8	88,4
Total tourist consumption	119,5	121,6	124,4
Supply purchases, including imported goods	-54,7	-55,6	-56,5
Direct contribution * to the GDP from the Travel and Tourism sector**	64,8	66	67,9
Domestic supply	47,7	48,5	49,7
Capital investment	8,2	9,2	9,3

372 *World Travel & Tourism Council – Country Reports*

Public expenditure ****	9,8	9,8	9,8
Indirect goods imports	-4,1	-4,5	-4,6
Induced expenditure	33	33,8	35
Total contribution * to the GDP from the Travel and Tourism sector**	159,3	162,7	166,9
Direct employees (000)	1.061,7	1.082,0	1.100,1
Total contribution * to employment from the Travel and Tourism sector (000)**	2.507,7	2.553,0	2.588,5
Other expenses	24,1	25,3	26,3

Note: (*) estimates; (**) public expenditure directly linked to tourist services (museums, public parks); (***) sectors directly related to tourism such as hotels, airlines, airports, recreational and leisure services (****) expenditure on safety or sanitation services in holiday resorts, tourism promotion and marketing by way of example.

Source: World Travel & Tourism Council

Figures

According to Istat, in 2013, considering the accommodation and catering activities, travel agencies, amusement and theme parks, bathing establishments, museums, monuments and botanical gardens, nature reserves, the number of businesses is almost 330 thousand for a total of 1 million and 374 thousand employees (4.2 per facility).

Accommodation structures

In Italy there are 158,412 accommodation structures which are associated with 4,849,432 beds and over one million rooms. 21% of the establishments are hotels while 79% are non-hotel facilities. Most of the hotel sector is represented by three-star hotels, while in the extra hotel, rented accommodation managed in an entrepreneurial form and bed and breakfasts cover almost 80% of the accommodation offer.
Between 2013 and 2014, the strongest growth was recorded for luxury and 5-star hotels (4.4%), youth hostels (7.9%), mountain huts (10.9%) and bed and breakfasts (7%).
Domestic and foreign arrivals are 106.5 million and presences 377.8 million for an average stay of 3.5 days. Arrivals grew by 1.9% for hotels and 5.1 for non hotels. Arrivals and presences in cheaper hotels decrease while they grow in bed and breakfasts. 85% of arrivals are concentrated in 4 and 3-star hotels while in the non-hotel sector 40% of arrivals are in campsites and tourist villages.
81% of Italian and foreign arrivals concern places of tourist interest and the remaining 19% provincial capitals and municipalities; arrivals in seaside resorts represent 26.55% of arrivals in tourist destinations and 35% of the presences. In Italy there are approximately 4,458 bathing, maritime, lake and river establishments with 13,463 employees

Accommodation structures

	Number of facilities	**2014/2013 % var**	**% weight**
Hotels	33.290	-0,1%	21,0%
5 star and 5 star luxury hotels	428	4,4%	0,3%
4 star hotels	5.506	2,1%	3,5%
3 star hotels	15.361	0,3%	9,7%
2 star hotels	6.146	-1,3%	3,9%
1 star hotels	3.082	-4,4%	1,9%
hotel tourist residences	2.767	0,7%	1,7%
extra-hotel facilities	125.122	0,7%	79,0%
camping and tourist villages	2.699	2,2%	1,7%
rental housing managed in an entrepreneurial form	71.070	-2,0%	44,9%
farmhouses	18.121	2,1%	11,4%
youth hostels	573	7,9%	0,4%
holiday homes	2.139	-6,5%	1,4%
mountain huts	1.071	10,9%	0,7%
Other accommodation structures	891	9,3%	0,6%
bed and breakfast	28.558	7,0%	18,0%

Source: Istat

Tourist movement

	Italians and Foreigners		**2014/2013**		**% weight**
	arrivals	presences	arrivals	presences	
Total accommodation structures	106.552.352	377.770.806	2,6	0,3	100
Hotels	84.240.379	254.941.435	1,9	0,1	79

5 star and 5 star luxury hotels	3.119.794	9.519.711	5,1	3,4	4
4 star hotels	38.379.839	102.770.439	3,8	2,3	46
3 star hotels	33.212.451	104.204.475	0,5	-0,7	39
2 star hotels	5.030.966	16.041.746	-3,0	-6,0	6
1 star hotels	1.554.876	4.833.890	-5,1	-7,1	2
hotel tourist residences	2.942.453	17.571.174	4,4	-1,5	3
extra-hotel facilities	22.311.973	122.829.371	5,1	0,7	21
camping and tourist villages	8.986.431	60.855.487	2,6	-0,2	40
rental housing managed in an entrepreneurial form	6.108.080	33.320.418	6,9	0,4	27
farmhouses	2.584.819	10.796.301	5,1	0,7	12
bed and breakfast	1.600.655	4.234.831	15,8	8,5	7
Other accommodation structures	3.031.988	13.622.334	4,2	2,9	14

Arrivals and presences by location type

	Italians and foreigners		% weight	
	arrivals	presences	arrivals	presences
provincial capitals and municipalities	20.016.080	59.969.594	18,79	15,87
provincial capitals	2.193.343	6.261.302	10,96	10,44
municipalities	17.822.737	53.708.292	89,04	89,56
places of tourist interest	86.536.272	317.801.212	81,21	84,13
cities of historical and artistic interest	38.517.596	102.665.249	44,51	32,30
mountain resorts	10.629.893	46.379.032	12,28	14,59
lake locations	6.529.934	28.435.256	7,55	8,95
seaside resorts	22.973.754	112.998.323	26,55	35,56
spa resorts	3.624.174	12.639.933	4,19	3,98
hill towns and various interest places	4.260.921	14.683.419	4,92	4,62
all the items	106.552.352	377.770.806	100,00	100,00

Source: Istat

The expense of foreigners in Italy

The data from the Bank of Italy on the tourism balance of payments for 2014 indicate a number of foreign travellers at the border of 78 million, an increase of 1.3% compared to 2013. Spending by foreigners in Italy was € 34 billion, an increase of 3.6% on an annual basis. The expense of foreigners for holidays increased by 21.8 billion euro (+ 5.3%) while that for work reasons remains unvaried. The tourism balance of payments closes positively for 12.5 billion Euros, in fact the expenditure of Italian travellers abroad is 21.7 billion. The balance is 227 million lower than in 2013, the expenditure of Italian travellers grew almost double compared to that of foreigners (+ 6.9%).

Expenditure of foreign travellers by state of residence and accommodation facility (values in millions Euros)

COUNTRY	HOTEL, VILLAGE	HOUSE ON RENT	GUEST OF RELATIVES, FRIENDS	OTHER	(NO OVERNIGHT STAY)	TOTAL
EUROPE - EU	10.314	3.341	2.547	2.301	818	19.320
EUROPE - EXTRA EU	2.349	424	611	639	772	4.795
AMERICA	4.347	976	776	329	23	6.451
AFRICA	162	35	68	24	4	293
ASIA	1.811	257	182	91	7	2.348
OCEANIA	650	226	99	56	1	1.033
TOTAL	19.633	5.259	4.283	3.440	1.626	34.240

Source: Bank of Italy

Year-on-year variation in the expense of foreign travellers

COUNTRY	HOTEL, VILLAGE	HOUSE ON RENT	GUEST OF RELATIVES, FRIENDS	OTHER	(NO OVERNIGHT STAY)	TOTAL
EUROPE - EU	4,1%	14,1%	1,3%	-5,7%	-6,3%	3,5%
EUROPE - EXTRA EU	2,7%	19,8%	-5,3%	10,6%	-3,4%	2,8%
AMERICA	6,9%	16,5%	11,2%	-11,8%	-8,0%	7,5%
AFRICA	4,5%	12,9%	3,0%	0,0%	33,3%	5,0%
ASIA	-1,7%	-13,5%	4,0%	56,9%	16,7%	-1,3%
OCEANIA	-9,2%	38,7%	-16,1%	-27,3%	-75,0%	-4,3%
TOTAL	3,5%	14,0%	1,6%	-3,1%	-5,0%	3,6%

Source: Bank of Italy

Promotion of local farm businesses activities integrated with sustainable consumption

The ability to promote typical local products represents a decisive element for the endogenous development of territorial systems. The economic, social and tourist effects that it can produce, in fact, are very important thanks to the enhancement of the typical features that combine the productive function of agricultural activities with the protection of the environment and the territory.
In recent years there has been a proliferation of initiatives aimed at combining agricultural production with tourism, recreational, educational and social services.
To these has recently been added the sector in very strong growth of the vegetable garden Therapies, or experiential agricultural tourism which consists in the sale to foreign tourists, through international agencies, of complete packages including guided visits and participation in agricultural harvesting operations considered advantageous in terms of mental and psychological rebalancing (wine therapy, oil therapy, sauce therapy, preserves therapy etc).
These are additional tourist activities that encourage the seasonal adjustment of tourism and allow agro tourism, tourism service companies and transport companies to obtain additional off-season work.
The objective of intercepting and satisfying new segments of consumers interested in the consumption of agricultural products in the production territories in order to live the culture of the place and to live consumer experiences as opportunities for cultural enrichment is becoming the new dynamic of social tourism.
The emergence of a non-mass production and consumption model has also strengthened the interest in traditional and typical agro-food products, also giving rise to the phenomenon of multifunctionality defined by some rural restructuring scholars.[373]
The enhancement and promotion of the quality of typical products thus identifies the central element of an overall local development strategy which provides for the cultural safeguarding of production traditions.
The typical products are the result of small-scale agricultural activities, which present particular characteristics due to the combination of local raw materials and traditional production techniques handed down over time[374].
Firms, especially those of a smaller size and / or located in disadvantaged and marginal territories, see in the typical products both a possibility of finding a new space of competitiveness against increasingly competitive markets in terms of price, and recovering the added value that industry and modern distribution have limited over time.
The added value lies in the fact that this perspective reinforces the identity and cohesion of the local community, stimulating synergies and links with other economic activities in the area (crafts, tourism, etc.) to encourage endogenous local development.
Attention to typical products, especially food and wine products, has been encouraged and supported also by the growing attention of citizens to the quality of food products, as well as the desire to enhance local traditions and adherence to a simpler and natural lifestyle . It is recognized that typical products largely influence the social and economic development of rural local territories through the achievement of the following socio-economic benefits[375]:

- the increase in the incomes of agricultural enterprises, in single or associated form;
- the affirmation of a qualified occupation;
- greater social liveliness;
- the conservation and regeneration of traditional activities;

the development of food and wine tourism that can contribute to improving the economic sustainability of the reference territories.
With reference to the enhancement of the territory in the tourist sense, it is good to underline how food and wine in recent years have assumed a central role also in the motivations of travellers so much to imagine them as real tourist attractions capable of moving a target of travellers who international literature defines " *foodies*"[376].

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373 *Definition by Marsden – 1998.*

374 *In recent years a new paradigm of rural development has emerged (OECD, 2006, Ward and Brown, 2009) in response to the previous paradigm of modernization, intensification of agriculture and standardization of production accused of being one of the main causes of food safety crisis (Kizos and Vakoufaris, 2011).*

375 *What has been stated is consistent with the principles of the theory on endogenous rural development (Slee, 1993, Ploeg van der, 1993, Ploeg van der 2006), a paradigm essentially addressed to less favoured rural areas excluded from modernisation processes. The resulting development model is self-centred and at the same time conservative because it tries to preserve the local elements on which it is based (Sortino et al., 2008), and is characterised by the use and reproduction of experiences and knowledge developed locally to convert the local resources into quality agro-food products. It is a locally determined development that respects and protects local values. Within this paradigm, typical products become a resource capable of giving value to the development of smaller areas because they manage to integrate and enhance the different territorial resources (Brunori and Rossi, 2000, Marsden et al., 2000), also corresponding to the changes of consumer style of postmodern tourists.*

376 *This term identifies all those tourists sensitive to the local culinary heritage, who experience gastronomy as a complex and cultural experience, rather than as a useful resource for the satisfaction of a primary need for nutrition.*

In this way, gastronomy, in addition to being a pleasant sensorial activity, is transformed into an attraction and a tourist marketing tool[377], becoming a point of union between the authenticity of a territory and the visitor. The typical productions in fact allow to better satisfy the uniqueness requirements compared to the products of industrial origin and allow to exit the homologating models of the contemporary society.

The collective nature of the typical product and its ability to enhance the identity, quality and culture of a territory is therefore leading to the affirmation of new networks of social relationships that guide local development choices towards issues such as the sustainability of development, the quality of life of communities and the enhancement of territorial identities. [378]

The concept of "typical" that we assume as a qualifier is linked to the presence of precise historical-cultural connotations and materials rooted in the territory of origin[379], characterised by a unitary brand identity.

Experiential tourism and bio-districts [380]

A Bio-district is a geographical area where farmers, citizens, tour operators, associations and public administrations establish an agreement for the sustainable management of local resources, starting from the organic production and consumption model (short chain, purchasing groups, organic public canteens). In the Bio-district, the promotion of organic products is indissolubly combined with the promotion of the territory and its peculiarities, to achieve a full development of economic, social and cultural potential. The first Bio-district was activated in Italy in 2009 by the Italian Association for Organic Agriculture in an area that is part of the Cilento, Vallo di Diano and Alburni National Park.

After 3 years, the Cilento Bio-District has involved 30 Municipalities in the area, 400 companies, 20 restaurants and 10 tourist establishments that use organic products from the area. Today it represents a real permanent national and international laboratory of ideas and initiatives with a high cultural profile, which aims at a fair and supportive development of the territory based on the biological model. In particular, the Bio-districts allow the organic model to be promoted in the context of an ethical, fair and inclusive rural development, enhancing the natural and typical products together with their territory of origin, contributing to an economic and tourist development based on respect and the enhancement of local resources.

The organic strategies are changing and are no longer only oriented to reconvert the individual companies into an eco-sustainable key, but rather the entire territories with a biological vocation. It therefore proposes itself as a global model capable of giving concrete answers to the social needs of better environmental quality, to the increasingly less populated rural world, to perennial financial crises, to climatic emergencies, by promoting innovations in the field of research, production standards, alternative distribution channels and also in the field of certification.

The challenges that Bio-districts allow us to face can be traced back to six main themes:

• **Mix Farming,** which is an agriculture that connects plant production with animal breeding and the new frontiers of sustainability (energy, water, biodiversity, quality of life and work). This challenge is not always achievable at the company level, especially where agricultural businesses have a reduced extent, and it is therefore appropriate to promote territorial and association projects such as Bio-districts.

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377 *Folgado (et al., 2011) underlines the concept of a gastronomic itinerary which identifies a path that allows the knowledge of a specific autochthonous culinary specialty in a structured and organised way.*

378 *Murphy and Murphy, 2004, Beeton, 2006.*

379 *Tregear (2003) presents a complete literature review reporting the numerous definitions that have been given to the term typical product, namely: traditional food, regional specialties, artisan product, product with certification of controlled origin, etc. ., but, in the diversities, he underlines the presence of a shared meaning as regards the specific characteristics of these products and the contribution they can give to the socio-economic development of rural areas.*

380 *Entirely taken from the IDEASS ITALIA - Innovation for South-South Development and Cooperation report. Source: www.ideassonline.org*

• **Access to land**, increasingly difficult for those who do not have huge economic resources and in particular for young people who intend to become farmers. In the Bio-districts a real "agricultural renaissance" is promoted which marks a discontinuity with the past and is inspired by the organic as a reference model for the whole agriculture, capable of revitalizing, for example, state-owned areas and uncultivated lands, restoring dignity and profitability to agricultural work.
• **Fairer relationships in the supply chain**, creating new direct relationships between producers and consumers, adopting alternative distribution models such as the short supply chain and the Solidarity Purchase Groups, and encouraging the public administration to increase green purchases for school canteens, hospitals and other services public.
• **Food sovereignty**, recognizing the right of local communities to decide independently what and how to produce. In the Bio-districts, public forums are periodically promoted in which farmers, other economic operators, public administrators, the population, confront themselves with equal dignity and decision-making power and define how to meet their food needs.
• **The simplification of the control and certification system of the organic products**, making it less bureaucratic, more effective and inclusive, for example by resorting to "group certification" and Participatory Guarantee Systems. In the Bio-districts, the high concentration of organic farms makes control more agile and, often, it is the entire community that contributes to supervising and ensuring the correct application of the production method by the agricultural operator. The agricultural operator in turn is much more empowered and motivated thanks to public recognition of the important social role he/she plays within the local community.
• **Communication about the organic** must also aim at the "short chain", bringing authors and recipients of the message closer, in order to more effectively transmit the values of bio: food, ethical, social, environmental. Organic is good for those who produce it, for those who consume it, for society and the environment.
In the Bio-district, the natural, cultural and productive resources of a territory are put online and are enhanced by local policies aimed at safeguarding the environment, traditions and local knowledge. Generally the driving force behind its establishment comes from organic farmers who are looking for local markets capable of appreciating their products, and from citizens, who are increasingly interested in buying healthy food at fair prices and capable of protecting health and environment.
However, many other actors and organizations play a decisive role in the establishment and management of a Bio-district, starting with public administrations and schools which, with their increasingly green activities and purchases, can guide habits of consumers and local markets. Tour operators in turn, through eco itineraries and rural tourism, can aim at the requalification and deseasonalisation of the tourist offer.
Farmers are the main actors of the Bio-district, producing according to the rules of organic agriculture and being integrated into the environmental and social context of the territory. By participating in the bio-District, their advantage is to be able to place most of the productions locally, fully entering into the multifunctional tourist circuits (bio-farmhouses, bio-paths, educational bio-farms, social bio-farms). They also have the advantage of being able to promote their products through the territorial marketing plans that a Bio-district can activate. In Italy, moreover, through adherence to the AIAB Guarantee system (100% Italian, GMO free, local) they can count on greater opportunities for enhancing and promoting products.
Consumers can buy organic products from the area, preferably through the channels of the short chain (organic markets, company shops, direct distribution, Solidarity purchasing groups). Thanks to the Bio-district, consumers can count on the total traceability of the organic product from the short chain, on their greater availability and ease of purchase and on the protection of the natural resources of the territory in which they live. In addition, as citizens, they benefit from the environmental quality that organic agriculture ensures precisely in the places of production, and have the opportunity to establish a direct relationship, of trust and mutual collaboration with producers.
By joining the Bio-district, local bodies and public administrations undertake to spread the organic culture throughout the territory through a wide range of initiatives:

• declare the territory as OGM free and promote information and enhancement of the model of organic agriculture in the territory and for a wider audience: guides of local products and services, calendars of events in the Bio-district that enhance culture, tourism and typical local productions;
• support green purchasing, by promoting the development of biological canteens in schools, public and health facilities;
• provide assistance to farms that intend to start a conversion to organic production;
• carry out initiatives to enhance the organic production of the area: Markets for Bio-district producers, farmhouses that produce and use organic products, restaurateurs who create menus with organic products, organic restaurants, organic food;
• promote the application of organic principles also in other sectors such as public green management, organic waste management, building regulations, and others;
• promoting the organic conversion of state-owned areas and collective properties, transforming them into incubators for organic farms also aimed at social agriculture.

Companies in the agri-food sector or in the production of agricultural technical means can join the Bio-district and benefit from the local concentration of organic farms, both for the supply of technical means and for the production of raw material for food processing (pasta, feed). The companies in the tourism or gastronomic sector expand and qualify their offer through

local-seasonal organic menus and visits to the most significant agricultural realities, which allow tourists to create experiences in which cultural, educational and entertainment aspects interact.
A multi-product offer that can increase the attractiveness and permanence of tourists.
The experimentation, research and training bodies support the Bio-district with experimental and training initiatives useful for the consolidation and improvement of the initiatives of the individual actors in the area.
Environmental associations, agricultural, eco-tourism, social and other operators, promote the activities of the Bio-district in their respective fields. In particular, the AIAB coordinates all the activities of the network of associated organizations, making available the know-how and tools, such as the specifications and brands, necessary for the success of the initiative.
The AIAB also promotes agreements with the organic control bodies, to simplify the certification procedures and initiate pilot experiences of group certification and participatory guarantee. The tourist associations promote all possible forms of eco-tourism in the Bio-district area (bio-paths to be covered on foot, by bicycle or on horseback, rural tourism, widespread hotel, study visits, summer camps for children, teenagers and families). Environmental associations work for the protection of the territory and the enhancement of natural resources, which are the basis of the model of organic agriculture.

Taranto itineraries for creating tourism experiences

The transition from the traditional to the modern economy suggests the opportunity to increase the positioning of the offer to extract greater value from the customer and requires producers to move from the business of agri-food production to the business of services which, although connected to food and wine, can be perceived at a higher value level than traditional business.

The challenge consists in transforming food and wine products into offers of catering services or tasting experiences valid as proposals within wider and more complex systems that go beyond the "short term".

The need arises to set up territorial structures based on a high degree of interdependence between the actors, increasing the degree of mutual trust and ensuring a high level of coordination. [381]

From the point of view of how the network is formed, reticular organizations can be placed in two opposite situations:

the first one as a spontaneous aggregation logic, with bottom-up initiative, limited level of organizational structuring, not necessarily permanent and characterized by self-organization logics. This perspective involves the aggregation of different actors around a project idea for the common management of certain activities;

on the other end, a highly centralised configuration, which provides for the creation of a governing body which takes on the management of activities and processes with the highest intensity of economies of scale and variety, and which involves the different actors of the system through an associative model. In this case, the initiative is mainly top down, the level of organizational structure is high, the structure is destined to persist over time and is characterised by an associative model.[382]

A path to discover the splendours of Taranto, the capital of Magna Grecia, associated with food and wine proposals would enhance and found a new wealth around the city starting from events such as fairs, festivals, exhibitions, concerts aimed at promoting the territory.

In detail we list the various itinerary proposals that can be associated with excellent dishes and food and wine originality in association with possible 3D elaborations to be integrated into the experiential tourist package[383]:

Guided visits to the Old City of Taranto

the suggestions of the great Greek acropolis, the testimonies of Romanesque and Renaissance architecture, the splendour of the Baroque residences, the current challenge of urban recovery, more than 2700 years of history enclosed in an island between two seas.

Guided visits to the MArTa , National Archaeological Museum of Taranto

Mirror of the importance of the city in ancient times, it houses one of the main Italian archaeological collections, with extraordinary finds from the Magno Greek and Roman period and the collection of the splendid Golds of Taranto.

Guided visits to the ARAGONESE CASTLE: Built in 1492, Saint Angel Castle overlooks the Navigable Canal, an extraordinary example of Renaissance military architecture, it was erected on ancient Greek, Byzantine and Norman-Swabian-Angevin structures.

Mudi Diocesan Museum of sacred art of Taranto

One of the largest museum structures in Italy in the renovated structure of the former archiepiscopal seminary of Taranto, in the heart of the ancient City and next to the Cathedral. Three exhibition floors for 305 works that will accompany you in the religious and ecclesiastical history of the province of Taranto from the seventh to the twentieth century, including sacred furnishings, relics, paintings and sculptures of exceptional cultural value.

The Dome of San Cataldo, the Cathedral of Taranto

In the heart of the historical centre of Taranto stands, in all its monumental beauty, the Cathedral of San Cataldo, the oldest Cathedral in Puglia. Its artistic configuration is the result of different historical periods: from the crypt of the ancient and pre-

[381] *According to the authors, there are three variables that determine its intensity: the density of relationships (intended as the number of contacts between the organisations of the territorial system); the degree of willingness to collaborate, intended as an awareness of the actors to be part of a system and as a willingness to manage it commonly; the level of mutual trust among the actors.*

[382] *in order to reap the advantages linked to what Rullani calls "network of multi-subjective value"*

[383] *Source: http://www.vivitaranto.eu/ViviTaranto/COSA_FARE/COSA_FARE.html*

existing cathedral of Santa Maria, to the Romanesque elements visible in the naves of the interior, up to the very fine Baroque architecture of the facade and the amazing high altar. On May 10, 1071, during the reconstruction of the temple, the body of San Cataldo was found in a marble urn, wrapped in pontifical clothes and with a golden cross on the chest engraved with the word CATALDUS; cross now kept at MuDì. The inhabitants of Taranto dedicated the new Cathedral to him and erected him as patron of the city.

Underground Taranto

with the Crypt of the Redeemer, the Hypogeum Delli Ponti, the Tomb of the Athletes, the Necropolis of via Marche, the four-chamber Tomb of via Pasubio, the Chamber Tomb of via Pio XII, the Archaeological Area of largo San Martino.

Permanent exhibition Time and Sea on maritime culture in Taranto

The Clock Tower is a symbol of the Old City of Taranto, with its bells it has been marking its rhythms for centuries. In the same way, the culture of the sea, fishing and mussel farming is still a fundamental element of life and economy in Taranto. These two elements are summarized in the permanent exhibition "Time and Sea". A path based on a scientific and historiography approach has been created in the exhibition space of the Clock Tower, aimed at promoting and understanding the traditional and modern practices of the productive activities of the seas of Taranto.

De Beaumont-Bonelli hypogeum

The hypogeum de Beaumont-Bonelli-Bellacicco is an underground structure located at number 39 of the railing of the great sea of Taranto. The peculiarity that makes this structure unique in the whole historical-artistic panorama of Taranto is that all historical periods have been documented since the foundation of Taranto by the Spartans, ending with the seventeenth century, date of construction of the homonymous noble palace. The hypogeum, divided into four rooms, has a depth of up to 16 meters below the road surface and 4 below the sea level. The structure, in a central position with respect to the island of the historical centre, represents a crossroads with the other underground structures of the ancient village which together form the "underground Taranto" system.

Bios Taras Natural History Museum

It was born in the late 1960s thanks to the contribution of the well-known biologist Prof. Pietro Parenzan, director of the Thalassography Institute of Taranto and author of the work "Identity Card of the Mediterranean Shells", a true vademecum for Malacology scholars all over the world. In recent years the Museum, in addition to being a destination for scholars and students, has fuelled its activity by supplying scientific preparations for study and collecting in Italy and abroad. In the museum there are more than 4000 scientific finds from all continents such as shells, minerals, biological preparations of various kinds and in particular local and exotic butterflies and insects. During the visit to the museum, an expert in the naturalistic field welcomes visitors by describing the exhibited specimens and revealing the many curiosities related to them.

WWF oasis Palude La Vela (The Sail Marsh)

Just 8 km from Taranto, on the shores of the Mar Piccolo, we find the WWF Oasis "Palude la Vela", declared a protected area since 2006. The marsh is part of a Regional Reserve which extends for a total area of 10 hectares and is covered with luxuriant Mediterranean maquis, thick reeds, salsola and salicornia. The Oasis houses a rich birdlife consisting of herons, egrets, spatulas, dips, pyro-pyroses, knights of Italy, curlews, shelducks, avocets and ospreys. It is also possible to observe wintering waterfowl such as ducks, geese, swans, creepers, seagulls and waders. It is also possible to enjoy its wonders by canoe, boat and horse. The WWF 'Palude la Vela' oasis is a protected environment and in order to enjoy it, appropriate behaviours must be adopted. For a good visit respect for rules is fundamental.

Taranto's Small Sea Itinerary

A walk along the Mar Piccolo coast to discover sites of great historical, architectural and environmental interest: Villa Pantaleo, Cimino park, WWF oasis Palude La Vela, Convent of the Battendieri and source of the Cervaro river, Basilica SS. Pietro and Andrea, Galeso Park, Triglio aqueduct.

Taranto's military history itinerary

Taranto and its military history between the Old Town and the Borgo. On foot we will visit, among other things, the Artillery Batteries of World War II, we will continue with our own means in the tour on the eastern coast (from the Turkish danger to World War II).

Mini-cruises by ferry on the two seas

One of the most suggestive ways to discover Taranto is undoubtedly from the sea, its most characteristic element. The city extends over two peninsulas interspersed with an island, the Old City, which is connected to them by two bridges. This absolutely unique conformation earned her the nickname of City of the Two Seas. The companies that operate with ferries and boats offer connection services and mini-cruises between Mar Grande and Mar Piccolo to discover the Cheradi islands, the fresh water springs and the gardens of the delicious mussels from Taranto. A journey through stories and anecdotes, landscape and historical wonders to get excited and enchanted.
SAILING EXCURSIONS

Fishing tourism

Fishing trip with different techniques (gill-nets, pots, longline fishing and lines) on board real fishing boats, with lunch / dinner on board and observation and explanations on professional fishing and mussel farming.

On the route of Taras - observation of the dolphins of Taranto

Since 2009 the Jonian Dolphin Conservation has been carrying out scientific research and protection activities on cetaceans of the Ionian Sea. From this year you can participate by boarding the brand new TARAS research catamaran designed and built specifically to actively involve you in the protection and safeguarding of cetaceans which have been present in these waters for over 4,000 years. Together with the JDC researchers you will identify the specimens by photographing their dorsal fin (photo identification), listen and record whistles and clicks of the specimens (vocalizations), collect environmental assessment data of the waters of the Ionian Sea (oceanographic parameters) and fill in the forms of cetacean sighting.

Diving and Snorkelling

the thrill of breathing underwater with the self-contained breathing apparatus thanks to the "Discover Scuba Diving" program. "Cruises between the two seas" with a view of the seabed live on the boat for pre-formed groups of minimum 40 passengers.

Guided visits to the Archaeological Park of Saturo - Leporano (Ta)

Satyrion, the original settlement of Taranto in Marina di Leporano, 10 km from the city on the Salento coast. A journey from the Neolithic to the early Middle Ages, passing from Greek colonization and Roman domination.

Arkeogiochi - the playground of the ancient world - Leporano (Ta)

the innovative Educational Theme Park for children inside the Archaeological Park of Saturo, in Marina di Leporano (Taranto). A true archaeological amusement park, linked to the recovery of ancient games of the Greek, Roman and medieval periods, to spend days having fun in contact with the history of myths, heroes and gods, leaders and knights, in the wonderful territory of Magna Grecia. ARKEOGIOCHI is a unique park in the national territory, set in a context of great archaeological and landscape value, intended to welcome primary and secondary school children, as well as young people accompanied by adults. The park is located in ancient Satyrion, the landing place of the Spartans who colonized Taranto in 706 BC. and linked to the myth of Satyria, nymph of the springs, daughter of King Minos of Crete and mother of Taras, from which the name of the Ionian capital descends.

Route of the one hundred Masserie

Five themed itineraries in the territory of the one hundred Masserie: the route of the Bandits, of the Saints (chapels, farms and cave crypts), of the Gravine di Crispiano, the Archaeological one, the one hundred Masserie. At the end of each itinerary tasting of typical local products in the farm.
Excursions to the LAND of GRAVINE Regional Park: An unforgettable excursion in the most fascinating and majestic natural canyon of Europe among fauna, flora and ancient rock settlements. Excursions, trekking and guided tours to discover

dolmens, archaeological areas of the classical and Hellenistic age, medieval settlements and cave churches in the territory of the Taranto murgia.

Mountain bike and trekking routes

Mountain Bike excursions with guide. Plausible itineraries:

- Site of Community Importance of the Mar Piccolo of Taranto
- Eastern Natural Reserves (S. Pietro in Bevagna - Ta)
- Eastern Taranto Murge (S. Giorgio Jonico, Roccaforzata, Faggiano - TA)

Grottaglie city of art and ceramics

Guided visit to the Ceramics Museum at the Episcopio Castle and to the famous Ceramics District, where you can watch the processing of vases and furnishings of the typical local tradition.

Castellaneta (TA)

Visit to the birthplace of RODOLFO VALENTINO in

Martina Franca, City of the Baroque

Guided visits to the historic centre between spontaneous architecture and magnificent testimonies of baroque art.

Civic Museum of Palaeontology and Man in Lizzano (TA)

One of the most innovative and interesting museum containers in our province, dedicated to Natural History, Palaeontology and Archaeology. A path that goes from the origins of the Earth to the testimonies of peasant civilization, telling the evolution of man through the archaeological evidence of the local territory. Another section is dedicated to the ethnography and civilizations of Black Africa and Oceania.

Missionary Museum of Chinese Culture in Sava (TA)

Curated by the Community of Friars Minor of Salento, the Chinese Missionary Museum of Natural History narrates the missionary process of the friars in Mainland China, passing through the island of Taiwan, the Holy Land and Albania; and again, the fine collection of minerals, fossils and artefacts from China and work tools of the predecessors of today's friars. It will also be possible to admire the collection of the approximately 30,000 volumes that currently make up the library housed in the same convent, which can be visited together with the church of S. Francesco.

Guided visits to the Muscettola Castle in Leporano (Ta)

A project that could be developed in collaboration with CETMA, with funding raised in special funds (Horizon 2020, Urban or Life) is the 3D Full HD experience digital reconstruction of the Doric temple of Taranto starting from the columns. In this case the tourist visit could combine the emotion of observing the original columns of 2500 years ago with the breathtaking vision of the same inserted in their original context of the Spartan Taranto with elements of virtual reality, holographic presences and real actors trained in the framework of the Taranto Spartan City project.

The new proposals: Taranto the Spartan City

"Taranto, the Spartan city", is a relaunch project for the city of Taranto and its province with a view to the sustainable development of the tourist, cultural, food and wine offer and crafts.[384]

The Spartans, unequalled warriors and sons of the ancient Greek polis that went down in history for its formidable army, founded Taranto, the only surviving Spartan city in the world that is, however, going down in history for its formidable pollution.

The origins of Taranto are lost in the most remote antiquity when, about 2500 years before Christ, populations of Hethei-Pelasgi, after colonizing the Aegean coasts, settled in the immediate vicinity of the current city and more precisely in the area which goes from Capo San Vito to Leporano, where they founded a city to which they gave the name of Saturo, a name that still identifies that district, that is city (-Ur) dedicated to Sat, their supreme divinity.

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The legend says that the Spartan hero Falanto, before venturing into the sea in search of new lands, consulted the oracle of Delphi and learned that he would arrive in the land of Saturn (in the Salento peninsula) and would found a city on the place where a rain from "etra", that is from a clear and cloudless sky, had fallen on him.
Falanto started sailing and reached the mouth of the Tara river. Tired for the trip, he fell asleep. His wife, in remembrance of the vicissitudes endured and the dark response of the oracle, wept in tears. Her tears abundantly bathed her husband's face. The oracle had come true. A rain had fallen on Falanto: the tears of his wife "Etra". The hero, having solved the riddle, set about founding his city, after a sacrifice to Apollo, to whom it remain dear.
Next to this version on the origin of Taranto, there is another one that traces back the birth of the city to 2000 years before Christ, by the immediate descendants of Noah, the so-called Noechidi, who, after the universal flood, were dispersed in the different parts of the world, gradually taking steps to increase the population.
According to this version in this era, Tiras, or Taras, in the Greek way, one of the sons of Neptune, arrived in this region, at the head of a fleet, landing at that stream that would later take its name from himself (it is precisely the Tara river, which flows about 10 km from the city, in the Cagioni district). Then, always according to the legend, Taras dedicated himself to building, at the same river and at the sea, not only the city that would have been named after him (precisely Taras, then Taranto), but also the one he dedicated to his wife Satureia that he called Saturo.
To give a little more value to the second hypothesis, there is the great cult that ancient Taranto had for Neptune and of course in the city, a temple dedicated to this mythical divinity was erected.
The most accredited tradition, in fact, wanted this temple to rise precisely in the space between the Church of the Trinity and the municipal building. This tradition proved to be true, since, after appropriate works, which however made the Church of the Trinity disappear, some finds and a column of a temple were brought to light. [385]
In the great process of coordination and rebirth of the city, an immense role must be recognized to the Taranto Spartan city association, a mature open, comprehensive and inclusive project of urban, architectural, archaeological, infrastructural and environmental requalification also thanks to its privileged position in the centre of the Mediterranean.
In the middle of the logo there is the lambda, the Greek letter that aggregates the initial of the Lacedaemon, the creators of Sparta, with the symbol of the shield to be proposed both on the railing of the promenade of the old city and on the number of the gates. Just like the lily in Florence.
Marco De Bartolomeo, president of the association confirms that it is not a symbol for its own sake but the beginning of an identity path that opens ambitious horizons.
Exactly two years after the explosion of the Ilva case with the consequent judicial demolition of the Riva family, a study of great depth matures which attests Taranto at the thirteenth position in Puglia by number of arrivals.
By enlisting it on Google, it owes its higher quantity of pages to the Ilva which outclasses the Archaeological Museum and mussels as, in terms of comparison, Germany did with Brazil at the World Cup. Crossed with the allegory of steel and cancer, the lack of infrastructure (the Grottaglie airport at the stake and the exclusive commercial use of the port area) completes a bleak picture.
Just think that with quarterly surveys on the web, comparing the main items associated with Taranto, the following results are obtained:

- Ilva just under 500 thousand pages,
- mussels and Ponte Girevole (The swivel Bridge) well below 100 thousand, like the Museum.
- the Spartans, 35 million pages!

The association has developed a survey with 800 users caught from Alaska to New Zealand. To the question "do you know Sparta?", One hundred percent of the people interviewed answered yes. To the question "Don you know Taranto?" Only 2.5% of the same people answer yes.
When asked about the most visited monument in the world, the most loved postcard live and online, however, the podium is assigned to the Eiffel Tower in Paris with fifteen million pages, less than half than Sparta and the Spartans.
The myth, therefore, perpetuates itself over time without linguistic or geopolitical barriers. An imprint that is a thousand-year saga among sportsmen, from the name of many football teams (Sparta Rotterdam, Sparta Prague and so on) to the war screams of the audience in Michigan before the football matches, from the competitive inspiration of the Spanish motorcycle ace Jorge Lorenzo to the one million annual participants in the Spartan Race (extreme disciplines race).
A track that expands to the cinema, with eleven million people who have announced on Facebook in recent months to be waiting for the sequel to the blockbuster Trecento. A global suggestion, with beers and energy drinks among its many paired, without a bodily reference since today's Sparta, just 16 thousand inhabitants, is a biologically modified village as well as hardly linked to its extraordinary civilization. And from here the idea comes.
To restart Taranto from its narration. Enrich it in the wake of hospitality, which with Sparta's followers could guarantee it impressive returns. Immerse it in its origins so that it comes out cleaned, even favouring the coexistence of workers and greens.

[385] *Source: http://www.tarantocitta.it/storia.htm*

A remediation from the roots.
Research has verified that five, maximum seven million would be enough for Taranto to take the brand. Seven start-up interventions stand out:

- Waterfront railing,
- house numbers with the symbol of Sparta,
- the statue of Falanto, the founder of Taranto, to be raised in the middle of Piazza Garibaldi replacing the current iron gazebo,
- the transposition of Taras to Piazza Fontana with the Doric columns by Vincere De Paola;
- the Palio of Taranto to be run not with fishermen's boats but with Spartan galleys and rowers in period costumes,
- the construction of a Spartan ship that makes the tourist tour along the two seas,

the shield with a radius of 50 meters on the Punta Penna bridge with changing colours at night and a kilometre and a half of waterfalls. The goal is to make beauty win, with goldsmiths 'and artisans' shops, with the promotion of the city of sport, a galley-shaped stadium, and the setting up of a museum of athletes. The organization of a thousand-mile and fifteen-day Taranto-Sparta regatta would also be of great interest. 386
In order to emerge in this sector where competition is very high, a strong "brand" is needed, easy to identify and recognise where identity is transformed into an economic-strategic factor, not just a social one. "Taranto, the Spartan city" is in this sense an extraordinary challenge achievable through a path shared with all the forces and professionals that want it and whose realization would allow to offer an important contribution to the development and systemic internationalization of the whole Puglia, already considered land of beauty today.

Short Chain Promotion in public and private canteens and schools

By virtue of the foregoing regarding the importance of the short chain, the EU Agriculture Commission has presented new food proposals for schools which should be implemented in all Italian and European schools.
According to Europe, there is a need to invest more in the consumption of local products among children and in school canteens. A balanced diet focused on local and seasonal products is outlined as the basis for maintaining good health.
The consumption of fruit and vegetables has decreased significantly among European citizens, with evident negative consequences.
The objective of the new rules proposed concerns both the foods that will actually be served in schools, and the need to better educate children about healthy eating habits. More than 20 million children are overweight and adolescents consume on average only 30% to 50% of the recommended daily intake of fruit and vegetables. [387]
Among the main points illustrated by the Commission there are proposals to expand the list of food products to include local dairy products such as yogurt, cheese and dairy products (as long as they are not flavoured and do not contain fruit, nuts or cocoa). [388] In addition, 10% - 20% of the EU funding that Member States receive for educational activities should be used to promote healthy eating habits, with visits to farms and occasional distribution of local specialties such as processed fruit and vegetables (it is expected that they do not contain sugars, added, fats, salt or sweeteners), honey, olives and dried fruit.
The axioms on which the short chain in public canteens could be based start from public administrations which have a privileged tool [389] to maintain control over supply and encourage the adoption of sustainable practices in the supply of Catering service.
Attention to the requirements for the award of contracts is a first step to affect the level of greater sustainability of the service provided.
In fact, most tenders are based on value for money values or on the most economically advantageous offer (about 77%).[390]
The above figure describes the main catering practices aimed at sustainability which can be indicated in the calls for tenders and implemented according to the characteristics of the specific local realities.
The first aspect concerns the determination of the menus and therefore of the combination of products included in it. The administrations can have their own dietetics service that prepares the menus, or they are prepared by a dietician working in the

386 *Source: http://corrieredelmezzogiorno.corriere.it/lecce/notizie/cronaca/2014/24-luglio-2014/ecco-brand-citta-futurotaranto-riparte-mito-sparta-223624635212.shtml*
387 *Source: http://www.greenme.it/vivere/speciale-bambini/16244-mense-scolatiche-ue*
388 *these products are described as "with proven beneficial effects on children's health".*
389 *These are the specifications contained in the call for tenders, in which the criteria that the winning company must meet and the relative weight that these criteria have in determining the most advantageous offer are set.*
390 *From a recent report drawn up by the Angem (National Association of Canteen Managers) observatory on tenders together with the EBnt (National Bilateral Tourist Board).*

contracting company with the supervision of the local health authority. [391] As already mentioned, although the use of organic products, together with products of designation of origin (PDO and PGI) is constantly growing, the certification tools must still be verified on a case by case basis, in particular if supply is supported on the local market. Procurement through the "short chain" is associated on the one hand with the freshness and seasonality of the products and on the other with the possibility of saving in terms of transport and brokerage costs, which instead weigh on wholesale trade. The a priori choice to use products as much as possible from the surrounding area can represent a limit for those areas where, for geophysical reasons, production possibilities are scarce, for example in large urban municipal administrations. Furthermore, the supply of many fresh products (e.g. fruit and vegetables) presents risks both in terms of poor production availability (e.g. due to adverse weather and climatic conditions), and overproduction compared to the ability of collective catering to absorb local products. Again as regards the quality of the raw material used, the specifications may indicate some special quality criteria such as the maximum permitted level of sugar in the fruit, which indicates the degree of ripeness, or the maximum time that must elapse between the moment of the collection and the moment of consumption of fresh vegetable products. Even the snack, which is important for the overall nutritional balance of the day, can become an opportunity to propose a change in eating habits: several projects, in collaboration with the catering companies, have set themselves the goal of introducing fruit snack, fresh or fourth range, in many schools throughout Italy. [392]

The second point concerns the (ecological and economic) practice of doing without plastic bottles for mineral water and proposing the tap water in school canteens. This implies the commitment to have the water checked periodically by a third party, making structural interventions necessary where the water system needs it and a particular consideration for the very low age groups for which the microbiological characteristics of the water have particular importance.

Point3 specifies that the cooking of the meals is carried out in the cooking centres with subsequent transport to the places of consumption at the schools, or inside the school, if adequate facilities are available. The constraints in terms of maximum distance that can be travelled and maximum time that can be used are often indicated in the specifications in order to increase the quality of the meal, especially in terms of intrinsic quality, as well as the reduction of CO2 linked to transport. This could be a problem for the municipalities which are extended from a territorial point of view, where there are few cooking centres. A logistics organisation that tends to reduce transport kilometres for supplies or for the delivery of meals conveyed by the cooking centres to consumption points must deal with a system set according to logics anchored in the past and not easily modifiable, except with investments aimed at equipping schools with facilities for preparing meals.

As highlighted in point 4, closely linked to this, many specifications provide for structural and functional adaptation obligations for kitchens and other structures intended for the preparation and consumption of food, such as refectories. In fact, the presentation conditions of the meals, the characteristics of the environment, the noise level in the canteen rooms affect the pleasantness of the moment of eating the meal. The verification and, where necessary, the adaptation of the environmental comfort of the canteen spaces (e.g. reusable soundproof table covers for noise limitation) can contribute to increasing the quality of the service but also its efficiency, through the reduction of waste.

Point 5. Also encouraging the use of 100% biodegradable dishes and glasses or reusable crockery, together with the use of detergents with reduced environmental impact, would favour the pleasantness of the meal for users and therefore the reduction of waste. However, the management practicality and the structural difficulties related to the lack of washing points are fundamental elements of the administrations' choice to remain with disposable dishes.

The activation of internal procedures for the monitoring of leftovers as in point 6, either through weighing or rough indicative evaluation, would constitute an important practice for the evaluation and self-evaluation of the service. From what emerges from the Slow Food report, only in very few cases this procedure is carried out and the data made available.

As regards waste disposal (point 7), a separate collection procedure that would allow recycling is not always activated.

Last but not least at point 8, the provision in the specifications of professional training and updating activities of the staff constitutes a sort of precondition for the quality of the service and for the correct activation and performance of the practices previously discussed. In particular, training courses on hygiene safety (e.g. Haccp principles) and palatability of meals produced and administered may be provided.

Infrastructure and transport plan

Improving the usability of the public space and allowing the citizens of Taranto to have their spaces in the best possible way must be an absolute priority.

The most efficient way of improving traffic and infrastructure in Taranto as in many Italian cities, is through a virtuous plan that cannot be ignored.

[391] *most of the cases. Source: Slow Food*

[392] *Source: http://agriregionieuropa.univpm.it/it/content/article/31/29/verso-una-ristorazione-scolastica-italiana-piu-sostenibile-sustainable-public*

Italy continues to have the record number of cars per inhabitant, precisely 65 per 100 against a European average of around 48. Estimates of victims of air pollution could be around 3,400 per year due to ozone and 64,000 due to the very fine dust Pm2.5. [393]

In Taranto, the average number of cars per 100 inhabitants is estimated to be between 50 and 60 units. [394]

The new city will be designed giving the possibility to move above all on foot, by bicycle or by public transport in order to take on the role of city of tourism and commerce.

In order to achieve the objectives set, some interventions have been identified, the most important of which are undoubtedly:

Extension and immediate restoration of the works concerning the cycle routes, for which municipal funds [395] have already been allocated and approved, to connect the cycle route from the city centre to San Vito, from Viale Magna Grecia to Viale Ionio (already existing) which would allow an accessible route to Praia a Mare.

A qualitative / quantitative increase in the offer of public transport;

Parking policies that allow better usability of the public space by citizens.

Reorganisation of road traffic to allow destinations to be reached by minimizing city crossings;

Requalification of urban spaces, taking into consideration first of all citizens as pedestrians and inhabitants.

Definition of the road system also intended for heavy traffic.

Implementation of new Third Industrial Revolution technologies for mobility management, such as car sharing.

The infrastructure plan will lead to predicting the existence of an urban building model already in use in other European cities, capable of generating work and income. The techniques will take advantage of the adoption of the policy of reuse and recovery of existing buildings and revitalization of urban centres through the modification of the urban destination of many historic buildings.

Restoring Taranto's vocation as an international reference point in freight transport, creating an industrial centre with a high technological, scientific and research rate.

This will be possible through the functionality of the port and the Arlotta airport in Grottaglie.

There are some ghost airports in Italy, which operate only very few non-commercial flights. Often these are large structures, with excellent potential, in which the state has invested hundreds of millions of Euros and which remain stationary only for political will and nothing more.

One of these cases is in Taranto, the airport is the Marcello Arlotta in Grottaglie equipped with the longest runway in the South (3.2 km) and which costed 1000 billion Liras!

The first hangars for airships and small planes were built between 1910 and 1920. In the following years the airport was used only for military purposes and was also destroyed in various bombings.

In 1964 the airport became civilian for the first time and so remained, except for a few cases, until 2003. From this date civilian flights did not land and did not depart anymore and until 2006 it was used only for military purposes.

In 2006, Alenia Aeronautics became interested in it and signed agreements with Boeing for the manufacture of fuselages. The airport is enabled for cargo use and the runway stretched from 1,860 to the current 3,200 metres. For this change, the road network has been changed and investments have been made throughout the airport area. As can be read from the 2009 Aeroporti di Puglia budget, thanks to the interventions financed with CIPE resources n. 17/03, in Taranto 117 million Euros were financed.

Taranto airport would be able to cover a large basin which is currently very distant from any airport such as, for example, the whole eastern area of Basilicata or the north of Calabria.

Basilicata alone has a population of approximately 575,000 inhabitants, which combined with the northern belt of the Calabria Region (approximately 600,000 inhabitants) and the southwest section of the Puglia Region near the province of Taranto (approximately 300,000 inhabitants), could serve potentially about 1.5 million travellers.

The movements by plane, although with important variables, would seem to affect a segment of the population between 15 and 64 years of age, therefore in the worst-case scenario the outgoing users should interest about 65% of population according to national statics, which in "numbers" translates into approximately 975,000 "active resident" passengers.

To the "outgoing" passengers would be added the "incoming" passengers who would respond mainly to the synonym of tourists!

Taranto Grottaglie, in fact, would serve an area with a very high tourist vocation mainly concentrated in the summer months. Salento alone saw more than 3 million people arrive in 2015, most of them in Gallipoli and the surrounding areas which are geographically positioned on the Ionian side.

The "phenomenon" of the Taranta Night attracted nearly 200,000 people only in the penultimate weekend of August, so as to double the cost of rents for that period!

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393 *Source: http://www.ilsole24ore.com/art/tecnologie/2015-01-30/ecco-citta-la-qualita-dell-aria-peggiore-secondo-legambiente-165455.shtml?uuid=ABTALimC*

394 *Source: http://www.comuni-italiani.it/073/027/statistiche/veicoli.html*

395 *Source: http://www.tarantobuonasera.it/taranto-news/cronaca/388270/news.aspx*

An important count of arrivals must also be made on the Basilicata Region which in the last year, thanks also to the boost of Matera as "European Capital of Culture 2019" has seen about 2.3 million presences registering more tourists than residents!
At the end of the holiday attraction, the approximately 1.4 million arrivals in the Calabria region should not be underestimated, of them Grottaglie could be of interest for about a third, that is about 450,000.
As far as Taranto is concerned, the official data of the 2014 annual tourist movement are clear: the province of Taranto, in a Salento that with over 6 million presences between Lecce and Brindisi, gains the covers of the international tourist press, remains in the queue both for tourist presences 1,121,064, and for arrivals 258,894, despite the increase in the last 5 years of 11% of presences and 1% of arrivals.
The revaluation of the port certainly does not go in the second order!
It would be of particular importance to support the development of an intermodal system allowing Taranto to go beyond the military arsenal and enhance the possibility of becoming a logistics platform for the Mediterranean serving goods directed to Europe, Africa and the South America. [396]
Such a work, close to the Colossus to be disposed of, would allow the creation of several thousand jobs as well as the opportunity to develop related logistics for the entire territory.
The countries of North Africa and the Mediterranean represent an immense opportunity from a commercial point of view, as evidenced by many Italian companies that have invested in that area. The Italian naval armament, which already has the world's second largest fleet of ferries, continues to invest in new ships to hold a transport of excellence.
Suffice it to say that the only regular traffic of freight and people transport have about 450 weekly departures with routes identified in the ports of the area in question.
Taranto is part of the Mediterranean basin, a natural infrastructure in which 19% of the entire world traffic passes and where 80 ports of international importance are positioned. A basin that spans 25 states on three different continents with a potential market of around 525 million people!

Taranto's export and its economic conversion

The province of Taranto ranks second among the Apulia realities in terms of export volume. In 2014, the value of exported goods stood at around € 1.6 billion, recording an increase of + 24.7% compared to 2013, a figure well above the changes that occurred at the regional (+1.9 %) and national (+ 2%) level. However, the balance of payments remains at a loss of around € 600 million.
The composition of exports from Taranto is not very diversified: the top ten exported goods account for 91.7% of the total export volume. More in detail, it is observed that almost half of the export (47.5%) concerns metals or metal products, for a total value of 758.9 million; among other items, coke and refined petroleum products (11.9%), means of transport (10.2%), electrical appliances (9.4%) and mineral extraction (7.9%) assume a certain weight. The weight of the agriculture, forestry and fisheries sector is rather limited (2.8%).
Also with regard to imports, there is a marked concentration. In fact, more than half of the imported goods concern the extraction of minerals (50.3%). Among manufacturing activities, the main import items concern metals and metal products (11.6%), followed by coke and petroleum products (11.3%).
Outside Europe, the only area to represent a relevant market is North America, which absorbs 14.7% of total exports. A significant reference area for imports in the province of Taranto is represented by Central South America (26.2%)[397]

[396] *Source: http://bit.ly/2ICEVXt - page 53*
[397] *Source: Taranto Chamber of Commerce - 13th day of the economy - Taken from " Taranto Report 2015 ". Page 54*

Foreign trade by sector of the province of Taranto (in absolute values as of 2014) [398]

	Import	export
AGRICULTURE, FORESTRY AND FISHERIES	11.179.043	44.351.818
MINERAL EXTRACTION	1.107.466.661	126.295.836
Food, drinks	17.081.007	35.765.578
Textile products, clothing, leather	37.483.395	50.739.160
Wood; paper and print	7.850.551	1.831.976
Coke and refined petroleum products	248.994.428	190.533.604
Chemicals	58.904.830	5.356.061
Pharmaceutical, chemical-medicinal products	2.207.568	945.032
Rubber, plastics, non metal minerals	82.277.875	7.414.386
Metals and metal products	256.262.111	758.930.844
Computer, electronic and optical appliances	8.102.132	6.184.826
Electrical devices	148.431.633	149.763.783
Machinery and equipment	45.832.077	23.255.759
Transport means	132.144.106	162.547.232
Other manufacturing activities	36.452.121	3.401.901
MANUFACTURING ACTIVITIES	1.082.023.834	1.396.670.142
WASTE AND RENOVATION	468.412	2.135.359
INFORMATION AND COMMUNICATION	408.368	101.477
SPORT AND ART ACTIVITIES	33.075	23.140
SUPPLIES ON BOARD	216.937	27.004.861
TOTAL	2.201.796.330	1.596.582.633

Top 10 goods exported from the province of Taranto and share of the total exported [399]

Good 1	Steel products
Good 2	Products from oil refining
Good 3	Aircraft, spacecraft and related devices
Good 4	Electric motors, generators and transformers, electricity distribution and control equipment
Good 5	Crude oil
Good 6	Clothing, except fur clothing
Good 7	Steel pipes, conduits, hollow profiles and relative accessories (excluding those of cast steel)
Good 8	Permanent crop products

Connected to these activities it is necessary to foresee:

- The railway expansion of the area
- The start of the renovation and restoration works in the Old City

Recovery and requalification of military state-owned areas

The Financial Covers are to be found in the European Fund for abandoned areas and undergoing remediation, for training, for new production activities, for regional development, for European Smart Cities projects.

Hypothesis of requalification of the ILVA area

A Taranto "free" from Ilva or at least without the most polluting part of the colossus, better known as the hot area, is possible. So tells us the architectural project "Green Ilva" by Dr. Alice Martemucci who with a thesis in architecture has demonstrated a radical redevelopment of the spaces now occupied by blast furnaces and coking plants. The new Taranto passes from a park for renewable energies to a natural reserve, from spaces equipped for leisure and aggregation to a commercial pole.

The two seas in the background and the immense space of the port returned and reconnected to the city through a series of structures capable of relaunching new economies and the tourist image of a magnificent city.

An architectural project that manages to go beyond the fear of writing a different future, both in the event of a complete closure of the industry and of the hot area only.

Conversion is possible following the example of countless virtuous realities. As previously illustrated, one of the most successful examples in the world concerns the Ruhr basin, a large industrial area that has undergone a colossal recovery work to create the IBA Emscher Park.

Ilva extends over an area that is almost double the city of Taranto. If we consider the whole industrial area with Cementir and the Eni Refinery we go much further. The transformation of urban spaces, the merger with the city, the creation of equipped

[398] *Source: processing on Istat data*
[399] *Source: processing on Istat data*

green areas, sustainable mobility, clean energy, the recovery of the port area and the preservation of the factory's historical memory would allow the change and restoration of a city now on its knees.
Areas for art, commerce, sport, leisure and exhibition spaces in a mixture of public and private, favouring tourism, fish farming, fisheries, agriculture and all other excellences once and for all.[400]
The plant is located in a flat area north-west of the city. The area is approximately 15 million square metres and borders:

- To the south with the Highway Taranto Grottaglie and with the Tamburi district of Taranto
- To the north with the quarry area and with the territory belonging to the municipality of Statte
- To the west with the Taranto-Statte provincial road and with the small business area
- To the east with the Highway Appia Taranto- Bari and with another large territorial area that includes the Agip petroli refinery and the Cementir cement factory.

The rivers Patemisco, Tara, Galeso and the D'Aiedda canal are recorded in a wider area than the steel complex.
The production process of the plant is "integral cycle" and set according to an interdependence of the cycles from the raw material procurement phases to the shipment of the products, an activity that engages the port traffic for 76%.
The redevelopment of the area with the definitive closure of the Ilva scrap derives from the careful analysis of numbers indicating 256 chimneys and 140,000 cubic meters per hour of waste into water, as well as three landfills, one of which with "hazardous waste". [401]
The decommissioning represents the historical occasion of transformation of the urban and territorial space, putting aside the drift of the living spaces and of the productive factors.
The times are now mature to reach the objective to enhance the city like in the virtuous examples already existing in the various experiences mentioned in the first part of the study. Here are just a few:

- IBA EMSCHER PARK GERMANY
- LANDSCHAFTSPARK DUISBURG - NORTH OF GERMANY
- ZECHE ZOLLVEREIN XII of ESSEN - GERMANY
- CULTUURPARK WESTERGASFABRIEK AMSTERDAM – THE NETHERLAND
- ANSALDO MILAN – ITALY
- ILVA OF BAGNOLI - ITALY
- ZHONGSHAN ZHONGSHAN – CINA
- DISTRICT OF BERCY – FRANCE
- PARC DE GIRLAND LYON – FRANCE
- MFO ZURICH - SWITZERLAND
- KATHARINA SULZER PLATZ WINTERTHUR – SWITZERLAND

Ultimately it would be a matter of transforming concepts such as weakening, emptying and decay, into images such as availability and ultimately liveability.

[400] *Source: http://www.targatota.org/2013/07/sviluppo-taranto-senza-ilva.html*
[401] *Source: Redevelopment project of the ' Ilva area - Thesis by Dr. Alice Martemucci*

D) Economic and social impact

Scenario zero: economic evaluation and GDP growth

The energy, food and economic sovereignty of the Third Industrial Revolution marries, as widely illustrated, a model in which the first sovereignty to be achieved is that of energy with the sun as the main source.
The energy radiated by the sun is fifteen thousand times higher than our consumption and above all is distributed.
A recent Oxfam report showed that 60 people on Earth possess the wealth of 4 billion inhabitants on the planet. This is also because the oil economy, the one of the second industrial revolution, is capital intensive. That is, it concentrates wealth and profits in just a few hands. [402]
In Italy, at present, about 18,000 megawatts of photovoltaic power are installed, capable of covering the entire national needs thanks to the sun at peak times. Energy for everyone at no cost.
The Third Industrial Revolution, the axioms of which are distributed renewables, positive energy buildings, hydrogen as a universal vector, smart and mesh networks for the exchange of data and energy, electric and hydrogen vehicles for private, agricultural and industrial use, has also found a place in an exemplary compendium drawn up by Eng. Livio De Santoli and Dr. Angelo Consoli.
"Territorio Zero" is a manifesto that commits those who sign it to carry out a territorial development program respectful of natural resources in an innovative vision. But not only this. Territorio Zero contains a political-administrative program, based on technical-scientific bases, which suggests operational solutions for the new generations of local authorities administrators.
Whoever subscribes to the manifesto marries a conscious vision of the changes of the century just begun, and subversive with respect to the existing social policies linked to the logic of the past.
The reason is that the exploitation of conventional energy sources presupposes an invasion of capital and a progressive and definitive expulsion of the human factor from production processes.
The existing model, born with the geopolitics and the commodification of natural resources transformed into commodities during the second industrial revolution, has de facto expropriated the local communities of the possibility of controlling their economic destinies, because it deprived them of the security of access to energy , to food, water, common goods, and ultimately of any hope for the future; common sense is still resigned to the idea that pollution, greenhouse gas emissions, the production of waste, the commodification of common goods, the destruction of traditional agricultural knowledge are tolls to be paid for an unspecified "progress" .
Territorio Zero aims to program economic activities at the local level according to:
1. a new distributed energy model, which allows to reach the necessary critical mass starting from renewable sources according to a network and community scheme;
2. a new agricultural model based on the decarbonisation of production processes and the enhancement of local quality production, capable of providing farmers with direct access to the market for their products and at the same time a decent income;
3. a new model for the products life cycle, which develops those activities capable of saving, recycling and reusing according to the principles of "zero waste";
4. a new urban model which, instead of fuelling the consumption of the territory, re-qualifies and improves the conditions of the existing structures. [403]
The positive economic evaluation finds a practical example in the Nord Pas des Calais region in France.
The economic / energy objectives of the region in question which fully embraced the Third Industrial Revolution and became its world reference point are the following:

- decarbonisation by 2050;
- 70% consumption lowering and 30% coverage with renewables.

To achieve these objectives, the Department for the Third Industrial Revolution plans to use 200 billion Euros until 2050, with energy savings of 320 billion and therefore an active balance of 120 billion. The fossil-based scenario, on the other hand, provides for a minimum expenditure of 400 billion by 2050 without any return, even if it will probably be worth counting the savings in health costs as a result of the improvement of the environment.
As far as employment is concerned, an industrial reconversion of this magnitude provides for an employment balance by 2050 with 165,000 jobs more than the approximately one hundred thousand of the fossil scenario. [404]
The impact of renewable sources in Italy is also measured in terms of jobs created: 2500 for each potential gigawatt compared to 600 with conventional sources.
The peninsula, a country where the unemployment rate reaches one of the highest historical levels ever, reaching 12.7%. [405]

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[402] *Source: https://www.salto.bz/article/03022016/la-terza-rivoluzione-industriale-delle-tre-sovranita*
[403] *Towards Territorio Zero. Manifesto for a society with zero emissions, zero waste and zero kilometres by Livio de Santoli and Angelo Consoli. Pages 11, 12, 13.*
[404] *Source: http://www.europa2030.it/benvenuti-al-nord-con-la-terza-rivoluzione-industriale/*
[405] *Istat data June 2015.*

Young people looking for work, on the other hand, represent 43.1%. The employment rate is 55.5%. In absolute terms, the employed are around 22.5 million, the number of unemployed is around 3.5 and the unemployed between 15-24 years are around 700 thousand.
A necessary premise to understand the employment data existing in the energy sector and the real potential of the any sectors. Italy has a balance sheet on renewables that can be summarized in the production of one third of national electricity and which has about 200 thousand employees [406].
The study made by the GSE during the conference on the new energy plan of Lazio Region, specifies that in 2012, against an investment of 12.6 billion Euros, 137 thousand people found work in the new clean energy plants and 53 thousand in managing existing ones. Furthermore, between 2008 and 2015 the cost of photovoltaic has fallen by more than three times.
Other data instead are collected for the traditional sources employment market. Just think that the largest energy giant operating in Italy (and therefore aggregative of different realities), ENI s.p.a., accounts for approximately only 25 thousand employees in the entire peninsula[407]!
According to the report "Renewable Energy Benefits: Measuring the Economics"[408], presented at the sixth meeting of the International Renewable Energy Agency, reaching a 36% share of renewable energies in the global energy mix by 2030 would increase global GDP up to 1.1%, about 1.300 billion dollars, more than the economies of Chile, South Africa and Switzerland together.[409]
The report also analyses the specific impact on different countries. Japan would have the greatest positive impact on GDP (2.3%), but also Australia, Brazil, Germany, Mexico, South Africa and South Korea could grow over 1% each.
The planet would gain in terms of well-being thanks to a series of social and environmental benefits since the implementation of renewables on well-being is estimated to be about 4 times greater than its impact on GDP. Global well-being would grow to 3.7% and employment in the industry could also increase from today's 9.2 million jobs globally, to more than 24 million by 2030. Commercial flows would also move the asset thanks to mitigation, triggering new investments and a win-win scenario.

Social aspects

The planetary dream of an existence based on the "better quality of life" is therefore possible. It is a question of marking human and social rights in a scenario positioned between social and market models with visions of cooperation between peoples.
According to Rifkin[410]:
The new societies are based on ten pillars:

1) A sustainable standard of living: the long-term increase in gas and oil prices and the growing effects of climate change on commercial sectors ranging from agriculture to tourism are already having serious consequences on the living standards of millions of Europeans. Food prices are constantly rising and the same is true for services and consumer products. In the years to come, the situation can only get worse, endangering the dream of a new social Europe. Governments, the financial and business world and civil society must move together to switch to new forms of energy.

2) The economic multiplier effect: the transition to the third industrial revolution will entail a global reconfiguration of European infrastructure with the creation of millions of jobs and new goods and services with an economic multiplier effect that will be felt until second half of the 21st century. Massive investments in renewable energy will be necessary, millions of buildings will be renovated and transformed into real power plants and energy production plants and we will be forced to abandon the obsolete technology of cars powered by the internal combustion engine.

3) New jobs and business models for the 21st century: the rebuilding of European infrastructures and the modernisation of the industrial system will entail a massive requalification operation for European workers as already happened at the beginning of the first and second industrial revolution. The workforce of the third industrial revolution will be expert in renewable energies, green building, information technology, nano-technologies, sustainable chemistry, management of digital energy grids, means of transport powered by electricity and hydrogen and hundreds of other technologies. Entrepreneurs and managers will need to know new business models, including open-source and networked trade, distributed and collaborative research and development strategies, sustainable low-carbon logistics and supply chain management.

4) Improving Europe's energy security: The EU began to deal with energy security with the creation of the European Coal and Steel Community and the introduction of the Euratom project. Europe will have to create a self-sufficient and widespread renewable energy regime that is

406 *GSE data - Source Repubblica Ambiente, article of 3 April 2014 by Antonio Cianciullo.*
407 *ENI s.p.a. annual financial report data*
408 *The report provides the first global assessment of the macroeconomic impacts of renewable energy development.*
409 *Source: http://www.greenreport.it/news/clima/il-36-di-energie-rinnovabili-farebbe-aumentare-il-pil-mondiale-di-13-trilioni-di-dollari/*
410 *" The Third Industrial Revolution " - as well as lateral power is transforming energy, economy and the world. Page 73*

able to guarantee energy independence. An integrated European system will allow each EU country to produce the energy it needs and to distribute excess production to other countries.

5) Realizing the Lisbon Agenda and becoming the most competitive economy in the world: the European industry has the scientific, technological and financial know-how to pave the way for renewable energy, green building, the economy founded on hydrogen and to start the world towards a new economic era. The automotive, chemical, manufacturing, IT and communications industries, the banking and insurance industries are capable of boosting the third industrial revolution. Furthermore, the EU is the world's largest market for solar energy and is a world leader in wind energy production. Only the EU remains responsible for creating a single and integrated energy market. Despite potentially being the largest internal market in the world with its 500 million consumers and other 500 million consumers in the associated areas spanning the Mediterranean and North Africa, the EU has not yet created efficient logistics infrastructures with a common transport, communications and energy grid.

6) Empowering people and promoting a European network: the third European revolution leads to a new social Europe in which power will be more widely spread in order to encourage new levels of collaboration among its 500 million citizens. In the new era, businesses, local authorities and homeowners will become producers as well as consumers of energy - we are speaking about the so-called "distributed generation". Just as in the past decade the "distributed communication" revolution has broadened minds and democratised communications, the third industrial revolution intends to democratise energy. The democratization of energy becomes a focal point of the new social Europe and access to energy becomes an inalienable fundamental right of the third industrial revolution era. In the twentieth century, we have seen the expansion of political participation and more widespread access to education and economics for millions of Europeans. In the twenty-first century, access to energy will also become a social and human right.

7) Education in the 21st century: The first and second industrial revolution were accompanied by profound changes in school systems. The third industrial revolution will also entail a radical school reform to prepare future generations to work and live in a post-coal world. Schools and universities will mainly teach computer science, bio and nano-technologies, earth sciences, ecology, systems theory, open-source learning models and social capital. We will need to educate our children to think like global citizens and prepare them to move from traditional twentieth century geopolitics to twenty-first century global biosphere politics. Education will concern the task of protecting the health of the planet's biosphere and promoting regional ecosystems.

8) A quality of the society of human life: in the new social Europe of the twenty-first century, the economic opportunity of the individual becomes part of a wider social vision that aims at creating a quality of the society of human life. The traditional economic indicators of the twentieth century which emphasize gross domestic product and per capita income will be accompanied by equally important indicators on the quality of life, human and social rights, on the level of education, on health, on the safety of communities, on a right relationship between work and leisure and on the quality of the environment. In the third industrial revolution, distributive power and sustainable communities are the drivers of the quality of human life society.

9) Rethinking globalization from below: the transition from the second to the third industrial revolution which will last half a century and will profoundly change the globalization process. Developing countries are likely to be the most affected. It may seem unbelievable but over half of the inhabitants of the planet have never made a phone call and a third have no electricity, which acts as a poverty multiplier. Access to energy guarantees greater economic opportunities. If millions of individuals and communities became producers of the energy they consume, the consequences would be enormous and the geography of power would also change. Local communities would be less subject to the will of distant centres of power. Communities could produce goods and services on the spot and sell them worldwide. This is the essence of sustainable development policy and a globalization rethought from below.

10) The legacy of Europe, a sustainable planet: in 1960 President Kennedy invited the American baby boom generation to help him bring a man to the moon within ten years and to explore space. In the 21st century, Europe must play a leading role in the salvation of the biosphere on earth. To move from the second to the third industrial revolution, a long-term and carefully studied transition plan is needed.
The European Union knows this and is committed to following a process based on two pillars:

- *increase energy efficiency and reduce the use of coal by 20% by 2020*
- *hitting the target of 20% renewable energy and laying the foundations of the third industrial revolution by the first half of the 21st century.*

Financing arrangements

The third industrial revolution, unlike the previous ones, does not need large funding and has projects that can be financed or at least co-financed directly by citizens.

Crowd funding, in particular, is a phenomenon that has spread in recent years but which has roots much more deeply rooted in time. The term used can be reinterpreted in terms of "fundraising" in the digital age.

It encompasses notions of crowd and funding, and the main reasons for its rapid diffusion are to be found in the global geopolitical situation and in the growing diffusion of social media, crowd funding consists in using the Internet for financial collection from groups of people with common interests in order to support a project or initiative.

The phenomenon can be interpreted as an exchange of information (ideas and projects) and capital (funds) between people or groups of people (crowd), through IT tools (social media, social networks), in a virtual environment (Internet).

Although online fundraising is not an absolute novelty, this type of collection uses the ability of IT tools to reach, involve and excite a large number of people in order to support projects proposed by entrepreneurs, artists, musicians, designers, planners or anyone who has an idea but is unable to find the funds useful to start it.

The business model of crowd funding platforms, in most cases, is based on a percentage retained by the sum of money collected.

The support provided has developed in various forms which differ according to the nature of the exchange. The most widespread example, in Italy and in the world, is represented by donation / rewards crowd funding and consists of a non-financial reward (a gadget, a product, a meeting with the creator of the idea, thanks in various forms, etc ...). Another model of growing interest arises from the growing difficulty of access to credit by SMEs, which has contributed to the development of equity crowd funding. In practice, a loan in the form of risk capital is provided in order to obtain stakes in the company.

A brilliant example of the application is found in the French region of Nord Pas des Calais, which has developed a master plan for the transition to the Third Industrial Revolution under the guidance of Jeremy Rifkin and under the direct supervision of the President of the Region Daniel Percheròn. To implement the plan, a department for the Third Industrial Revolution was created led by Marq Roquette, leading the 2050 decarbonisation objectives, providing for a 70% lower consumption and an energy coverage with 30% of renewables.

To achieve these objectives, the Department for the Third Industrial Revolution plans to use 200 billion Euros until 2050, with energy savings of 320 billion and therefore an active balance of 120 billion.[411]

In addition to crowd funding, there is financing which can be found in national public investments, regional infrastructure funds and European funds.

These forms of alternative funding may represent co-financing with regard to European projects, thus solving one of the main obstacles to the allocation and disbursement of Community funds through the region.

Focus: the economic circuit of Taranto

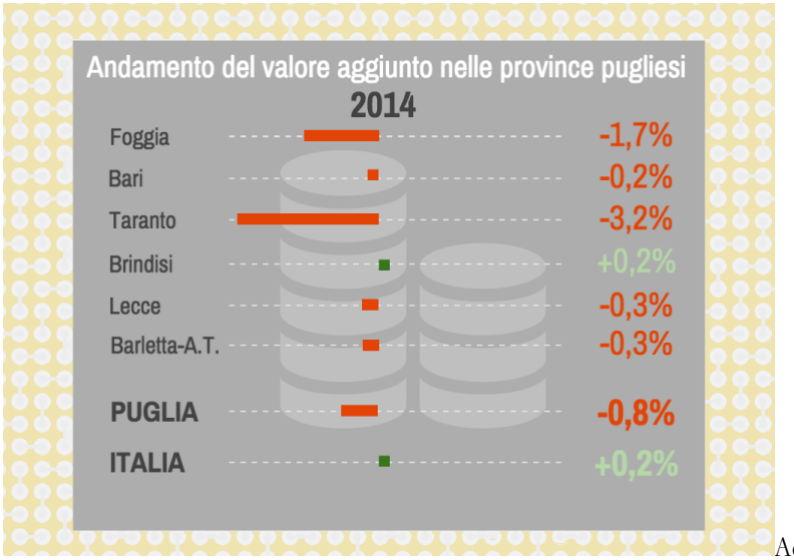
In the data available until 2014, the province of Taranto was found to be the worst Italian area by loss in terms of wealth, which reflects an entrepreneurial system that is struggling to grow together with a severely troubled induced employment. [412]

However, the province is full of potential so as to be framed among areas with high unexpressed potential which, if supported by concrete plans, could unleash disconcerting growth. In this context, the unexpressed potential of the province of Taranto is such as to rank it 76th among the Italian provinces, in an intermediate position between Bari and Brindisi on the one hand

[411] *Source: http://angeloconsoli.blogspot.it/2014/04/nord-pas-de-calais-francia-la-terza.html*

[412] *About half of the residents of the province of Taranto in working age are inactive, while the youth unemployment rate (15-24 years) has grown by almost 14 points in a year, reaching 54.2%. - Source: www.istat.it*

(56th and 60th) and Foggia and Lecce on the other (82nd and 86th). In particular, Taranto is framed within the areas of medium-high unexpressed potential, similarly to Bari and Brindisi.



Added value trend in Apulia Provinces

The infrastructure plan plays a key role and it is urgently necessary to remedy the shortcomings which at present are severely deficient and which lead to a well known international isolation. At European level, growth remained rather contained while in Italy it stood at -0.4%.

On the basis of 2014 data, the Italian turnover worsened by 44.7%. Construction, trade and tourism companies are the most affected, with percentage reductions greater than 50%. The situation in the more innovative industrial sectors is less severe, however difficult. Smaller companies and those in Central and South are more severely registering a long duration of recession. [413]

The scarcely encouraging general economic cycle of the province of Taranto has taken on a more marked dimension than the other Apulia provinces, thus identifying a two-speed region.

The economy of Taranto has a lower level in third sector than other areas. In detail, trade and services contributed for 72.8% to the production of provincial added value in 2013, while the national average was 74.4% and the Apulia average 77.2%.

On the other hand, the city presents together with Brindisi, a more industrial feature which in the period considered has contributed for 20.8% to the formation of added value, exceeding the average regional figure (17.9%), but still lower than the national one (23.2%). [414] A further distinctive element of the Taranto province is represented by the relevance of the primary sector. With regard to the latest available data, the incidence of the agriculture, forestry and fisheries sector on the provincial added value was 6.4%.

The agricultural sector, on the other hand, appears to be the one with the greatest chance to be the engine to relaunch the local economy, registering a performance higher than the average value of the territorial areas of comparison (Italy: + 9.1%; Puglia: + 18.6%).

The importance of medium-sized enterprises on the wealth produced, especially craftsmanship, is significantly higher than the average regional figure with added value equally shared between artisan manufacturing industries (37.3%) and services (38.9 %).

The share of added value determined by the activity of the Taranto cooperatives is 4.8% and non-profit sector has modest importance, accounting for 1.2% of the added value. 24.1% of the added value is generated by public bodies, to an extent greater than the average regional and national figure (19.1% and 12.5% respectively). [415]

Added value by branch of economic activity in the Apulia provinces, in Apulia and in Italy [416]

	Agriculture, forestry and fisheries	Industry strictly speaking	Building	Trade	Other services	Total
Foggia	725	824	419	1.723,1	4.879	8.570
Bari	725	2.683	1.234	5.151,3	11.918	21.711
Taranto	565	1.465	381	1.480,7	5.002,5	8.894

[413] *Source: Taranto Chamber of Commerce - 13th economy day- Taken from "Taranto Report 2015 ". Page 13.*
[414] *Industry strictly speaking 16.5%; construction 4.3%. Source: Taranto Chamber of Commerce.*
[415] *Source: Taranto Chamber of Commerce - 13th economy day- Taken from "Taranto Report 2015 ". Page 17*
[416] *Source: Processing by Guglielmo Tagliacarne Institute on Istat data*

Brindisi	370	1.089	251	1.146,9	3.131,1	5.988
Lecce	318	967	651	2.120,1	6.518,6	10.575
Barletta-A.T.	187	634	279	1.009,6	2.760	4.870
APULIA	2.891	7.662	3.214	12.631,8	34.208,4	60.607
ITALY	33.699	262.619	76.390	352.342,7	731.752,2	1.456.803

Percentage distribution of value added by size range in the Apulia provinces, Apulia and Italy (as a percentage)[417]

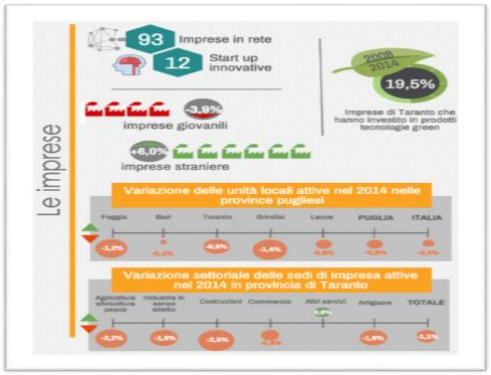
	Up to 49 employees	50-249 employees	≥ 250 employees	Total
Foggia	76,2	5,1	18,7	100,0
Bari	66,8	9,6	23,6	100,0
Taranto	69,4	12,1	18,4	100,0
Brindisi	77,6	10,0	12,4	100,0
Lecce	79,6	5,6	14,8	100,0
Barletta-Andria-Trani	80,7	9,3	10,0	100,0
APULIA	72,9	8,6	18,4	100,0
ITALY	67,7	9,6	22,7	100,0

Composition of the craftsman added value in the Apulia provinces, Apulia and Italy (in million Euros) [418]

	Agriculture, forestry and fisheries	Manufacturing industry	Other industries in	Building	Services	Total
Foggia	9,2	233,6	8,1	230,6	396,4	878,0
Bari	8,1	677,8	28,1	678,9	1.057,1	2.450,0
Taranto	4,8	305,5	20,5	169,7	318,3	818,7
Brindisi	3,1	192,8	67,2	171,9	334,5	769,4
Lecce	7,7	365,6	57,5	414,3	674,8	1.520,0
Barletta-Andria-Trani	1,1	255,3	9,6	180,7	252,0	698,7
APULIA	34,0	2.030,6	191,0	1.846,1	3.033,1	7.134,8
ITALY	1.564,8	53.806,5	2.840,4	39.181,0	70.248,6	167.641,2

Payments made by municipal administrations for macro spending items in the Apulia provinces, Apulia and Italy - 2014 (million Euros) [419]

	Ongoing expenses	Capital expenditures	Expenses for repayment of loans	Expenses for third parties services	Other expenses	Total
Foggia	447,3	126,2	116,2	45,8	55,2	790,6
Bari	836,2	147,3	49,6	70,4	7,3	1.110,8
Taranto	417,1	44,6	44,0	45,3	0,2	551,3
Brindisi	270,2	39,4	91,3	26,5	20,5	447,9
Lecce	533,5	124,4	156,5	55,5	54,3	924,2
Barletta-Andria-Trani	234,3	49,7	25,8	22,4	55,7	387,9
APULIA	2.738,6	531,5	483,5	265,9	193,2	4.212,7
ITALY	55.736,20	10.936,56	9.408,00	5.483,53	1.815,29	83.379,57



The province of Taranto shows a low sensitivity to the economic cycle, ranking 83rd among the Italian provinces. The rigidity of Taranto economic cycle mainly depends on its international isolation. Therefore, it is necessary to identify policy lines that can allow greater integration of the local economy with the foreign markets, promoting an increase in both exports and tourism. First of all, the competitiveness of local goods is modest as it is connected to a traditional production system, characterised by a low innovative content.

In this context, business networks, innovation clusters on specific domains, as well as collaboration platforms between the university and research system and local businesses can play a central role.

The dynamics of the Taranto businesses do not differ from the regional and national ones, in fact the local units active in 2014 in the province of Taranto are 48,031, recording a contraction of -0.9% compared to 2013.

417 *Source: Processing by Guglielmo Tagliacarne Institute on Istat data*
418 *Source: Processing by Guglielmo Tagliacarne Institute on Istat data*
419 *Source: Processing by Guglielmo Tagliacarne Institute on Istat data*

The decrease in the number of active business locations (41,043 at the end of 2014) was more pronounced for less structured legal forms, as they are more vulnerable to the effects of the recession. More specifically, in Taranto, there was a decline between companies active in the types of partnerships (-3%), individual companies (-1.9%), cooperatives (-6.1) and other forms (-2, 2), while capital companies grew (+ 4.3%), confirming, in the long term, a tendency to strengthen the production sector. The incidence of joint stock companies is more pronounced in Taranto than in the other Apulia provinces. In 2014, 16.6% of Taranto businesses belong to this legal form, 1.9 points higher than the regional average. However, this is a value still far from national standards, where almost a quarter of companies are a capital company (19.6%). Clothing, furniture and leather goods manufacturing companies are penalized. The number of active craft businesses fell by 1.9% in 2014, which is substantially in line with the Italian trend (-1.8%), but better than the regional performance (-2.4%). The negative trend in Taranto, as well as in Puglia, affected all sectors, and manifested itself to a greater extent for construction companies (-3.2%) and for those of agriculture, forestry and fisheries (-2, 9%).

Local units registered and active in 2014 in the Apulia provinces, Apulia and Italy [420]

	Absolute values	Absolute values	Variations 2014/2013	Variations 2014/2013
	Registered	Active	Registered	Active
Foggia	80.499	72.132	-1,3	-1,2
Bari	175.840	151.368	0,2	-0,1
Taranto	54.992	48.031	-0,5	-0,9
Brindisi	41.516	36.413	-1,5	-1,4
Lecce	83.693	73.927	-0,4	-0,6
APULIA	436.540	381.871	-0,4	-0,6
ITALY	7.221.476	6.238.056	-0,1	-0,4

Companies active in the Apulia provinces, Apulia and Italy by sector (in absolute value) [421]

	Foggia	Bari	Taranto	Brindisi	Lecce	APULIA	ITALY
Agriculture, forestry and fisheries	24.420	26.280	10.779	7.387	8.941	77.807	757.758
Industry strictly speaking	3.937	12.897	3.064	2.367	6.292	28.557	529.973
Building	6.580	15.724	4.498	4.071	9.609	40.482	774.124
Trade	16.448	41.733	12.598	9.753	21.242	101.774	1.412.349
Other services	12.046	33.109	10.091	7.669	16.484	79.399	1.670.682
Not classified	25	75	13	6	21	140	3.527
Total	63.456	129.818	41.043	31.253	62.589	328.159	5.148.413

Companies active in the manufacturing sectors in Apulia provinces, Apulia and Italy (in absolute value) [422]

	Foggia	Bari	Taranto	Brindisi	Lecce	APULIA	ITALY
Food and drinks companies	1.051	2.022	576	548	989	5.186	60.813
Textile	50	446	54	35	200	785	16.709
Clothing	158	1.949	335	185	713	3.340	46.998
Manufacture of leather goods	26	450	17	5	159	657	21.546
Wood and furniture	374	1.583	289	288	878	3.412	59.735
Non-metallic minerals	308	645	220	155	440	1.768	25.502
Metallurgy	645	1.703	615	439	1.037	4.439	103.098
Electronics, electrical appliances	116	432	87	58	136	829	23.280
Machinery and transport means	165	664	155	115	222	1.321	38.529
Other manufacturing industries	675	2.412	563	414	1.161	5.225	110.572
Total	3.568	12.306	2.911	2.242	5.935	26.962	506.782

Craft businesses active in the Apulia provinces, Apulia and Italy (in absolute value) [423]

	Foggia	Bari	Taranto	Brindisi	Lecce	APULIA	ITALY

[420] *Source: processing of Infocamere data*
[421] *Source: processing of Infocamere data*
[422] *Source: processing of Infocamere data*
[423] *Source: processing of Infocamere data*

Agriculture, forestry and fisheries	88	82	33	37	51	291	9.986
Industry strictly speaking	2.246	7.559	1.553	1.439	4.338	17.135	324.454
Building	3.222	9.358	2.541	2.782	7.134	25.037	532.604
Trade	1.073	2.619	652	642	1.652	6.638	86.236
Other services	3.107	9.718	2.792	2.355	5.243	23.215	417.232
Not classified	4	14	1	7	4	30	1.065
Total	9.740	29.350	7.572	7.262	18.422	72.346	1.371.577

Looking with a more detailed lens we find that, with data as of 2014, the youth enterprises in the province of Taranto are 4,739 and are active, in particular, in the tertiary sector (trade 38.8%, other services 32.6%), in a dimension rather in line with what can be found at regional and national level.
Female-owned businesses amount to 10,734 and are mainly distributed in the sectors of commerce (32.8%), agriculture (30.9%) and services (27.3%).

Finally, there are 13,417 foreign companies in the province of Taranto, mostly operating in the commerce sector (61.8%); among other things, companies managed by foreigners are the only ones to show a positive growth rate. [424]

Youth businesses active in the Apulia provinces, Apulia and Italy (in absolute value) [425]

	Foggia	Bari	Taranto	Brindisi	Lecce	APULIA	ITALY
Agriculture, forestry and fisheries	1.650	1.926	497	435	775	5.283	50.884
Industry strictly speaking	417	1.104	260	207	565	2.553	38.056
Building	892	1.940	595	597	1.224	5.248	99.070
Trade	2.824	6.084	1.839	1.486	3.488	15.721	177.738
Other services	2.114	5.419	1.544	1.352	2.752	13.181	197.703
Not classified	2	7	4	2	5	20	549
Total	7.899	16.480	4.739	4.079	8.809	42.006	564.000

Women-owned active business in the Apulia provinces, Apulia and Italy (in absolute value) [426]

	Foggia	Bari	Taranto	Brindisi	Lecce	APULIA	ITALY
Agriculture, forestry, fisheries	8.172	7.328	3.316	1.903	2.506	23.225	219.034
Industry strictly speaking	607	2.236	576	392	1.067	4.878	89.001
Building	523	1.023	380	245	489	2.660	44.111
Trade	4.170	8.865	3.525	2.462	5.101	24.123	348.311
Other services	3.420	8.177	2.932	2.264	4.809	21.602	447.167
Not classified	3	13	5	0	4	25	701
Total	16.895	27.642	10.734	7.266	13.976	76.513	1.148.325

Foreign active business in the Apulia provinces, Apulia and Italy (in absolute value) [427]

	Foggia	Bari	Taranto	Brindisi	Lecce	APULIA	ITALY
Agriculture, forestry and fisheries	187	286	48	331	232	1.084	13.945
Industry strictly speaking	254	97	612	239	287	1.489	40.440
Building	561	134	606	242	421	1.964	123.045
Trade	6.173	499	10.699	925	4.194	22.490	182.601
Other services	746	285	1.445	455	902	3.833	115.729
Not classified	4	1	7	1	1	14	273
Total	7.925	1.302	13.417	2.193	6.037	30.874	476.033

[424] *Source: Taranto Chamber of Commerce - 13th economy day- Taken from "Taranto Report 2015 ". Page 34*
[425] *Source: processing of Infocamere data*
[426] *Source: processing of Infocamere data*
[427] *Source: processing of Infocamere data*

Taranto and the third industrial revolution

Among the rethinking strategies of the production system as a whole, a fundamental factor is represented by the green economy, and this is not a case.
In the numerous spaces left free by the cumbersome steelworks, Taranto could host world excellence centres for experimentation and applied research in the leading sectors of the Third Industrial Revolution, for example in the following sectors:

1) Free software and "Open Source" programming
2) Mesh Networks
3) Advanced solar energy (integrated photovoltaic, organic photovoltaic, solar cooling, energy efficiency of historic buildings etc.
4) Application of hydrogen propulsion technologies to boating
5) Alternative fuels and electric motors
6) Reuse banks and waste reduction practices
7) Experiential tourism and garden therapies.
8) New TRI didactic models
9) Zero disease and prevention practices distributed throughout the territory

Taranto zero disease: The health commons[428]

Taranto is sadly famous in the world for the suffering and illness of its inhabitants induced by the wicked industrialisation that has observed purely economic and profit maximisation logics. A different economic model no longer based on the centrality of profit, can only be based on the centrality of the human being and his/her physical and mental well-being. This implies studying each economic planning activity in light of the implications for health and disease, for life and death. For this reason it would be symbolic to introduce the principle of "Zero Illness" as an element of redemption of the territory of Taranto. To experience, in Taranto too, those "Commons of health" which represent one of the central themes of the sharing economy according to Rifkin.
The Third Industrial Revolution is not just the change from a centralized and top-down energy / economic model to a distributed and interactive one.
The Third Industrial Revolution is also and above all a paradigmatic change for the human race.
An epochal transition from an individualistic and utilitarian lifestyle to a biospheric and empathic one. In a society where the marginal cost of producing and distributing goods and services is getting closer to zero, where information, objects, ideas, services and people travel at infinitesimal costs compared to a hundred years ago and in times then unimaginable, mankind exits an economy of scarcity and definitively enters a sustainable economy of abundance in which economic activity will no longer develop according to the canons and standards of the traditional profit-based market economy, but according to the canons of the standards of a social economy based on collaborative Commons.
Rifkin clearly describes the Energy Commons made up of millions of prosumers capable of generating almost all their green energy at almost zero marginal cost, the Logistics Commons capable of designing, printing and distributing goods and services at almost zero marginal costs, and the Commons of Health, Education and Culture capable of guaranteeing school, health and cultural services under the same conditions, or the Commons of Mobility for the movement of human beings in increasingly sustainable, efficient and economic ways.
The new generations are projected beyond the capitalist market, beyond a centralised, hierarchical, closed, patriarchal model, linked to ownership, towards a distributed, collaborative, open, transparent, equal and empathic model.
It's what Rifkin calls "Lateral Power".
Today's young people, connected to each other in the virtual space (by social networks where information travels abundantly and for free), and in the physical one, (by low cost flights unimaginable only ten years ago, or increasingly rapid and efficient metropolitan transport networks), "are quickly getting rid of the residual cultural and commercial ideological constraints that have separated" mine "from" yours "since immemorial time , within the framework of a capitalist system characterised by private property relationships, market exchanges and national borders. "Open Source" has become the mantra of a generation that sees power relationships in a completely different way than their parents and grandparents who have lived in a world dominated by geopolitics. "(Cit. Jeremy Rifkin, The Zero Marginal Cost Society, pages 429-430)
In a new empathic civilisation deeply integrated into the biosphere community, all natural resources become common heritage and their conservation becomes everyone's concern.
Even the planning of urban, industrial or rural spaces cannot be subtracted from this rule.

[428] *Written in collaboration with prof. Angelo Barbato and Drs Eloisa Fioravanti*

The construction of large industrial plants and infrastructural networks of the third millennium and the third industrial revolution can therefore no longer proceed according to the dissipative and unsustainable canons of the fossil era in which the networks were built ignoring the principles of efficiency and space optimization of urban and rural areas that were repeatedly and wildly disembowelled for the construction of tens of thousands of power lines, gas pipelines, cable ducts, aqueducts, road infrastructures, electromagnetic networks and lighting networks.
In the idea of collaborative Commons, the Internet of Things offers new and unprecedented possibilities of "doing more with less" (principle of energy efficiency affirmed by the European Union) by exploiting existing networks, enriching them with new functions useful for expanding the sharing economy and empathy among human beings.
Collaborative Commons is based on the idea that the laws of thermodynamics cannot be ignored, minimized, circumvented or violated. The first law of thermodynamics clearly tells us that nothing is created, nothing is destroyed but everything is transformed. So burning an object to close the waste cycle does not mean having eliminated it completely but simply that it changed from solid to gaseous status, making it even more dangerous not only for the environment but for human health. All the energy of the second industrial revolution is based on the violation of the laws of thermodynamics. Combustion as propulsion for turbines is a thermodynamic madness with lethal consequences for human health. Changing paradigms from the fossil cycle to the solar cycle therefore means activating an economy that is less productive of risks to human health, and therefore more in line with a disease prevention policy, closer to the zero disease objective.
The Third Industrial Revolution is creating healthier and cleaner societies, an agriculture without pesticides and without GMOs, a distributed, non-centralised industry, non 'sclerotised' on the steel industry, electric and non-fossil, therefore without emissions or very low emissions, a consumption cycle oriented towards recirculation of materials and therefore the elimination of health pollution factors such as land and water pollution from landfills and air poisoning from incinerators.
But Rifkin with his new book brings reflection many steps forward to this albeit remarkable result. He speaks about the "Commons of Health."
Why not imagine, in addition to the Commons of Information and the Commons of Energy, also the Commons of Health? A Commons in which modern distributed and interactive information technologies allow to create what Dr. Gille Frydman, founder of the ACOR (Association of Cancer Online resources), call a model of participatory medicine, where in a single Commons various subjects, patients, researchers, doctors, funders, manufacturers of medical equipment, therapists, pharmaceutical companies, and healthcare professionals all committed to collaborating to improve patient care. "(Rifkin, The Company at Zero Marginal Cost p. 343)
This is not a remote and unrealistic hypothesis. Patients like me a network of over 200,000 e-patients, already treats 1800 diseases and has for example unmasked the scam of lithium carbonate-based drugs that in reality their study based on the information received on the network has demonstrated to be totally irrelevant in the treatment of ALS. This shows how the "open source" approach to medical research can give much more effective results than that of proprietary and competitive research where data remains limited and secret.
In no sector as in that of medicine it becomes so fundamental to have "big data" treated with adequate algorithms, according to the crowd sourcing model, to identify health models with low marginal costs and very high efficacy. In the "Everyone is a Doctor" chapter of his latest book, Jeremy Rifkin reminds us that Today the Internet has hundreds of Open Source health Commons. And then he underlines that “everything suggests that their number will increase considerably in the coming years, when in the various countries the electronic storage of health data will make it possible to make patient care services more fluid and efficient ... The big data that will be possible to generate in the United States as in all other countries, will constitute a pool of information that, if properly exploited by patient-oriented open source healthcare Commons, could, without prejudice to the necessary guarantees regarding confidentiality, revolutionize the health sector ”(Rifkin, Ibidem, p. 348).
In this sense, the message launched by this collective work of sensitive and intelligent doctors interpreters of the Rifkinian message, such as Dr. Angela Meggiolaro, Dr. Bruno Corda and Dr Angelo Barbato completes the vision of a society with zero emissions, waste and km and an economy with zero marginal cost, where thanks to the contribution of Angelo Barbato, it was possible to start spreading the concept of Zero Illness, as a scenario in which the Internet of Things and the Third Industrial Revolution allow to move on the territory (in fact) the care centre of gravity with the need to increase prevention as a "Pillar" of the distributed model of healthcare in territorial medicine, and as an effective way of guaranteeing the well-being of citizens compared to the traditional hospital-based model which has become ineffective for the treatment of chronic diseases which are increasingly popular due to the lifestyles and work imposed by second industrial revolution, and which cannot be eradicated except with a third industrial revolution healthcare model based on telemedicine, curative and preventive home medicine, the fight against chronic diseases, the action of doctors in the territory in schools, public administrations, taking charge of the citizen-patient by experts but also by other citizens.
This presupposes a real paradigm shift: from waiting medicine to initiative medicine
Since ancient times, the sick person has always addressed him/herself to a person who, through experience, training and passion, was able to diagnose and treat diseases. Medicine was born precisely in this way, developing on what we can define the paradigm of waiting medicine.

The disease condition, which has always been considered an event on which to intervene to change its course, has developed organizational responses over the centuries that in the waiting paradigm have been structured on the basis of urgency-emergency, by the intervention of a single doctor up to the helicopter rescue.
Waiting is the classic paradigm of the biomedical health model, the one on which the university education of doctors and healthcare professions has always been based. The academic world and the faculties of medicine, over the centuries and until today have mainly been structured in their training courses on the study and treatment of diseases.
However, waiting medicine is fine in an emergency, when there are no other possibilities.
Waiting too long for the course of a disease is not "good for your health"- of course - but prevention, repeatedly invoked in recent years, has struggled to be included in effective disease monitoring programs.
The hygienic (holistic) approach in medicine, which includes preventive medicine, has started to modify the global approach to disease, introducing the concept of prevention of the disease itself, which acts before the disease manifests itself, which in some cases means anticipating the different pathological states. Epidemiological studies have in fact made a fundamental contribution to the development of anticipatory strategies.
It is intuitive that the approach to the disease taken until now has been an often late approach, which took into account only the moment when the patient "is sick", too often in an emergency, developing organisational contrasting models only through waiting medicine, forgetting to act before the disease begins its course by activating preventive medicine.
However, still today the models for contrasting the disease often forget to apply a new way of organising health care, which must be preliminary to the condition of urgency, which is achieved through the so-called initiative medicine.
Research by the medical and scientific community has in fact confirmed the predictability and, in some way, the possibility of avoiding many pathologies, through the environmental and behavioural observation of individuals and communities. Attention to lifestyles and the environment that surrounds us in fact remain fundamental for the protection of the health of the individual and affect the incidence of new pathologies and the aggravation of pre-existing risk conditions.
A case in point comes from some reflection on whether to drilling in the underground of our country or not.
Third Industrial Revolution technologies in healthcare: re-engineering of hospitals, digital data management, energy plan of hospitals and territorial structures
In recent years, the traditional and top-down model of health that identifies with hospital care has started to falter not only for the high energy, technological and management costs but also for the profound epidemiological modifications of the diseases.
Traditionally, acute pathology has seen the development of a waiting medicine that has developed vertically in the hospital, a structure dedicated more and more recently to the high intensity of care. The increase in average life with the progressive aging of the population has led to the increase in chronic-degenerative and disabling pathologies, for which the traditional waiting model of the hospital is inadequate; the assistance centre of gravity is moved to the territory, with the need to intervene more and more effectively with preventive actions. Prevention therefore becomes the pillar of the distributed model of health in territorial medicine: not only for its undisputed value of promoting and maintaining health, but also for a better use of resources with consequent reduction of costs.

Hypothesis of Zero Disease Plan for Taranto

- Immediate closure of all emission sources and their remediation
- Re-engineering of the hospital and territory with related functions and interconnections: from waiting medicine to initiative medicine
- integration of prevention into the social and territorial medicine care model
- The new information in healthcare: digital data management (organizational, epidemiological, economic etc.)
- Circular motion of sanitary innovation
- Energy plan of hospitals and territorial structures

This new healthcare model of the third Industrial Revolution, which can achieve extraordinary and very rapid results in terms of treatment but also and above all prevention, is the heart of the book Zero Disease, which tells us about a possible future whose realisation depends on all of us, starting from public administrations and healthcare companies, but without forgetting the citizen and the aggregate strength of networks that go ever more rapidly towards a biospheric, empathic, collaborative and sustainable lifestyle in each Community, starting from Taranto.

Taranto's economic redemption begins with respect for its biosphere

The more rational use of resources and a reduced environmental impact can be the tool for the revitalization of areas characterized by various types of deficiencies.
At Puglia level 22% of the companies has "invested green" with maximum peaks in the province of Brindisi (23.2%) and Lecce (23.1%). In the regional ranking, the province of Taranto with an incidence of green businesses equal to 19.5%, ranks last; sad

record also as regards the incidence of green companies that have made investments to reduce consumption and raw materials, precisely 75.9%.
Even innovative start-ups are still few. Of the 156 Apulia companies registered in the innovative start-up section at 28 April 2015, only 12 are located in the Taranto area, and exclusively in the services sectors. Most of them, around 80%, are located in the province of Lecce.
Among the highly innovative companies a central role is represented by those producing digital outputs. In this sense, Apulia has a more limited number of businesses attributable to the digital economy than the country's average.
Specifically, these companies represent 2.4% of the Italian production system and 1.7% of the Apulia one. The province of Taranto is slightly below the regional average (1.6%) with 774 companies, of which 99 are craftsmen, equal to 12.1% of the Apulia total.
However, it should be noted that in Taranto, as well as in Apulia, the share of digital enterprises of youth or female initiative is greater: in 2014 20.8% of digital economy enterprises were classified as run by women (Italy: 18.2%) and 18.1% as youth, 4.2 points above the national average (13.9%).
The province of Taranto is also characterised by a delay, compared to the regional average, also in relation to the incidence of the cultural production system. The companies ascribable to this area represent 5.3% of the total: 0.7% less than what was observed for Apulia as a whole and two percentage points less than the Italian figure. Furthermore, compared to the regional average, the creative industries aggregate is two percentage points lower (Taranto: 71,1%; Apulia: 73,2%), while the cultural industries are located one point above (Taranto 20.8%, Puglia 19.8%).[429]

[429] *Source: Taranto Chamber of Commerce - 13th day of the economy - Taken from " Taranto Report 2015 ". Page 37*

Companies that have invested or planned to invest in green products and technologies[430]

	Companies that have invested / planned to invest in the green 2008-2014	Companies that have invested / planned to invest in the green 2008-2014	Companies that invested in the green 2011-2013 by type of investment (%):	Companies that invested in the green 2011-2013 by type of investment (%):	Companies that invested in the green 2011-2013 by type of investment (%):
	Absolute values	% Incidence on companies total	Reduction of consumption of raw materials and energy	Sustainability of the production process	Product/service offered
Foggia	2.950	22,5	83,3	15,0	11,5
Bari	8.720	21,7	76,4	20,4	13,8
Taranto	2.280	19,5	75,9	22,8	14,1
Brindisi	2.080	23,2	84,6	13,6	10,9
Lecce	4.720	23,1	80,9	16,0	12,7
APULIA	20.760	22,0	79,2	18,2	13,0
ITALY	341.410	21,8	79,7	18,8	12,4

Companies registered in the section of innovative start-ups by sector in the Apulia provinces, Apulia and Italy [431]

	Agriculture/ fisheries	Industry/ handicraft	Trade	Tourism	Other services	Not classified	Total
Foggia	0	2	1	0	10	3	16
Bari	0	14	1	0	61	0	76
Taranto	0	5	0	0	7	0	12
Brindisi	0	3	1	0	2	0	6
Lecce	0	11	2	0	33	0	46
APULIA	0	35	5	0	113	3	156
ITALY	13	685	167	17	2.944	16	3.842

Digital economy companies registered in the Apulia provinces, Apulia and Italy [432]

	Total companies	Women-owned companies	Youth businesses	Foreign companies	Craft businesses
Foggia	743	151	169	25	76
Bari	2.638	456	501	76	446
Taranto	774	161	140	21	99
Brindisi	528	115	95	18	101
Lecce	1.273	236	239	78	246
Barletta-Andria-Trani	459	77	103	13	79
APULIA	6.415	1.196	1.247	231	1.047
ITALY	144.160	26.259	20.073	9.125	22.826

Indicators of digital economy companies registered in the Apulia provinces, Apulia and Italy (2014, in %) [433]

	Total digital companies out of total companies	Women-owned digital companies out of total digital companies	Young people-owned digital companies out of total digital companies	Foreign digital companies out of total digital companies	Craft digital companies out of total digital companies
Foggia	1,1	20,3	22,8	3,3	10,2
Bari	2,3	17,3	19,0	2,9	16,9
Taranto	1,6	20,8	18,1	2,7	12,8
Brindisi	1,5	21,8	18,0	3,4	19,1
Lecce	1,8	18,5	18,8	6,1	19,3
Barletta-Andria-Trani	1,2	16,8	22,3	2,8	17,2
APULIA	1,7	18,6	19,4	3,6	16,3
ITALY	2,4	18,2	13,9	6,3	15,8

[430] *Source: processing of Infocamere data*
[431] *Source: processing of Infocamere data– Dat as of 28th April 2015.*
[432] *Source: Processing by Guglielmo Tagliacarne Institute*
[433] *Source: Processing by Guglielmo Tagliacarne Institute*

Despite the aforementioned difficulties in the province's economic cycle, with data updated at the end of 2014, 86.2% of the registered companies are active, data substantially in line with the regional one (87%) and one point above the national one (85.2%).
The persistence of the recession continues to produce negative effects on employment. As anticipated, the framework is dramatic. In the Ionian territory, the sum of unemployed (28.8%) and non employed (15.75%) determines a level of 44.55%, which is equivalent to over 110 thousand people.
Four out of ten people do not work and many have stopped looking for a job because they do not see any prospect. [434]

Total employed in the Apulia provinces, Apulia and Italy (in thousands) [435]

	2013	2014
Foggia	162,6	156,9
Bari	385,0	382,0
Taranto	169,6	159,1
Brindisi	115,3	116,9
Lecce	225,1	217,9
Barletta-Andria-Trani	100,9	110,8
APULIA	1.158,4	1.143,7
ITALY	22.190,5	22.278,9

Male employed in the Apulia provinces, Apulia and Italy (in thousands) [436]

	2013	2014
Foggia	108,9	107,6
Bari	248,1	244,0
Taranto	107,4	102,8
Brindisi	74,7	75,9
Lecce	142,5	135,9
Barletta-Andria-Trani	70,5	75,9
APULIA	752,1	742,2
ITALY	12.914,2	12.945,3

Female employed in the Apulia provinces, Apulia and Italy (in thousands) [437]

	2013	2014
Foggia	53,7	49,3
Bari	136,9	138,0
Taranto	62,2	56,3
Brindisi	40,6	41,0
Lecce	82,6	82,0
Barletta-Andria-Trani	30,3	34,9
APULIA	406,3	401,5
ITALY	9.276,3	9.333,7

Composition by sector of the employed in the Apulia provinces, Apulia and Italy (in %) [438]

People seeking employment in the Apulia provinces, Apulia and Italy (values in thousands) [439]

	2013	2014
Foggia	43,8	46,4
Bari	94,2	98,1
Taranto	31,1	36,1
Brindisi	23,3	26,3
Lecce	63,7	75,9
Barletta-Andria-Trani	28,8	29,8
APULIA	284,8	312,6
ITALY	3.068,7	3.236,0

The data show that around half the residents of the province of Taranto in working age are not active. In particular, the age group between 15 and 24 years of age is involved, together with all the Apulia provinces as shown in the following table.

[434] *Source: http://www.pugliapress.org/2016/02/03/taranto-disastro-occupazione-puglia-picchi-del-60-di-giovani-disoccupati/*
[435] *Source: processing on Istat data*
[436] *Source: processing on Istat data*
[437] *Source: processing on Istat data*
[438] *Source: processing on Istat data 2014*
[439] *Source: processing on Istat data*

	2013	2014
Foggia	58,7	63,7
Bari	55,8	60,5
Taranto	40,5	54,2
Brindisi	38,9	45,4
Lecce	48,5	62,0
Barletta-Andria-Trani	43,2	53,0
APULIA	49,7	58,1
ITALY	40,0	42,7

Socio-economic difficulties lead to a reduction in the wealth of the people of Taranto causing a decrease in the average wealth per inhabitant whose added value is around 14,500 Euros per year. Favoured by the greater tourist attraction, the municipalities on the coast have the highest added value per capita in the province, which stands at 72% of the national average and (Apulia: 73,4%).
The situation turns out to be more critical in the non-coastal municipalities (52.7% against the regional 55.8%) which cannot take advantage of any externalities connected to the blue economy.
The level of per capita consumption stands at three quarters of the national average (75.1%) and coincides with the regional average figure. The breakdown of consumption by final destination shows that in Taranto there is a prevalence of goods (55.6%) over services (44.4%). 440

Per capita added value in the Apulia provinces, Apulia and Italy (in Euros) [441]

	2013	2014
Foggia	13.564,06	13.278,87
Bari	17.311,62	17.182,68
Taranto	15.163,08	14.609,86
Brindisi	14.941,27	14.965,66
Lecce	13.149,65	13.072,56
Barletta-Andria-Trani	12.387,94	12.335,29
APULIA	14.889,22	14.709,92
ITALY	24.185,75	24.022,88

Agricultural leverage and the unexpressed potential of the tourism sector

The provincial agricultural sector was less affected, compared to the rest of Apulia and Italy as a whole, by the effects related to the recession.
With reference to the agriculture, forestry and fisheries sector, the examination of the data shows a greater incidence of the agricultural added value (6.4%) compared to the regional (4.8%) and national (2.3%) average, associated with the prevalent component of traditional products, mostly quality food, but characterised by a limited growth capacity.
In this regard, the distribution of the value of production at basic prices shows a significant specialisation in woody crops, which represent a little less than half the total (46%), higher than the territorial areas of comparison (Apulia: 37.5%; Italy: 22,5%).
On the contrary, herbaceous crops weigh for just over a quarter (22.3%), unlike what is observed for Apulia (38.3%), where they are the most significant item, and for Italy as a whole (30.2). Zootechnical products play a more marginal role, determining only 12.7% of the value of Taranto's agricultural production and 8.4% at Apulia level, compared to the 33.4% that is recorded for the rest of the country.
Finally, the importance of the related services is greater in the Taranto area where they contribute to almost a quarter of the total volume (19%).
Turning attention to the individual items, the examination of the data shows that a large part of the value of production is attributable to wine products (26.1%), potatoes and vegetables (19.5%) and related services (19 %). 442
As regards quality production, 80 operators are registered in the province of PDO / PGI quality food products. Of these, 54 (67.5%) concern fruit and vegetables and cereals, PDO cheeses and PDO and PGI extra virgin olive oils 12 each (15%) , and 2 (2.5%) PGI meats. Overall, the number of operators is rather marginal, representing just 3.4% of the Apulia total. 443
In 2014, the balance of payments relating to the agri-food sector was in the surplus of 51.86 million Euros, with 28.26 million imports and 80.12 million exports.

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[440] *Source: Taranto Chamber of Commerce - 13th day of the economy - Taken from " Taranto Report 2015 ". Page 51*
[441] *Source: Processing by Guglielmo Tagliacarne Institute on Istat data*
[442] *Source: Taranto Chamber of Commerce - 13th economy day - Taken from "Taranto Report 2015". Pages 62 – 63 – 64.*
[443] *Source: processing of data provided by Taranto chamber of commerce*

Top 10 sectors by impact of the number of companies on the total agri-food sector[444] (2014; absolute and %values)

	ABSOLUTE VALUES	INCIDENCE
Growing of grapes	3.125	27,5
Permanent crop growing	2.685	23,6
Growing of oleaginous fruits	1.163	10,2
Growing of citrus fruits	1.043	9,2
Agricultural crops associated with animal breeding	805	7,1
Cultivation of cereals (excluding rice), leguminous vegetables and oil seeds	509	4,5
Cultivation of vegetables and melons, roots and tubers	458	4,0
Cultivation of non-permanent agricultural crops	329	2,9
Bread production; fresh pastry products	284	2,5
Dairy cattle breeding	213	1,9
Other	741	6,5
Total agri-food	11.355	100,0

Below is a series of data on the trend of the main agricultural production in the province:

- the production of table grapes, wine grapes and wine was 4,242,500 quintals, equal to 19.4% of the regional total.
- the production of tomatoes and industrial tomatoes was 220,500 quintals, equal to just 1.7% of the regional total.
- the production of citrus fruits (oranges, mandarins, clementines, lemons) was 2,297,000 quintals, equal to 89.4% of the regional total.
- the production of cereals (common wheat, durum wheat, barley and oats) was 370,500 quintals, just 3% of the regional total

  The tourism sector could represent an important factor in relaunching the local economy of the province of Taranto, taking advantage of a natural resource[445] potentially attractive to visitors.

Reading the main tourist surveyors, however, suggests that this resource is still far from being fully exploited. If we consider the tourist concentration index[446], Taranto is placed only at 98th place at the national level. In fact, the number of arrivals is just 43.8% of the population, compared to a national average of 170.9%.

At the same time, a number of positive factors also emerge. First, the Taranto area seems suitable for attracting medium-term tourism and, therefore, potentially more profitable for the local economy. According to the relevant index, Taranto ranks 35th for average stay: 4.3 days versus 3.6 in the rest of the country.

The high hotel quality of the province should also be highlighted, with 48.9% of the hotels classified at least with four-five stars. Taranto ranks second in Italy in this ranking, well above the general average of 17.4%.

On the other hand, among the elements that are lagging behind, there is, first of all, a slightly diversified accommodation offer, to the point that complementary structures have a limited impact: as much as 88.3% of total arrivals and 85.4% total attendance were recorded at hotel facilities. This aspect can be considered as a peculiarity of the Taranto area, if we consider that in Apulia the share of arrivals and presences recorded in hotel establishments stands at 74.7% and 60.3% respectively.

The flows of foreign tourists represent a rather small component of total arrivals and presences, although in line with the modest level of internationalization that characterises regional tourism. Taranto area is struggling to attract international tourists, as evidenced by the 90th position of the tourist internationalisation index, which measures the relationship between foreign and Italian visitors.

The expenditure of international tourists in the province of Taranto reached the lowest level in the last five years (ref. 2014), reaching 30 million Euros. The drop in the period 2011-2014 was particularly significant, when the volume of expenditure decreased by 38.8%, going from 49 to 30 million Euros. This is a much more marked negative trend than recorded in Puglia as a whole, where between 2011 and 2014 the expenditure of tourists fell by 14.8%, falling from 616 to 525 million Euros. 447

The main tourist indicators of the province of Taranto and position in the national ranking of the provinces (2013; % values)[448]:

Tourist internationalization index (foreign arrivals / total arrivals)

Rank: 90	Taranto	16,6	ITALY	48,4

Average length of stay (presences / arrivals)

Rank: 35	Taranto	4,3	ITALY	3,6

444 *Source: processing of Infocamere data*

445 *140 kilometres of coastline. Source: https://issuu.com/pasqualebondanese/docs/scienza_mare_e_coste*

446 *measures the ratio between total annual arrivals and the population*

447 *Source: Taranto Chamber of Commerce - 13th economy day - Taken from "Taranto Report 2015". Pages 72 – 73 – 74.*

448 *Source: processing on Istat data*

Hotel quality index (4-5 stars hotels / total hotels)

Rank: 2	Taranto	48,9	ITALY	17,4

Tourist concentration index (arrivals / population)

98	Taranto	43,8	ITALY	170,9

Arrivals and presences in the complex of accommodation facilities in the Apulia provinces, Apulia and Italy 2013; absolute values[449]

	Arrivals Italian people	Presences Italian	Arrivals Foreign people	Presences Foreign people	Arrivals Total	Presences Total
Foggia	724.779	3.663.546	139.751	729.687	864.530	4.393.233
Bari	515.408	1.142.705	184.523	469.527	699.931	1.612.232
Taranto	215.903	866.265	42.842	234.445	258.745	1.100.710
Brindisi	270.196	1.170.714	82.330	350.527	352.526	1.521.241
Lecce	752.444	3.850.880	132.848	595.889	885.292	4.446.769
Barletta-A.T.	101.020	218.417	25.696	66.614	126.716	285.031
APULIA	2.579.750	10.912.527	607.990	2.446.689	3.187.740	13.359.216
ITALY	53.599.294	191.992.233	50.263.236	184.793.382	103.862.530	376.785.615

Expenditure of foreign travellers in the Apulia provinces, in Puglia and in Italy (2010-2014; in million Euros) [450]

	2010	2011	2012	2013	2014
Foggia	104	103	85	88	45
Bari	214	229	210	221	212
Taranto	36	49	40	31	30
Brindisi	74	72	75	107	109
Lecce	148	139	129	150	105
Barletta-A.T.	8	24	41	23	24
APULIA	585	616	580	621	525
ITALY	29.257	30.891	32.056	33.064	34.154

Sea economy in Taranto

Around the sea, sectors that affect both the traditional economy and highly innovative departments can flourish and develop. The areas of activity constitute the economy of the sea (blue economy), which develops through four directions which coincide with four different ways of understanding the sea:

- resource producer;
- territorial attractiveness factor;
- communication route;
- ecosystem to be protected.

The impact of the blue economy on the added value of a territory is a priority indicator on the possible development of a territory. The data relating to the Apulia context show how Taranto represents the area where the economy is most dependent on sea. In 2014, the impact of the added value of the sea economy on the total 451 was 7.3% 452. In terms of absolute value, only in Bari there is a greater share of added value connected to the sea resource (854 million).

More than half (56.5%) of the wealth produced by the blue economy in the Taranto area is attributable to "research, regulation and environmental protection" sector.
The remaining part of the blue added value in Taranto is divided fairly evenly among the other types of economic activity, among which the most significant are accommodation and catering (10.3%) and the movement of goods and passengers (9.2%). The data on accommodation confirms the low level of development of the provincial tourism system, drawing attention to the need for interventions that can make the area more attractive. In addition, the presence of an important port - the fifth at

449 *Source: processing on Istat data*
450 *Source: Bank of Italy*
451 *estimated at 693.1 million euros*
452 *2.4 percentage points more than the Apulian average and 4.3 percentage points more than the national figure*

national level for cargo handling - is not fully valued in light of the limited impact of the "cargo and passenger handling" sectors (Taranto: 9,2%; Italy: 16,6%), as well as the shipbuilding industry, which contributes only 6.2% to the formation of the provincial blue economy (Italy: 16,5%).
Finally, it should be noted that the contribution of fisheries is much lower than what is observed at the regional level: in 2014 the fish supply chain represented 12.7% of the added value of the economy of the Apulia sea and only 6.6% of the one of Taranto.
In 2014, the number of companies connected to the sea economy is estimated for the province of Taranto in 1,810 units, equal to 3.8% of the total number of companies. The ratio between blue companies and total companies is slightly higher than the regional average (3.5%), but lower than in the areas of Lecce (4.3%) and Brindisi (4.2%).
The distribution of companies by sector of economic activity allows us to observe how in Taranto, despite the lower contribution to the formation of added value, activities with a tourism / recreational function prevail. In fact, 55.7% of the production units of the sea economy fall within the sectors specialised in accommodation and catering and sport and recreation. Conversely, a modest number of companies are observed in the field of "research, regulation and environmental protection", which represent just 3.1% of the total. Finally, the companies in the fish supply chain represent little more than a fifth (21.3%) of the blue total for the province of Taranto. There are about 10,200 employees in the marine economy activities in the province of Taranto (6.7% of the total number of employees). [453]

Added value of 'sea' economic activities by sector in the Apulia provinces, Apulia and Italy (2014, % composition)

	Fish supply chain	Mining	Shipyard chain.	Freight and passengers transport	Accommodation and restaurant	Research, regulation and environmental protection	Sport activities
Foggia	22,7	0,7	11,9	3,1	33,6	23,2	4,8
Bari	11,5	0,7	7,2	6,8	19,1	49,5	5,1
Taranto	6,6	7,4	6,2	9,2	10,3	56,5	3,8
Brindisi	9,3	0,1	7,5	5,5	21,9	51,2	4,5
Lecce	14,1	0,1	5,7	4,7	29,2	40,9	5,2
B.A.T.	20,6	2,4	4,8	2,5	22,0	43,1	4,6
APULIA	12,7	2,1	7,1	6,0	21,5	45,9	4,7
ITALY	7,1	5,4	16,5	16,6	28,3	19,9	6,3

Companies of the sea economy by sector in the Apulia provinces, Apulia and Italy (2014; absolute values)

	Fish supply chain	Mining	Shipyard chain.	Freight and passengers transport	Accommodation and restaurant	Research, regulation and environmental protection	Sport activities	Total
Foggia	481	6	122	59	897	34	193	1.792
Bari	956	2	585	201	1.394	155	464	3.758
Taranto	385	6	253	103	733	56	275	1.810
Brindisi	342	6	124	110	666	44	207	1.499
Lecce	664	0	225	80	1.504	98	473	3.043
B.A.T.	443	6	112	45	574	31	261	1.472
APULIA	3.272	26	1.420	597	5.767	418	1.873	13.374
ITALY	33.884	524	27.715	10.983	74.040	6.263	28.411	181.820

The employment balance of a third industrial revolution economy in Taranto.

It is indisputable that the Second Industrial Revolution has created work in Taranto. Less known is what it destroyed. How many jobs in the agricultural and maritime tourism economy have been cancelled due to industrial plants, their invasiveness and their pollution.
Business models are emerging throughout the world that respect the principles of collaborative commons and thrive alongside traditional capitalist models. Creating much more work per unit of capital employed.
These new business models reflect the qualities and characteristics of the territory and guarantee their conservation as "assets" to be protected in order not to fade the same profitability possibilities (a typical case is that of the quality of the water to be protected from various pollutants to protect fish farming, mussel farming and fishing.
To reconcile the needs of two very different economic systems - on the one hand the capitalist economy operating in the market and on the other the social economy operating in the Commons - alongside new financing channels and social currencies new business models are emerging. They respond to the attempt to identify value in the spaces where the two economies work in

[453] *Source: Taranto Chamber of Commerce - 13th economy day - Taken from "Taranto Report 2015". Pages 77 – 78 – 79.*

symbiosis. We have already talked about cooperatives, which for their structure and their operating protocols are the most suitable candidates to overcome the gap between the two systems and to draw value from any fold in which potential synergies arise.

In the United States, a new, interesting business model is the "benefit corporation", which is an attempt to transform the traditional capitalist company to make it more agile and suitable to operate in a hybrid context of markets and Commons. The most important company that has turned into a benefit corporation is Patagonia, a Californian sportswear company that sells items for around $ 540 million annually.

The benefit corporation falls into the broader and relatively generic category of "social entrepreneurship", which has gained the interest of young people who have studied in management training schools around the world. Social entrepreneurship covers the wide territory that ranges from non-profit organizations, real cornerstones of the Commons, to conventional joint stock companies, the dominant companies in the market economy. In addition to the interaction along the borders where the social and market economy meet, a reciprocal exchange of attributes is taking place between the two models - non-profit organizations and profit-oriented companies - which makes it less clear-cut the distinction between one and the others. Social entrepreneurship is the great tent under which the world of profit and its opposite devise all sorts of accommodation to create an amphibious commercial space, a crossroads of market economy and collaborative Commons.

Social entrepreneurship has its roots in the non-profit community. Welfare cuts implemented in America, England and other countries in the 1980s and 1990s marked a time of crisis, but also opened up an opportunity for the non-profit sector. The reduction of public aid programs for the most deprived put the most disadvantaged communities at risk.

The attempts to fill the void put in place by private philanthropic initiatives provided those communities with very few resources, compared to the contributions that failed with the withdrawal of the state. The concomitance between the worsening of the social burden and the reduction of the appropriations destined for the most fragile communities induced the non-profit organisations to look for some new business model, which in respect of their basic mission would allow to open a source of additional revenue, thanks to which they could keep operating and expand their services.

The fact remains that in Taranto the Third Industrial Revolution will create much more work than the second has created per unit of capital employed. In fact, the labour capital intensity of the industrial phase which is in the process of definitive decline is much higher than that of the other sectors (agriculture and the service sector) and also than the economic futures of the Third Industrial Revolution.

In other words, to create a job in the ILVA or other large heavy industrial complexes, investments are needed from two to 10 times greater than those necessary to create a job in traditional agriculture or in the advanced services of TRI or in the circular economy.

The calculation of the employment intensity per unit of capital invested according to the axioms of Jeremy Rifkin's third industrial revolution master plan.

By way of example, in the North Pas de Calais the Master Plan developed by Jeremy Rifkin provides for the total decarbonisation of all production and economic processes by 2050, through investments by the same date of 240 billion Euros which, however, will return 320 billion Euros by 2050 in the form of energy savings. The same work predicts that in a traditional scenario (BAU or Business As Usual), the costs for operating the regional energy and economic infrastructures would be 400 billion which, however, would not entail any savings.

The scenario of the Third Industrial Revolution of the North Pas de Calais (today called the **Region of Upper France** after the administrative merger with the Picardy region) produces a net employment balance of 165,000 jobs by 2050. In the BAU scenario, on the other hand, the employment balance is negative for 102,000 units.

The TRI scenario is based on parameters developed by the American economist Skip Leitner member of the Scientific

Committee of the FOET (Foundation on Economic Trends) of Jeremy Rifkin, as a method of calculating the employment intensity of the capital invested according to the Master Plan of the Third Industrial Revolution.
According to these new axioms, we cannot exit the "crisis" using the same development model that created it. According to the vision of the zero marginal cost company, by Jeremy Rifkin, the T.R.I. (Third Industrial Revolution), with the internet of things and the rise of the "commons", represents a new economic model capable of allowing the overcoming of the irreversible crisis of capitalism allowing the redistribution of wealth through greater employment intensity.
The Nord Pas de Calais Masterplan is a strategic act that puts energy and economy in a new perspective, demonstrating that the investments made in the TRI infrastructures generate significant economic results compared to any other investment based on traditional fossil energy infrastructures. In other words, the same environmental performance also translates into an economic and employment performance, with a consequent increase in effectiveness, productivity and therefore competitiveness.
In the elaboration of his "guides" to the Third Industrial Revolution, Jeremy Rifkin makes use of calculation methods that allow to measure, among other things, the employment intensity of new technologies and new TRI economic and energy models. Precise and innovative calculations allow to identify short, medium and long-term economic trends in the area under consideration.
In the North Pas de Calais, in 2013 the French region, of an old industrial vocation, not surprisingly identified as a "black country" due to the large coalfields, steel mills and heavy industrial plants, decided to change gears abandoning the past and making a leap in the future following the directions of the new renewable and sustainable economy.
By 2050, the plan provides for a 60% reduction in energy consumption and a four-fold reduction in greenhouse gas emissions based on five pillars:

- The transition to renewable energy, the backbone of all the others.
- Converting buildings into production plants, so as to cover not only the needs of those who live there, but to become a real production centre for the community.

Use of hydrogen as a means of storing electricity

Application of a smart grid technology, an information network that supports and manages the electricity grid in an "intelligent" way, avoiding energy waste, overloads and voltage drops

Sustainable mobility

With regard to what has just been announced, the most important discussions to be supported therefore concern the certainty of a long-term energy scenario of the third industrial revolution as well as the fact that an ineffective energy economy can produce a weaker labour market and erosion of social well-being.

Effective investments

The drafting of the master plan in terms of investments, in the absence of a "historical perspective" to quantify with certainty the amount and the economic impact of a Third Industrial Revolution, is based on the potential gains obtainable by exploiting energy efficiency only. This measurement difficulty arises mainly from the simultaneous combination of the five pillars.
The inefficiency of the energy consumption / cost ratio, as noted in the figure below, concerns the entire European Union.
In the Nord Pas de Calais, the average per capita energy consumption reached 35.7 MWh per year in the region, against 27.8 MWh of the national average. At the macroeconomic level, each GWh [454] of energy produces 600,000 Euros of GDP in the Nord-Pas de Calais against 948,000 Euros of GDP on average in France.
The international energy agency reports the use of energy in millions of tons of equivalent oil (Mtep), otherwise, as has been done for the Nord Pas des Calais, it is calculated in giga watt hours (GWh). Another frequently used measure is the billion Joules, also called TeraJoules (TJ). The table below illustrates the various ratios for converting the amount of energy from one unit of measurement to another.

GENERAL CONVERSION FACTORS OF ENERGY CONSUMPTION[455]

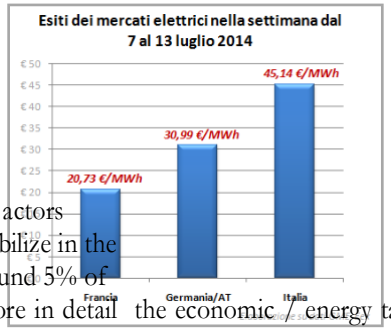
Table 1

From/to	TJ	Mtep	GWh
TJ	1	2.388×10^{-3}	0.2778

[454] *1 GWh = 1.000 MWh*

[455] *Source: adapted from the work of the international agency of energy"2012 Key World Energy Statistics".*

Mtep	4.1868 x 10^4	1	11,630
GWh	3.6	112	1
1.000 kWh		= 1 MWh	
Average cost 1 MWh EU		= 27,00 Euro	
Average cost 1 MWh France		= 20,73 Euro	



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In other words, France mobilizes on average 8% of its GDP in energy, while the Nord Pas des Calais 13%. The goal of a 60% reduction in energy consumption 2050, proposed by the regional development and sustainable development plan the territory (SRADDT), will therefore have the effect of doubling energy efficiency in the entire region. To achieve this goal, the investment that (governments, businesses and individuals) have set themselves to period 2014-2050, is around 5 billion Euros per year and represents the region's annual GDP.

More in detail the economic / energy targets set with a 40% renewable coverage, plan to employ 200 billion Euros up to 2050[456], with energy savings of around 320 billion [457] again by 2050 and therefore an active balance of about 120 billion* [458].

		TOTAL VALUE
Average annual energy consumption in the Nord Pas de Calais carbon region	35.7 MWh per capita per year x about 4.500.000 (inhabitants) = about 160.000.000 MWh(160 Twh) (Tot. consumption per year)	Euro 20,73 x 142.800.000 MWh = Euro 3.316.800.000 (Annual cost)
Predetermined reduction (60% by 2050) (= Energy saving by 2050)	160.000.000 MWh x 60% = 96.000.000 MWh (saved by 2050)	Euro 20,73 x 96.000.000 MWh = Euro 1.990.080.000 (= Real economic savings by 2050)
Average energy consumption in the Nord Pas de Calais region Post carbon	160.000.000 MWh - 96.000.000 MWh =64.000.000 MWh	Euro 20,73 x 64.000.000 MWh = Euro 1.326.720.000 (Annual cost of post-carbon energy)
Employment by 2050	(2050-2010) x 5.000.000.000 (Euros per year)	= 200.000.000.000
Estimated savings in utility bills	7.000.000.000 per year	= 320.000.000.000 (from 2010 to 2050 cumulative)
Active balance	Economic savings by 2050 - Employment by 2050 = [320.000.000.000 - 200.000.000.000]	= Euro 117.016.000.000*

The reference scenario, based on a starting GDP of around 90 billion Euros in 2010, projects the hypothesis of a growing economy at a constant rate of 0.8% per year. In this case, the GDP of Nord-Pas de Calais is likely to reach € 122 billion in 2050.

	2010/2011	**2020**	**2030**	**2050**
SCENARIO 1: OF REFERENCE				
GDP EVOLUTION IN BILLION EUROS	90	97 (54.089)	105 (115.905)	123 (255.000 workers more)
SCENARIO 2: INCREASING IMPACT OF ENERGY PRICES				
GDP EVOLUTION IN BILLION EUROS	90	95	100	112 (153.000)
NET CHANGE IN EMPLOYEES NUMBER	0	- 29.000	- 62.000	- 102.000
SCENARIO 3: THIRD INDUSTRIAL REVOLUTION				
GDP EVOLUTION IN BILLION EUROS	90	99	112	133 (420.000)

456 *(2050-2010) x 5 billion.*

457 *See table 2.*

458 *Economic savings by 2050 - Employment by 2050 = [320.000.000.000 - 200.000.000.000]*

NET CHANGE IN EMPLOYEES NUMBER	0	+ 87.000	+ 109.000	+ 165.000

Table 3[459]

The masterplan, ultimately, shows how the mere lowering of the energy bill will allow a transfer of flows to other more promising sectors in terms of employment. The traditional energy sector generates 8.5 jobs per million Euros of GDP, while other sectors employ an average of 16.3 (between 14.1 and 20.6) people. On the basis of this calculation it is estimated, in absolute terms, the possible creation of 7.8 jobs [460] for every reallocated million Euros. These could gradually reach 165,000 jobs in 2050 (cumulative net profit over the period)[461].
By 2050, in the traditional scenario, about 7,727 (255,000 / 33) new jobs would be created with 33 billion more reallocated (123 bln-90 bln). If we assume, in a TRI scenario which does not undergo the increase in the cost of energy and moreover produces it, an increase in jobs of 0.25% more per million Euros reallocated, we can understand the numbers in the table in detail.
Finally, the second scenario examines the impact of rising energy prices on the regional economy[462]. In this case, the calculations indicate that GDP would grow, but at a lower level than the reference scenario, reaching 112 billion Euros in 2050 and generating a loss of 29,000 jobs in 2020, 62,000 in 2030, 102,000 in 2050. The erosion of employment is easily calculated on the data just stated: if in fact we apply employment data of 14.5 in 2020, 12.4 in 2030 and 10.2 in 2050 (= jobs per million euro lost due to the increase in the cost of energy compared to the reference scenario) we just have to perform a simple multiplication to explain the data.

It is indisputable that the Second Industrial Revolution created work and development, but the jobs it destroyed remain still less known today. How many jobs in the agricultural and maritime tourism economy have been cancelled due to industrial plants, their invasiveness and their pollution.

DISTRIBUTION PROBABLE DES GAINS NETS D'EMPLOI PAR SECTEUR DANS LA RÈGION

PRINCIPAUX SECTEURS D'ACTIVITÈ	*PART*
BÂTIMENT	9%
AGRICULTURE ET INDUSTRIE MANUFACTURIÈRE	15%
SERVICES PUBLICS (Y COMPRIS L'EAU, LES ÈGOUTS ET L'ÉNERGIE	2%
COMMERCE DES GROS ED DE DÉTAIL	12%
TRANSPORT ET LOGISTIQUE	7%
HÔTELLERIE ET SERVICES D'HEBERGEMENT	3%
SERVICES PROFESSIONELS	11%
FINANCE ET AUTRES SERVICES	8%
EDUCATION ET ADMINISTRATION PUBLIQUE	34%
GAINS NETS D'EMPLOIS EN MOYENNE SUR LA PÉRIODE 2014 - 2050	*100%*

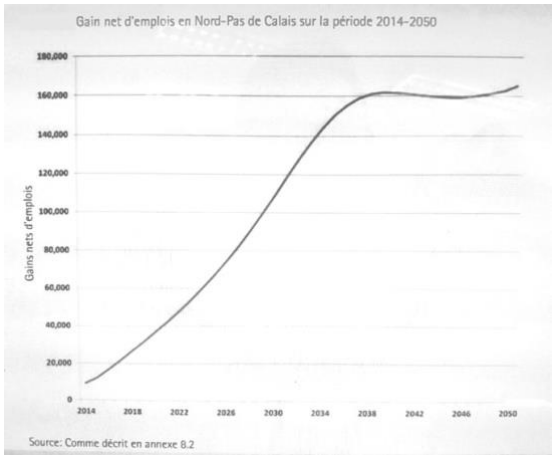
Business models are emerging throughout the world that respect the principles of collaborative commons and thrive alongside traditional capitalist models, creating much more work per unit of capital employed. The calculations listed in the Rifkinian model, in consideration of the time of study, are effectively underestimated in terms of new employment and improvement of the environment and the overall quality of life.
In fact, to date, there are new paradigms that include in addition to storage and hydrogen systems, smart grids and the internet of things, also experiential tourism, the transformation of agricultural products with high added value, the circular economy and the banks of reuse, the sharing economy (food sharing, house sharing, car sharing, tool sharing).

In particular, circular economy is a system in which all the activities, starting from extraction and production, are organised in such a way that someone's waste becomes resources for someone else. In the linear economy, instead, once consumption is over, the cycle of the product ends and it becomes waste, forcing the economic chain to continually resume the same pattern: extraction, production, consumption, disposal. A model that focuses on the sustainability of the system, in which there are no waste products and in which materials are constantly reused. It's a general term to define an economy designed to be able to regenerate by itself.
In a circular economy, the flows of materials are of two types: biological ones, capable of being reintegrated into the biosphere, and technical ones, destined to be revalued without entering the biosphere"[463].
If you think that traditional industry has managed to create about one (= 1) employment unit per million Euros invested[464], it is not difficult to perceive that the counter-tendency indicated in the study is more urgent than ever. The employment impact in the new formulations could exceed of about 50% (= 25 jobs for every million Euros reallocated) [465] the already rosy structure of 16.3 new jobs for every million Euros reallocated.

[459] *Figures in the table are rounded for ease of calculation.*
[460] *16,3 – 8,5*
[461] *Source: Nord Pas de Calais 2013 masterplan– page 92*
[462] *"Optimistic" hypothesis of a small increase of 1% per year or 40% by 2050.*
[463] *According to the definition given by the Ellen MacArthur Foundation. Source:http://www.ilpost.it/2014/07/05/economia-circolare/*
[464] *An example above all is Fiat, a private company based on public funding. From 1975 until today it has obtained about 220 billion euros from the Italian state , passing from an induced activity of 250 thousand employees to the current 30 thousand.*
[465] *16,3 + (16,3 x 50%) = 25*

It is clear that we are at the showdown: the old fossil model, obsolete, polluting and centralised has reached its efficiency limits even before the ecological or economic ones.

The new collaborative and distributed models Compared to the reference period, they are affected by the increase in the cost of traditional energy which clearly affects GDP, which will characterise the production and distribution of energy, will act as an unstoppable push to modify all models and production systems at the base of each economic sector.



In the last five years, the per capita GDP of the city of Taranto has been between 17,000 and 18,000 Euros, in full South Italy average. [466] The data provided by the **Tax Policy Department of the Ministry of Economy**, in fact, denote the GDP per inhabitant equal to 33.5 thousand Euros in the North-West, 31.4 thousand Euros in the North-East and 29.4 thousand Euros in the Centre. The South, with a GDP per capita of 17,2 thousand Euros has a very wide negative differential.[467]

According to the Istat Report on the territorial economic accounts, the GDP per inhabitant is equal to 33.5 thousand Euros in the North-West, 31.4 thousand Euros in the North-East and 29.4 thousand Euros in the Centre. The South, with a GDP per capita of 17,2 thousand Euros has a very wide negative differential.

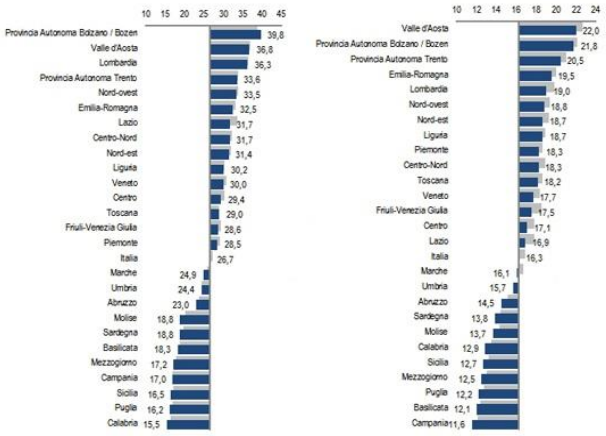


Figure 7[468]

The city of Taranto, with its 200,100 inhabitants, therefore, has a total annual GDP of about 3.5 billion Euros.[469]

Reference scenario: the case of Taranto

If the city decides to follow the guidelines analysed [470] in this paragraph, it could be possible to support the rebirth of the economy of this territory and its natural and human resources according to two different projections, a pessimistic one that is limited to the Third Industrial Revolution activities and technologies that are more tested, which gives rise to a conservative estimate, and an optimistic one, which presupposes the development of all those so-called "ancillary activities" with high occupational intensity and lower financial density, which are in the process of being tested but will be probably well stabilised during the reference period and therefore can justify a more positive projection of employment data.

We illustrate several **projections** below. Those relating to the T.R.I. concern:

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466 *South: http://www.lecceprima.it/economia/report-reddito-pro-capite-lecce-5-aprile-2015.html*

467 *Source: Istat report on territorial economic accounts.*

468 *Trend of recent years. Source:http://www.repubblica.it/economia/2015/02/09/news/istat_pil_pro_capite_mezzogiorno_nord-106869795/*

469 *GDP per capita x number of inhabitants.*

470 *about 170 million euros per year to be allocated to T.R.I. investments (3.5 bln x 5% per year of GDP).*

- a projection to 2050, starting from the axioms of the Nord Pas de Calais Masterplan and thus building an illustration of the direct investments that can be made, without taking into account the indirect and related sectors (pessimistic scenario) [471];
- a projection to 2050 by presupposing the development of all those so-called "ancillary activities" with a high occupational intensity and lower financial density that are in the process of evolution but are expected to be well stabilized during the reference period and which can therefore justify a more accelerated increase in the evolution of GDP and a consequent more positive forecast of employment data (optimistic scenario).

Below we start with the "pessimistic" projection to 2050, starting from the axioms of the Nord Pas de Calais masterplan and building an illustration proportioned to table 3 and with regard to realizable direct employment, without taking into account the indirect and related industries.

[471] *Only DIRECT uses are calculated, leaving out INDIRECT and INDUCTIVE ones. We limit ourselves to the most tried and tested Third Industrial Revolution activities and technologies, which gives rise to a conservative estimate.*

Table 1: Scenarios for Taranto area

	2017	2030	2040	2050[472]
SCENARIO 1: OF REFERENCE				
GDP EVOLUTION IN BILLION EUROS	3,5	3,9[473] (2.174 workers more)[474]	4,2[475] (4.636 workers more)	4,5[476] (7.000 workers more)[477]
SCENARIO 2: INCREASING IMPACT OF ENERGY PRICES (BAU)[478]				
GDP EVOLUTION IN BILLION EUROS	3,5	3,7	3,9	4,4[479] (4.200)
NET CHANGE IN THE EMPLOYEES NUMBER[480]	0	- 1.129	- 2.418	- 2.800[481]
SCENARIO 3: THIRD INDUSTRIAL REVOLUTION (PESSIMISTIC HYPOTHESIS)[482]				
GDP EVOLUTION IN BILLION EUROS	3,5	3,9	4,3	5,2 (16.421)
NET CHANGE IN EMPLOYEES NUMBER[483]	0	+ 3.427	+ 4.184	+ 9.421
EMPLOYEES NUMBER[484]	12.750	+ 25.200	+ 57.000	+ 103.500[485]
SCENARIO 4: THIRD INDUSTRIAL REVOLUTION (OPTIMISTIC HYPOTHESIS)				
GDP EVOLUTION IN BILLION EUROS	3,5	4,1	4,7	5,5 (17.363)
NET CHANGE IN EMPLOYEES NUMBER	0	+3.599	+4.573	+ 9.960[486]
EMPLOYEES NUMBER	17.000	+ 33.600	+ 76.000	+ 138.000[487]

The employment intensity of investments [488] according to the calculations of the TIR team produce 8 jobs per million in the traditional fossil economy and instead produce a minimum of 16.3 jobs per million invested in the TRI economy.

[472] *Workers as accumulated net profit over the period.*
[473] *[3.5 bln x 0.8% per annum x (2030 - 2017)] + 3.5 bln = 3,864 bln Euro by 2030*
[474] *Data extrapolated in proportion to the masterplan figures.*
[475] *[3,864 bln x 0,8% per year x (2040 – 2030)] + 3,864 = 4,173 bln Euro by 2040*
[476] *[4.173 bln x 0.8% per annum x (2050 - 2040)] + 4.173 bln = 4,50 bln Euro by 2050*
[477] *Source: http://cetri-tires.org/press/?dl_id=45 pag. 82 About 7,727 for every billion reallocated. Rounding down by default in economy pejorative hypotheses.*
[478] *Business as usual. The increasing impact of fossil fuels energy prices will destroy rather than create new jobs.*
[479] *Compared to the reference period, they are affected by the increase in the cost of traditional energy which clearly affects GDP.*
[480] *Differential with the reference scenario. Gradually decreasing estimates starting from the 2050 scenario.*
[481] *40% increase in the cost of energy from fossil sources = 40% less jobs. (= 7,000 x 40%) it is assumed that 40% of the increase in energy costs by 2050 will affect jobs).*
[482] *It is not affected by the increase in the cost of energy and therefore sums up the erosion of the GDP of scenario 2 to the reference GDP of scenario 1, with the difference that by 2050 the technologies of T.R.I. in addition to not being subject to increases in the traditional energy cost, will also produce energy themselves.*
[483] *Differential with the reference scenario. Decreasing estimates starting from the 2050 scenario.*
[484] *The applied method follows a comparative analysis, therefore in the pessimistic hypothesis, both for lower GDP and for "no ancillary activities" conditions; the number of employees although constantly growing thanks to the T.R.I. impact, remains undersized by about ¼ compared to the optimistic hypothesis illustrated.*
[485] *Against a cumulative investment of around 3.8 billion euros.*
[486] *We also consider total savings, including avoided social and health care costs and costs avoided for combating climate change.*
[487] *Against a cumulative investment of around 4.5 billion euros (see table 3).*
[488] *5% of regional GDP X 35 years.*

TABLE 2: COMPARATIVE IMPACTS ACCORDING TO THE RIFKINIAN VISION (study on France variables)

IMPACTS COMPARÉS SELON JEREMY RIFKIN DES DIFFÉRENTS SCÉNARIOS DE DÉVELOPPEMENT ÉCONOMIQUE

	2020	2030	2050
Scénario de référence			
Évolution du PIB[1]	97	105	123
Scénario 2 (Impacts des prix de l'énergie croissants)			
Évolution du PIB [1]	95	100	112
Variation nette du nombre d'emplois [2]	- 29 000	- 62 000	- 102 000
Scénario 3 (Troisième révolution industrielle)			
Évolution du PIB [1]	99	112	133
Variation nette du nombre d'emplois [2]	+ 87 000	+ 109 000	+ 165 000

(1) Les chiffres du PIB sont exprimés en euros constants 2005 (2) Différentiel avec le scénario de référence

» **Le scénario de référence,** basé sur un PIB de départ d'environ 90 milliards d'euros (chiffre 2011), projette l'hypothèse d'une croissance de l'économie à un rythme régulier de 0,8 % par an. Dans ce cas de figure, le PIB de référence du Nord-Pas de Calais est susceptible d'atteindre 123 milliards d'euros en 2050 (en euros constants de 2005).

» **Le deuxième scénario** explore l'impact d'une hausse des prix de l'énergie sur la solidité de l'économie régionale (hypothèse"optimiste" d'une faible augmentation de 1% par an, soit 40 % d'ici 2050). Dans ce cas, les calculs suggèrent que le PIB pourrait encore croître, mais à un niveau plus faible, pour atteindre 112 milliards d'euros en 2050, générant une perte de 29 000 emplois cumulés en 2020, par rapport au scénario de référence, avec une poursuite de l'érosion jusqu'à 102 000 pertes d'emplois en 2050, toujours par rapport au scénario de référence.

» **Le troisième scénario** intègre l'investissement et les données clés des économies d'énergie du Master plan de la Troisième révolution industrielle. Dans ce cas, le PIB pourrait augmenter pour s'établir à 133 milliards d'euros en 2050 (soit 10 milliards d'euros de plus que le scénario de référence). La création nette d'emplois atteint 37 000 en 2020, et continue de progresser jusqu' à 165 000 emplois nets d'ici 2050.
Non seulement le Master plan génère des avantages économiques supplémentaires pour le Nord-Pas de Calais, mais il peut empêcher des pertes d'emplois importantes. Plutôt qu'une érosion prévisible de 102 000 emplois nets dans le scénario 2, le scénario de la Troisième révolution industrielle dégagerait un gain net de 165 000 emplois d'ici 2050.

As explained in Table 2, already included and widely explained within the study[489], in the Nord Pas de Calais the 5 billion[490] of 2020 are transformed into 87,000 jobs. As investments are made and spending behaviour begins to promote global economic efficiency, a multiplier effect is obtained which generates a net increase in jobs. In this way the 5 billion in 2020 generate 87,000 jobs, the same 5 billion in 2050 generate a net change of 165,000 jobs (text from the Master Plan). It must also be considered that GDP is a variable that is likely to continue to grow, so that 5% of 99 billion in 2020 is lower than 5% of 133 billion in 2050.

Still in the context of pessimistic forecasts, we deemed it useful to make a comparative forecast for Taranto between the two forecasts, the one according to the TRI axioms of 2016 (Rotterdam Master Plan) and the two TRI forecasts according to the axioms used in 2010 (Master Plan of the Nord Pas de Calais).

As for the **optimistic** projection, we applied the TRI (Leitner) axioms to a wider spectrum of activities, (illustrated in the second table. Here are the increases in employment that we get.

489 "Taranto the future is now - TRI.0" page 215
490 Expected investment on 5% of 99 billion (annual GDP) in 2020.

"OPTIMISTIC" HYPOTHESIS FOR THE TARANTO AREA

Summary table

Investments 2020	Jobs 2020	Investments 2030	Jobs 2030	Investments 2040	Jobs 2040	Investments 2050	Jobs 2050
32,8 mln	17.000	50,3 mln	33.600	73.5 mln	76.000	164,5 mln	138.000

Below is a more detailed analysis of the sectors in which work can be generated.

Analytical table

SECTOR	Investments by 2020 in mln Euros	JOBS BY 2020	Investments by 2030 in mln Euros	JOBS BY 2030	Investments by 2040 in mln Euros	JOBS BY 2040	Investments by 2050 in mln Euros	JOBS BY 2050
ENERGY EFFICIENCY								
IMPROVING THE EFFICIENCY OF OLD BUILDINGS	1	1000	1,5	2000	2,5	5000	5	8000
ENERGY RESTRUCTURING	1	500	1,5	1000	2,5	3000	5	5000
SOLAR COOLING OF TOURIST PLANTS	0,5	500	1	1000	2	3000	4	5000
OTHER								
DISTRIBUTED RENEWABLES								
SOLAR THERMAL	0,2	250	0,4	500	0,6	1000	1,5	2000
COMMUNITY VERTICAL MINI WIND	0,2	250	0,4	500	0,6	1000	1,5	2000
INDUSTRIAL PHOTOVOLTAIC	0,5	250	1	500	1,5	1000	3	2000
HEAT PUMPS AND LOW ENTHALPY GEOTHERMY	0,5	250	1	500	1,5	1000	3	2000
DECARBONISATION OF AGRICULTURE	1	250	1,5	500	2	1000	4	2000
PHOTOVOLTAIC IRRIGATION	0,5	250	1	500	1,5	1.000	4	2000
SOLAR REFRIGERATION	0,5	250	1	500	2	1000	5	2000
HYDROGEN / ELECTRIC MOVEMENT MEANS	2	250	2,5	500	3	1000	5	2000
ANAEROBIC SHORT SUPPLY CHAIN BIODIGESTERS	1	250	1,5	500	3	1000	5	2000
OTHER								
POSITIVE ENERGY BUILDINGS	1	250	1,5	500	2	2000	5	4000
HYDROGEN AND STORAGE SYSTEMS	1	250	1,5	500	2	2000	5	4000
SMART GRID AND ENERGY INTERNET	1	250	1,5	500	2	2000	5	4000
ZERO EMISSIONS TRANSPORTS	1	250	1,5	500	2	2000	5	4000
CIRCULAR ECONOMY								
BANKS OF REUSE	0,5	400	1	700	1,5	3000	4	5000
DIGITAL ECONOMY	1	1000	1,5	1500	2,5	5000	7	7000
CIRCUITS OF SHORT CHAIN RECYCLING	1	1000	1,5	1500	2,5	2000	7	4000
SECOND LIFE SHOPS	0,5	500	1	750	2	1000	5	2000
REPAIR WORKSHOPS	0,2	500	0,5	750	0,7	1000	2	2000
OTHER								

RE-OPERATION OF THE ECONOMY								
INDUSTRIAL RECONVERSION	2	1000	2,5	2000	3	5000	7	7000
3D MANUFACTURE	2	1000	3	3000	4	5000	8	7000
INTERNET INFRASTRUCTURE OF THINGS	0,5	500	1	1500	2	3000	6	5000
TOURIST OBJECTS	0,1	500	0,2	700	0,5	1000	2	2000
INDUSTRIAL COMPONENTS	0,5	500	1	700	1,5	2000	4	4000
SCHEDULED OBSOLESCENCE REPAIRS	0,1	250	0,2	500	0,4	1000	5	2000
OTHER								
AGRICULTURE AND SEA PROMOTION								
SHORT CHAIN PROMOTION	2	600	3	1000	4	3000	7	5000
SEA ECONOMY	2	1000	3	2000	4	3000	8	5000
HISTORY AND CULTURE ECONOMY	2	500	2,5	1000	3	3000	6	5000
FARMER MARKET	0,5	500	0,7	1000	1	2000	1,5	4000
G.A.S.	0,5	500	0,7	1000	1	2000	1,5	4000
LAST MINUTE MARKET	0,2	250	0,4	1000	0,7	1000	1,5	3000
FOOD PARADE	0,2	250	0,3	500	0,5	1000	1	2000
LOCAL PROCESSING OF PRODUCTS	0,6	250	1	500	1,5	1000	3	3000
OTHER								
TOURISM PROMOTION								
DESEASONALISATION	0,5	250	1	500	1,5	1000	3	2000
PRODUCTS ACADEMIES	1	250	1,5	500	2	1000	4	3000
ORTHOTHERAPY	2	250	2,5	500	3	1000	5	3000
TOTAL	32,8 mln	17.000	50,3 mln	33.600	73.5 mln	76.000	164,5 mln	138.000

E) Taranto TRI.0 governance

From the North Pas de Calais to the Rotterdam Den Haag Metropolitan Region.
The experience of the Department of the Third Industrial Revolution of the French region of Nord Pas del Calais (currently Haut de France after the administrative merger with the contiguous Picardy region) then taken up and developed in the Master Plan of the Dutch Region Rotterdam - Den Haag, has demonstrated that a new economic model based on the principles of decarbonisation to have an effective impact on a specific territory needs to be entrusted to a specific structure (In the North Pas de Calais a special Department for the Third Industrial Revolution and Energy Transition was provided for this purpose, which was entrusted to Eng. Claude Lenglet, inventor of Positive Energy buildings for the French construction company Bouygues.

The Service was structured with departments that reflect the different sectoral TRI activities, namely:

- Distributed Renewables
- Positive Energy Buildings
- Hydrogen and Storage Systems
- Smart grid
- Zero Emissions Transports
- Energy efficiency of existing buildings
- Sharing economy
- Circular Economy

The Department was structured according to short, long and medium-term planning with objectives measurable through specific indicators (in this regard, see the following chapter).
A transition governance structure to which the realization of these objectives is entrusted as a single control room is essential to ensure that all TRI planning of the Master Plan is actually implemented and does not remain a dead letter as in other cases, so a Master Plan fit for the objectives of the territory has been adopted.
This structure of "governance" integrated into the administration of the territory makes the difference between a "Master Plan that really changes reality as in the Nord Pas de Calais, (creation of a new business, employment and improvement of the quality of life, environment and citizens' health) and one that remains on paper as the Master Plan produced for Roma Capitale, adopted in May 2010 and never built due to the lack of a structure in charge of its realisation.
In the transition from Nord Pas de Calais to the largest and most populous region of Hautes de France, the governance of the TRI Master Plan has changed, and the functions of managing the energy and economic transition towards a post-carbon scenario have been entrusted to one of the vice presidents , for which they moved from the Department of the Third Industrial Revolution to the Vice Presidency for the Third Industrial Revolution, sustainable development and the energy transition, entrusted to Professor Philippe Rappenau (see image below).
The new governance structure aims to extend the excellent results achieved in the Nord Pas de Calais to the Picardy region, which is the second component of the administrative merger, with targeted interventions in the main economic and social sectors, such as production in the various sectors, conscious consumption, improving housing quality, sustainable and efficient transport, distributed and democratic financing of social enterprise activities, the circular economy, and the local sharing economy and the short chain, and this is why a new action program called REV3 is in progress (where REV stands for the three initial letters of the word "Revolution" but also for the three initial letters of the word "Reve" which means dream, in a suggestive ideal association between the dream of a more sustainable life and the industrial revolution preached by Rifkin). The site www.REV3.fr has become a source of inspiration not only for the other French regions but also for the government which, under the previous administration, has prepared a report to extend the "revolutionary" economic format to all French regions, by the Minister of Ecology, Segoléne Royale, who instructed the former environment minister under the Chirac administration, Corinne Lepage, to draw up a report which was later adopted by the French Council of Ministers , for this purpose.
In the meantime, the TRI planning through specific Master Plans has extended from the North of France, to Luxembourg and the southern part of Holland, the Metropolitan Region of Rotterdam The Hague, and

to the Belgian region of Flanders, in a sort of de facto alliance between TRI regions in the beating heart of advanced Europe. The Dutch Master Plan is of particular importance for Taranto, because it is a territory that, starting from the natural conformation similar to the Ionian Region of which Taranto is the fulcrum, and a similar industrial and port past, is planning a growth strategy based on its rapid decarbonisation. How? Through technologies of the Third Industrial Revolution.

Rotterdam: the master plan of transition to the digital economy

The Rotterdam Master Plan has a very innovative structure, based on a different compartmentation than the one used to develop the Nord Pas de Calais Mater Plan. Compared to the latter, in fact, the Dutch Master Plan is based on an economic rather than an energy vision. The structure of the plan is very significant compared to all the other Master Plans so far developed by Rifkin. Energy is integrated into a wider economic process of which it is a fundamental part, but the plan revolves around a process of "digitalisation of the economy". And it is structured in 5 "*Transition Pathaways*"

1. Digital gateways to Europe
2. The digital energy estuary
3. Circular Economy
4. The Entrepreneurial Region

A new model of society

The basic objective is to protect the biosphere by adopting an innovative method allowing to create digital ecosystems on the model of natural ones and their dynamics, in order to create transparent and symbiotic relationships between circular natural cycles and Dutch economic activities. These ecosystems include self-organization, mutualism, parallel co-evolution, the protection of diversity, the prevention of emergencies, resilience and adaptation in business strategies and regulatory norms.
The plan has a forty-year duration during which these new digital ecosystems that will require professional new-type skills and talents, which will represent the work of the future for thousands of young people in a new hybrid economic system, will be developed according to a precise road map where traditional capitalism and the sharing economy will mix in various ways. As pioneers of this new economic model, the "Metropolitan Region of Rotterdam and The Hague" represents a model for thousands of other municipalities and regions in the 28 Member States of the European Union, who want to undertake a similar transition to the Third Industrial Revolution era, starting with those municipalities that have geographic and productive affinities with the Rotterdam region, such as Taranto and the entire Ionian arc.
The Transition to a Third Industrial Revolution in the Rotterdam Region is based on the creation of a global platform for the digital Internet of Things (IdC). The "Digital Gates to Europe", the Internet of telecommunications and information, the Internet of logistics and transport, the Internet of renewable Energy, intelligent "nodal" buildings , Circular Economy, the Entrepreneurial Region, the new social model, in the plan they are all structured according to the same model:

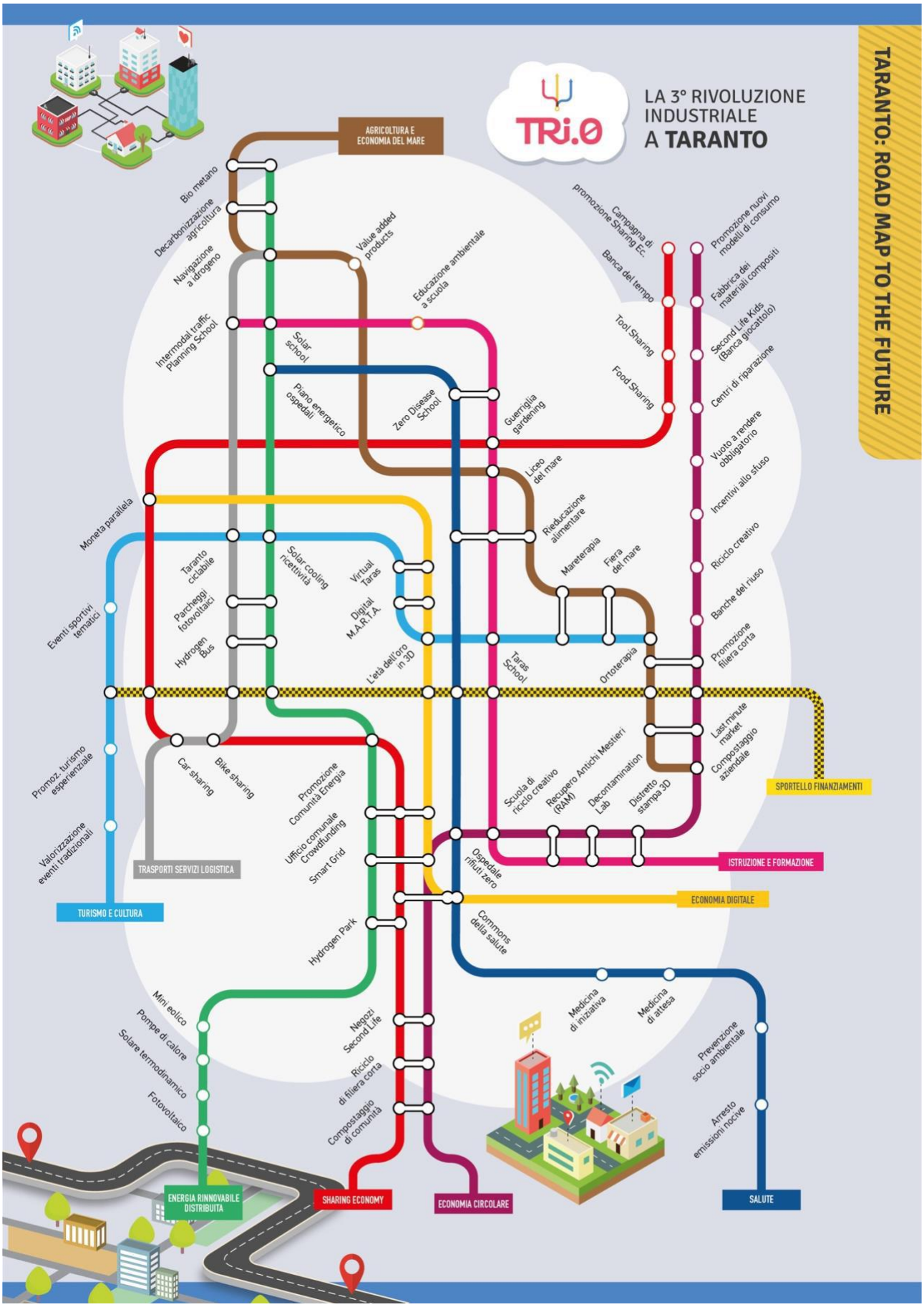
- Technical aspects
- Regulatory aspects
- Political aspects
- Educational aspects
- Financial aspects
- Research and Development

For digital energy, "resilience" proposals are also envisaged, in order to cope with the transition from the fossil era to the post-carbon era, without social and economic shocks.
Finally, the Master Plan ends with two chapters on the two particularly innovative aspects:
the first is on the new financing models of distributed renewable energies and energy prosumers in the region with particular reference to the digital technology of value and data transfer known as "BLOCK CHAIN".
The second analyses the future benefits introduced by renewables, energy efficiency and the digital economy for households, the revitalization of the economy and the economic impact of the new energy model, its employment intensity. This section also provides information on the investments required (size and type) to achieve the announced benefits. The section concludes with the description of some “first energy efficiency projects” quickly practicable in the economic fabric of the region, and defines new systems of economic forecasting which can be of help in evaluating the estimated benefits, and their indicators.

Finally, there are some legislative recommendations according to a temporal priority order.
For more information on the Rotterdam Master Plan:
https://mrdh.nl/sites/mrdh.nl/files/files/The-Third-Industrial-Revolution-Final-Report-RNE.pdf
In Taranto too, therefore, it is necessary to think about the development of a long, medium and short term plan, and the structure of "governance" (the Taranto TRI.0 Observatory) in charge of carrying it out, in order to get into the virtuous track of the Third Industrial Revolution Master Plan.
The Taranto TRI.0 Observatory will have the task to translate into practice on the territory the indications provided by this plan for a rapid transition of Taranto and its province towards a decarbonised economic model of Third Industrial Revolution. To carry out its tasks, the Observatory will be structured according to the 9 main lines of action identifiable for Taranto starting from the Master Plans of comparable territorial realities such as the Master Plan for the Rotterdam Region in Holland, or the French Haute-de-France region, yet without trying to superimpose the situation in Taranto on the methodology of these Master Plans, which, don't forget, are elaborated by a team of approximately 100 international specialists for a period of 6/8 months. For Taranto, one could imagine for the Observatory a route structured as follows:

- Distributed Renewable Energy
- Circular Economy
- Digital Economy
- Tourism and Culture
- Agriculture and Fisheries
- Sharing economy
- Training and educational aspects
- Transports, Services, Logistics
- Health

Each line of action provides for specific actions whose implementation, financing and monitoring will be a responsibility of the observatory. The different lines of action make up a complex map that we have represented, for ease of reading, according to the scheme of a metropolitan network, as shown in the following image:


TRi.0
LA 3° RIVOLUZIONE INDUSTRIALE A TARANTO
TARANTO: ROAD MAP TO THE FUTURE
AGRICOLTURA E ECONOMIA DEL MARE
Bio metano
Decarbonizzazione agricoltura
Navigazione a idrogeno
Value added products
Educazione ambientale a scuola
Intermodal traffic Planning School
Solar school
Piano energetico ospedali
Zero Disease School
Guerriglia gardening
Liceo del mare
Rieducazione alimentare
Mareterapia
Fiera del mare
Ortoterapia
Taras School
L'età dell'oro in 3D
Moneta parallela
Taranto ciclabile
Parcheggi fotovoltaici
Hydrogen Bus
Solar cooling ricettività
Virtual Taras
Digital M.A.R.T.A.
Eventi sportivi tematici
Promoz. turismo esperienziale
Valorizzazione eventi tradizionali
Car sharing
Bike sharing
Promozione Comunità Energia
Ufficio comunale Crowdfunding
Smart Grid
TRASPORTI SERVIZI LOGISTICA
TURISMO E CULTURA
Hydrogen Park
Mini eolico
Pompe di calore
Solare termodinamico
Fotovoltaico
Negozi Second Life
Riciclo di filiera corta
Compostaggio di comunità
ENERGIA RINNOVABILE DISTRIBUITA
SHARING ECONOMY
ECONOMIA CIRCOLARE
Campagna di promozione Sharing Ec.
Banca del tempo
Tool Sharing
Food Sharing
Promozione nuovi modelli di consumo
Fabbrica dei materiali compositi
Second Life Kids (Banca giocattoli)
Centri di riparazione
Vuoto a rendere obbligatorio
Incentivi allo sfuso
Riciclo creativo
Banche del riuso
Promozione filiera corta
Last minute market
Compostaggio aziendale
SPORTELLO FINANZIAMENTI
Scuola di riciclo creativo
Recupero Antichi Mestieri (RAM)
Decontamination Lab
Distretto stampa 3D
ISTRUZIONE E FORMAZIONE
Ospedale rifiuti zero
ECONOMIA DIGITALE
Commons della salute
Medicina di iniziativa
Medicina di attesa
Prevenzione socio ambientale
Arresto emissioni nocive
SALUTE

The administrative governance of TRI.0 Taranto

If the Taranto TRI.0 project were applied by the Municipality of Taranto, a modification of the administrative structure would be suggested to ensure effective governance inspired by the administrative structures set up by the local authorities that are implementing TRI Master Plans.
The competences of the Municipality, in the matter of the pillars mentioned, are quite limited and should act in synergy with the corresponding regional and state structures of competence.
Anyway, to accelerate the third industrial revolution it is essential to rethink a review of skills, creating governance as follows, starting from the current situation of the subdivision of municipal departments:

CURRENT STRUCTURE	TRI.0 STRUCTURE
Public Works	Energy
Implementation of the Program - Demographic Services - Organization and functioning of the municipal structure and Human Resources	Circular Economy
Sports, labour and youth employment policies	Digital Economy
Environment, health and life quality	Tourism, transport and services
Social policies, housing emergency	Agriculture and Fisheries
Heritage, public housing, relations with bodies	Culture
Urban planning, economic and territorial development, institutional relations	
Public education, university, culture, family protection	
Productive and economic activities, culture of the sea and seafaring, associations	

The new *governance* is not a simple replacement of the departments, but a redistribution of competences, since those constitutionally guaranteed to the Municipalities are of an administrative nature according to the provisions of article, 4, paragraph 3, of the law of March 15th 1997, n. 59 and the Legislative Decree n. 267 dated 18 August 2000.In fact, the Municipality is responsible for all the administrative functions that concern the population and the municipal area, especially in the organic sectors of services to the person and the community, the structure and use of the territory and economic development.
The same transposition of the redistribution can be carried out at the regional level, bearing in mind the major competences attributed to the Region by the Italian Constitution that are:

- international and European Union relations, trade with foreign countries;
- job protection and safety;
- education, without prejudice to the autonomy of educational institutions and with the exclusion of vocational education and training;
- professions;
- scientific and technological research and innovation support for production sectors;
- health protection;
- nutrition;
- sports law;
- civil protection;
- territorial government;
- civil ports and airports;
- large transport and navigation networks;
- communication laws;
- national energy production, transport and distribution;
- complementary and supplementary pension;
- harmonization of public budgets and coordination of public finance and tax system;
- enhancement of cultural and environmental heritage and promotion and organization of cultural activities;
- savings banks, rural banks, regional credit companies;
- regional land and agricultural credit institutions.

The dialogue among local authorities should guarantee a harmonious strategy towards the Third Industrial Revolution, while respecting the municipal territorial and decision-making autonomy.
While waiting to verify the willingness of the local administrations interested in adopting the Taranto TRI.0 Plan and creating

an adequate structure for its implementation, the proposing group of the Taranto TRI.0 plan has, as previously anticipated, consulted the representatives of the associations of stakeholders and of the business system of the Ionian province to set up an "**Observatory for the Third Industrial Revolution in Taranto**" which aims to promote its activities in the Ionian land both through adequate information and training actions and through the presentation of specific projects that can be financed through existing economic measures at regional, national and European level (programs such as LIFE, Urban, Horizon 2020 etc). Anyone in charge of the implementation of Taranto TRI.0 (private entrepreneurial observatory or public body) must measure the effectiveness of their action by using a system of indicators to measure the achievement of the objectives of the time schedule which will be elaborated according to the resources made available.

The indicators to measure the achievement of the objectives of Taranto TRI.0

The analysis for setting the indicators of Taranto TRI.0 is inspired by the model of fair and sustainable well-being (BES) which is an index, developed by the ISTAT and the CNEL, to evaluate the progress of a company not only from an economic point of view , as for example the GDP, but also the social and environmental ones and accompanied by measurement of inequality and sustainability.
Only the cognitive dimension will be dealt with. The "affective" dimension is still in progress, and therefore in this phase the definition of the indicators proposed to the BES will refer only to the cognitive component.
It indicates the emotions that the subjects experience during their daily life. These emotions can be positive (pleasant affect) or negative (unpleasant affect) and are treated conceptually in a distinct way, because they are determined by different variables (Bradburn 1969; Diener / Emmons 1984; Argyle 1987). Unlike the cognitive component, which implies an a posteriori reflection on one's life up to a certain moment, the affective component is linked to the present, to the current situation.
The most important dimension in the affective sphere that has not yet been assessed is that of happiness which presupposes a substantial reversal of the entire system of assessing individual and collective well-being.
The table of BES indicators, shown below, does not refer specifically to the TRI project for Taranto but follows a more classic scheme, although not without connections with the reality of TRI.0 Taranto:

- Health
- Education and culture
- Job
- Economic well-being
- Social relations
- Safety
- Subjective well-being
- Landscape and cultural heritage
- Environment
- Research and Innovation
- Quality of services

This system contains many useful elements to define a table of indicators that can be checked periodically about the most original parts of Taranto TRI.0 which must be discussed and verified with the socio-economic operators of the city.

Health

Indicators table

N.	Indicator name	Source	Detection	Frequency
1	Life expectancy at birth	Istat	Mortality tables for the Italian population	Annual
2	Healthy life expectancy at birth	Istat	Mortality tables of the Italian population and Survey of Aspects of daily life	Annual
3	Physical state index (Pcs)	Istat	Survey on Health conditions and use of health services	Five Year
4	Psychological status index (Mcs)	Istat	Survey on Health conditions and use of health services	Five Year
5	Infant mortality rate	Istat	Investigation on deaths and causes of death	Annual
6	Standardized mortality rate for transport accidents	Istat	For deaths: Investigation on deaths and causes of death. For population: Survey on the municipal resident population	Annual
7	Standardized mortality rate for cancer	Istat	For deaths: Investigation on deaths and causes of death. For population: Survey on the municipal resident population	Annual
8	Standardized mortality rate for dementias and diseases of the nervous system	Istat	For deaths: Investigation on deaths and causes of death. For population: Survey on the municipal resident population	Annual

9	Life expectancy without limitations in daily activities at 65 years	Istat	Mortality tables of the Italian population and Survey of Aspects of daily life	Annual
10	Overweight	Istat	Survey on Aspects of daily life	Annual
11	Smoking	Istat	Survey on Aspects of daily life	Annual
12	Alcohol	Istat	Survey on Aspects of daily life	Annual
13	Sedentary lifestyle	Istat	Survey on Aspects of daily life	Annual
14	Nutrition	Istat	Survey on Aspects of daily life	Annual

Education and Training

Indicators table

N.	Indicator name	Source	Detection	Frequency
1	Attendance in kindergarten	Ministry of Education, University and Research		Annual
2	People with at least a high school diploma	Istat	Labour Force Survey	Annual
3	People who have a university degree	Istat	Labour Force Survey	Annual
4	Early exit from the education and training system	Istat	Labour Force Survey	Annual
5	Young people who don't work and don't study (Neet)	Istat	Labour Force Survey	Annual
6	Participation in continuous training	Istat	Labour Force Survey	Annual
7	Alphabetic proficiency level of students	Invalsi National Service Evaluation		Annual
8	Level of numerical proficiency of students	Invalsi National Service Evaluation		Annual
9	People with high levels of computer skills	Istat	Survey on Aspects of daily life	Annual
10	Cultural participation	Istat	Survey on Aspects of daily life	Annual

Work and life balance

N.	Indicator name	Source	Detection	Frequency
1	Employment rate 20-64 years	Istat	Labour Force Survey	Annual
2	Rate of non-attendance at work	Istat	Labour Force Survey	Annual
3	Percentage of changes over the course of a year from unstable to stable jobs	Istat	Labour Force Survey	Annual
4	Percentage of people employed in completed jobs for at least 5 years	Istat	Labour Force Survey	Annual
5	Incidence of low paid employees	Istat	Labour Force Survey	Annual
6	Incidence of over-educated workers	Istat	Labour Force Survey	Annual
7	Fatal accident and permanent disability rate	Inail		Annual
8	Incidence of irregular workers on the total employed	Istat	National Accounting	Annual
9	Employment rate ratio of women aged 25-49 with preschoolers and women without children	Istat	Labour Force Survey	Annual
10	Share of population aged 15-64 who performs more than 60 hours per week of paid and/or family work	Istat	Use of time survey	Five Year
11	Asymmetry index of family work	Istat	Use of time survey	Five Year
12	Satisfaction for the work done	Istat	Labour Force Survey	Annual
13	Perception of job insecurity	Istat	Labour Force Survey	Annual

Economic well-being

N.	Indicator name	Source	Detection	Frequency
1	Adjusted average available income (per capita)	Istat	National accounts	Annual
2	Index of inequality of available income	Istat	Eu-Silc Survey	Annual
3	Relative poverty risk index	Istat	Eu-Silc Survey	Annual
4	Average net wealth per capita	Bank of Italy	Survey on Household Income and Wealth (SHIW)	Annual
5	Financial vulnerability index	Bank of Italy	Survey on Household Income and Wealth (SHIW)	Annual
6	Absolute poverty index	Istat	Household consumption survey	Annual
7	Index of severe material deprivation	Istat	Eu-Silc Survey	Annual
8	Home quality index	Istat	Eu-Silc Survey	Annual
9	Subjective assessment index of economic difficulty	Istat	EU-SILC survey and monthly survey on consumer confidence	Annual
10	Incidence of people living in unemployed families	Istat	Labour Force Survey	Annual

Social relations

N.	Indicator name	Source	Detection	Frequency
1	Very satisfied with family relationships	Istat	Survey on Aspects of daily life	Annual
2	Very satisfied with friendship relationships	Istat	Survey on Aspects of daily life	Annual
3	People you can count on	Istat	Survey on Aspects of daily life	Five Year
4	Playful activities for children aged 3 to 10 carried out with their parents	Istat	Survey on Aspects of daily life	Three-year
5	Free aids given	Istat	Family and social subjects survey	Five Year
6	Social participation	Istat	Survey on Aspects of daily life	Annual
7	Voluntary activities	Istat	Survey on Aspects of daily life	Annual
8	Funding of associations	Istat	Survey on Aspects of daily life	Annual
9	Non-profit institutions	Istat	Industry and services census - Survey on non-profit institutions	Decennial
10	Social cooperatives	Istat	Statistical Archive of Active Companies	Annual
11	Generalised trust	Istat	Survey on Aspects of daily life	Annual

Safety

Indicators table

N.	Indicator name	Source	Detection	Frequency
1	Homicide rate	Ministry of the Interior	SDI data	Annual
2	Home burglary rate	Istat	Istat processing of data from complaints to the police (Ministry of the Interior) and data from the survey on citizens' security	Annual
3	Pickpocketing rate	Istat	Istat processing of data from complaints to the police (Ministry of the Interior) and data from the survey on citizens' security	Annual
4	Robbery rate	Istat	Istat processing of data from complaints to the police (Ministry of the Interior) and data from the survey on citizens' security	Annual
5	Rate of physical violence against women	Istat	Women's Safety Survey	Five Year
6	Rate of sexual violence against women	Istat	Women's Safety Survey	Five Year
7	Rate of domestic violence against women	Istat	Women's Safety Survey	Five Year
8	Concern about sexual assault	Istat	Citizen Safety Survey	Five Year
9	Perception of security by walking in the dark alone	Istat	Survey on Aspects of daily life	Five Year
10	Fear of going to suffer a crime in the future	Istat	Citizen Safety Survey	Five Year
11	Presence of decay elements in the area where you live	Istat	Citizen Safety Survey	Five Year

Subjective well-being

N.	Indicator name	Source	Detection	Frequency
1	Satisfaction for one's life	Istat	Survey on Aspects of daily life	Annual
2	Satisfaction about leisure	Istat	Survey on Aspects of daily life	Annual
3	Opinion on future prospects	Istat	Survey on Aspects of daily life	Annual

Landscape and cultural heritage

Indicators table

N.	Indicator name	Source	Detection	Frequency
1	Endowment of cultural heritage resources	Istat	Elaboration on data from the Ministry for Cultural Heritage and Activities, Risk Charter	Only
2	Current municipal public expenditure per capita in Euros for the management of cultural heritage (museums, libraries and art galleries)	Istat	Final balance sheets of municipal administrations	Annual

3	Index of illegal construction	Cresme - Centre for social and economic market surveys about construction and the territory		Annual
4	Urbanization index of areas subject to landscape restrictions	Istat	Elaboration on data from the Ministry for Cultural Heritage and Activities, Risk Charter; 13th General Census of Population and Housing 2001	Decennial
5	Erosion of the rural space by urban sprawl	Istat	Elaboration on 4th and 5th general agriculture data, years 1990 and 2000; 12th and 13th General Census of Population and Housing Years 1991 and 2001; Territorial basis for the censuses, years 1991 and 2001	Decennial
6	Erosion of rural space by abandonment	Istat	Elaboration on 4th and 5th general agriculture data, years 1990 and 2000; 12th and 13th General Census of Population and Housing Years 1991 and 2001; Territorial basis for the censuses, years 1991 and 2001	Decennial
7	Presence of historic rural landscapes	Istat	Elaboration on Mipaaf data, National catalogue of rural landscapes of historical interest	Only
8	Evaluation of the quality of rural development planning (regional RDPs) in relation to landscape protection	Mipaaf, Landscape and rural development	The role of the landscape within the Rural Development Programs 2007-2013	Five Year
9	Density of historic greenery and urban parks of considerable public interest	Istat	Environmental data in cities; Territorial basis for the censuses, year 2010	Annual
10	Consistency of the historical urban fabric	Istat	Processing on data of the 13th General census of population and housing, Census of buildings	Decennial
11	Dissatisfaction with the quality of the landscape of the place of life	Istat	Survey on Aspects of daily life	Annual
12	Concern about the deterioration of landscape values	Istat	Survey on Aspects of daily life	Annual

Environment

N.	Indicator name	Source	Detection	Frequency
1	Drinkable water	Istat	Census of water for civil use	Three-year
2	Quality of marine coastal waters	Istat	Elaboration on Ministry of Health data	Annual
3	Urban air quality	Istat	Environmental data in cities	Annual
4	Availability of urban green	Istat	Environmental data in cities	Annual
5	Areas with hydro geological problems	Ispra	Iffi project	Under study
6	Contaminated sites	Ministry of the Environment and the Protection of the Territory and the Sea		Annual
7	Protected land areas	Ministry of the Environment and the Protection of the Territory and the Sea		Miscellaneous
8	Marine protected areas	Ministry of the Environment and the Protection of the Territory and the Sea		Miscellaneous
9	Areas of particular naturalistic interest	Ministry of the Environment and the Protection of the Territory and the Sea		Annual
10	Concern about biodiversity loss	Istat	Survey on Aspects of daily life	Annual
11	Materials flows	Istat	Materials flow accounts	Annual
12	Energy from renewable sources	Terna		Annual
13	CO2 emissions and other climate-altering gases	Istat	Namea-type accounts	Annual

Research and Innovation

Indicators table

N.	Indicator name	Source	Detection	Frequency
1	Research intensity	Istat	R&D survey in the companies; R&D survey in non-profit organisations; R&D survey in public bodies	Annual
2	Propensity for patenting	Istat, Eurostat		Annual
3	Impact of knowledge workers on employment	Istat	Labour Force Survey	Annual
4	Technological innovation rate of the production system	Istat	Cis (Community Innovation Survey)	Biennial
5	Product / service innovation rate of the national production system	Istat	Cis (Community Innovation Survey)	Biennial
6	Productive specialisation in knowledge-intensive sectors	Eurostat	Eurobase	Annual
7	Intensity of Internet use	Istat	Community survey on ICT usage in households and by individuals	Annual

Quality of services

Indicators table

N.	Indicator name	Source	Detection	Frequency	Historical series	Regional Level
1	Beds in residential social-welfare and social-health facilities	Istat	Survey on residential social-welfare and social-health facilities	Annual	Since 2000	Yes
2	Waiting lists	Istat	Eu-Silc Survey	Annual	Since 2004	Yes
3	Children taken care of by the municipal services for children	Istat	Census survey on the interventions and social services of individual or associated Municipalities	Annual	Since 1994	Yes
4	Elderly treated in integrated home care	Istat	Processing of data from the Ministry of Health, Health Information System (SIS)	Annual	Since 2000	Yes
5	Irregularities in the electricity service	Istat	Processing on Authority for electricity and gas data	Annual	Since 1998	Yes
6	Households connected to the methane gas distribution network	Istat	Survey on Aspects of daily life	Annual	Since 1998	Yes
7	Irregularities in the distribution of water	Istat	Survey on Aspects of daily life	Annual	Since 1995	Yes
8	Transfer of municipal waste to landfills	Istat	Processing on Ispra data	Annual	Since 1995	Yes

9	Separate collection of municipal waste	Istat	Processing on Ispra data	Annual	Since 1995	
10	Overcrowding of prisons	Istat	Elaboration on data from the Ministry of Justice, Penitentiary Administration Department	Annual	Since 1900	Yes
11	Time devoted to mobility	Istat	Use of time survey	Five Year	1988-89 2002-03 2008-09	
12	Density of urban LPT networks	Istat	Environmental data in cities	Annual	Since 2000	
13	Difficulty to access some services	Istat	Survey on Aspects of daily life	Annual	Since 1993	

Apart from the indicators on the decrease in morbidity due to the heavy industrial development model that determined the fate of the environment and the population of Taranto, bearing in mind the specificities of the project, indicators of the Third Industrial Revolution could be hypothesised that allow to evaluate not only quantitative aspects but also qualitative ones, for example of development and employment.
By way of example, one could think of a set of indicators that allows to evaluate the elements that determine the well-being of people in Taranto with reference to the sharing economy, (expansion of car sharing services, house sharing, food sharing, intergenerational collaboration for educational projects such as vegetable gardens, afternoon school centres etc) or linked to the digitalisation of the economy (expansion of the circular economy (number of re-use banks open, number of transactions carried out in traditional or parallel currency), digitalised production systems, 3D printing, diffusion of high speed connection in public places, information on public transport,) Circular economy (number of tons of solid waste stolen from disposal and put back into circulation, number of local banks of reuse and repair centres, distribution of second-hand shops and sale without packaging , number of composting social centres and social activities of public gardening ...), energy sustainability (decarbonisation levels of the Taranto biosphere, large-scale introduction of diffuse and distributed renewables, increase in the individual self-production of renewable energy, diffusion of zero-emission transport (bikes, cars, public transport, nautical vehicles), the conversion of human resources and professional profiles (introduction of new figures linked to the internet of energy, sensors, hydrogen and alternative fuels, distributed renewable energies) and finally to innovation in the enhancement of territorial resources through agricultural transformation initiatives, experiential tourism and gardening-therapies, innovative tourism linked to the myth of Sparta, expansion of virtual reality technologies etc.
These indicators can be decided within each project as a means of verification of the progress of each project. It is a matter of inventing them from time to time and project by project according to a scale of indicators capable of giving clearly understanding of the social and economic changes due to the introduction of TRI practices in the territory and in the socio-economic fabric of Taranto.

Epidemiological studies

The Health and Environment indicators in the Taranto area are of particular importance for the environmental damage that has already been caused by the presence of the steel pole.

In the context of the activities of the Health and Environment Centre of Apulia Region, in October 2016, the Study on the state of health of people residing in the municipalities of Taranto, Massafra and Statte was presented.

The area has been the subject of attention for years for the possible repercussions on the health of the population from environmental emissions deriving from the industrial plants present, in particular the ILVA steel plant. The study commissioned by the Apulia Region to a research group led by Francesco Forastiere of the Epidemiology Department of Lazio Regional Health Service and composed of researchers from ARPA Puglia, Ares, ASL of Brindisi and Taranto.

Complementing the numerous epidemiological studies conducted on Taranto in the last 20 years, the new research has been able to relate the increase in industrial atmospheric particulate matter (PM10), specifically coming from the steel industry, with mortality and health conditions of a large group of population (cohort) residing in the Ionian city from 1998 to 2013.
The study shows that the PM10 changes produced by the steel industry from 2008 to 2013 are correlated to the mortality rate in the Tamburi neighbourhoods.
The peak of PM10 and mortality was recorded in 2011.
Subsequently after the 2011 plateau, the curve lowered from 2012 onwards after the well-known seizure of the Judiciary authority.
Each microgram / m3 increase in PM10 in the atmosphere corresponds to a 2.66% increase in the risk of natural death.
The authors conclude that "there is a causal effect of industrial PM10 on the mortality of the Taranto area".

F) Conclusions: transition and rebirth

The occupational intensity of Third Industrial Revolution energy in a world without fossils. A macro economic analysis adapted to the reality of Taranto. It is clear that we are at the showdown: the old fossil model, obsolete, polluting and centralised has reached its efficiency limits even before the ecological or economic ones.

The new one that, thanks also to the incessant work of Jeremy Rifkin, is asserting itself inexorably is solar and distributed, with low marginal costs and accessible to all citizens. However, it affects the interests of the consortia and the energy-financial monopolies that feed the world politics, which is why they are trying to suffocate it in the bud.
The power groups, in the jargon identified as "Lobby", really intent on supporting fossils" to the last drop", defend their interests with mystifications and false arguments, first of all "occupational blackmail".
More than ever in this historical period, workers become a weapon of pressure and blackmail, turned into hostages for the sole purpose of pushing the adoption of subsidy and assistance policies for fossil sources.
There is also the problem of exceeding energy production from fossil sources which, as is evident, are not infinite and are now on the road to final exhaustion. Add to this the problem, which has now become a drama, of climate change linked to the production of greenhouse gases resulting from the combustion of fossil sources. From a strategic point of view, the rapid and immediate transition towards "clean and alternative sources" is needed to meet this global human need.
For the purposes of this analysis, socio-economic observations are not least. The major fossil resources are concentrated in geographically positions located especially in the Middle East, not surprisingly territories afflicted by heavy wars and social revolutions both internal and led by the countries most interested in controlling the last available reserves. The perverse game refers to an inverse proportion so that as the reserves themselves decrease, the conflicts will become more important, bitter and bloody.
Another focal point touches the environmental system. The first devastating impact regards the oil extraction and processing sites, where the local economies are totally distorted by the presence of drills and unbreathable air, as well as by possible accidents and spills causing the depletion of natural and tourist reserves to the total detriment of native inhabitants. Disarming examples exist all over the world as well as in the neighbouring Italian regions of Apulia (Taranto), Sicily (Gela, Priolo, Milazzo) and Basilicata, emblem of the denial of the so much vaunted fable by the oilmen according to which fossil sources bring well-being for local communities! Reality says the exact opposite, condemning Lucania to the tail light in terms of wealth within the entire boot.
Another analysis concerns health, closely linked to the points just explained. The aforementioned areas suffer from the greater presence of deaths due to cancer causes, childhood malformations and important disturbances at respiratory levels or something else. In economics, all this translates into the terminology of negative externalities (costs) that the communities themselves, the regions and in some way the Italian state, have to endure in terms of money and deaths.
Our civilization, therefore, must choose whether to continue on the road that has brought it a step away from the abyss, or to bravely try to take another one. And we don't have much time to do it. This new energy regime, no longer centralised and hierarchical but distributed and collaborative, and which will mark the transition from globalisation to "continentalisation", will rest on the five pillars proposed by J. Rifkin.
According to the scholar, the first and second industrial revolution are connected to a hierarchical system of energy production and distribution. Fossil fuels - coal, oil and natural gas - are elitist energies, since they are found exclusively in certain places on the planet. They require significant military investments to ensure access and continued geopolitical management to ensure their availability.
They also require a hierarchical organisation and huge capitals to bring them from the depths of the earth to the final consumer. This centralised system sets the conditions for the rest of the economy, encouraging similar models in all production sectors.
The only possible solution seems to find a remedy in the total change of energy paradigms and by moving the use of renewable sources and the network. The technological breakthrough can in fact put in communication an enormous quantity of capillary points of production, where the current plants can be supplanted by the single houses, true micro centres capable of satisfying internal consumption but also of storing and transferring the surplus to the network.
It will be the definitive transition from vertical to horizontal integration, with the power transmitted to citizens who are now able to self-produce energy.
The future scene thus outlines the revolution of the old asset also in the employment field, with the possibility of creating millions of new employees in the renovation of houses, in the construction of networks, in the development of technologies. The change will be able to profoundly change the geopolitical structure and relations between states, social relations, modes of production.

The pillars on which the new logic rests go through the definitive transit of renewable energy, micro-generation, the development of hydrogen for the storage of energy, a large distribution network accessible to all, electric mobility. According to Rifkin, the great economic revolutions take place when two factors coincide in history: the advent of new communication systems together with new energy systems. Here lies the key to the "new economic narrative" that will lead us towards a *no carbon* future and towards an era based on distributed capitalism.
Thanks to the most recent innovations, we have moved from personal computers, from telephone cables to cells, bringing in a very short time billions of people to be connected to each other horizontally and with very low costs through the Internet. This democratization of communications has rapidly enabled a third of humanity to share music, knowledge, information and social life in an open and accessible space, effectively implementing one of the most extraordinary evolutionary passages in all human history.
The same will happen with the Third Industrial Revolution. The new collaborative and distributed models which will characterise the production and distribution of energy, will act as an unstoppable push to modify all models and production systems at the base of each economic sector. The way companies conduct their businesses will be transformed. We will increasingly move towards customized, local micro-productions based on minimum capital investments.
In addition to the development of technological innovations and the contemporary harmonious growth of all the pillars on which the economic revolution is based, a real cultural revolution will also be needed. Entrepreneurs and managers will have to rethink their business models, also looking at distributed and collaborative research and development strategies, open source and network commerce, performance contracts, agreements on distributed savings and sustainable supply chains based on low-carbon logistics.
The European Union is potentially the largest single market in the world, with 500 million consumers from its Member States, and another 500 million consumers in associated countries in the Mediterranean and North Africa partnership regions. The creation of an Internet of Things platform for a Third Industrial Revolution, which connects Europe and its partnership regions in a single integrated economic space, will allow traditional businesses as well as prosumers to produce and distribute information, renewable energies, 3D printed products, and a wide range of other low marginal cost products and services in the traditional market, and with near zero marginal cost in the Sharing Economy, with enormous economic benefits for society.
The creation of the infrastructure for the Internet of Things for a digital economy of the Third Industrial Revolution will require a significant investment of public and private funds, as happened in the First and Second Industrial Revolution. European investments in infrastructure projects in 2012 exceeded 650 billion Euros, and were largely used for the maintenance of the obsolete technological platform of the second industrial revolution, which has already reached the limits of its production potential for some time. If only twenty-five percent of these funds were redirected to the creation of the Internet of Things infrastructure In every single region of the European Union, the Digital Union would become reality by 2040.
The aforementioned investments will be transformed into new jobs both with the use of personnel belonging to the traditional sectors and with the creation of new professional figures to be trained at all levels.
In Italy the unemployment rate reaches the all-time high ever recorded, reaching 13%. [491] Young people looking for work, on the other hand, represent 42.3%. The employment rate is 55.2%.
In absolute terms there are 22 million 216 thousand employed, the number of unemployed is 3 million 307 thousand and the unemployed among 15-24 year olds are 678 thousand.
A necessary premise to understand the employment data existing in the energy sector and the real potential of the various sectors.
Italy has a balance sheet on renewables that can be summarized in the production of one third of national electricity and which has about 200 thousand employees [492].
The study made by the GSE during the conference on the new energy plan of Lazio Region, specifies that in 2012, against an investment of 12.6 billion Euros, 137 thousand people found work in the new clean energy plants and 53 thousand in managing existing ones. Furthermore, between 2008 and 2013 the cost of photovoltaic has fallen by more than three times.
Other data, instead are collected for the traditional sources employment market. Just think that the largest energy giant operating in Italy (and therefore aggregative of different realities), ENI S.p.A., accounts for approximately only 25 thousand employees in the entire peninsula [493]!
The reform of the labour market, according to the current government, should be relaunched with the so-called Jobs Act, aimed at a series of manoeuvres including:

- Reducing the cost of energy for companies by 10%
- Less taxes for those who produce work and more tax burden on financial speculators
- Spending Review
- Administrative simplifications

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491 *Istat data February 2014.*
492 *GSE data - Source Repubblica Ambiente, article of 3 April 2014 by Antonio Cianciullo.*
493 *ENI S.p.a. annual financial report data*

- New job code
- Universal allowance for those who lose their jobs
- Greater transparency in the public sector
- Unique coordination of employment centres
- Union representation
- Electronic agenda (invoicing etc.)

The Decalogue will hopefully also include the consideration that our country is currently supplying money to fossil sources in the face of the elements just exposed. [494] There is talk of 4.4 billion in direct subsidies, distributed to road hauliers, fossil fuelled power plants and energy-intensive businesses, and 7.7 billion in indirect subsidies, including financing for new roads and highways, discounts and gifts for drilling.[495]

A correct application of the transition, ultimately, will lead to the effective creation of new employment in a ratio of 1 to 6, for each worker employed in models of the second industrial revolution, 6 TRI jobs will be developed
thanks to home automation, sensors, reuse banks, energy efficiency, recycling, savings, 3d printers, agriculture at km / 0 etc. a virtuous example is found in Nord Pas des Calais, a region with 4 million inhabitants in north east France where in a single year of application 20,000 jobs have been created with 5,000 new businesses.

The Third Industrial Revolution is based on the knowledge economy rather than knowledge of the economy. In the real economy, a diametrically opposed model is growing based instead on the value of work, on the centrality of the human being, on the laws of thermodynamics and on the enhancement of the environment and natural resources as common goods to be preserved to allow survival of the human species in the biosphere that hosts us.

It is therefore from the local level that the affirmation of a new financial model functional to the needs of companies that create value, distributed wealth and work through actual goods and services must start and not through "bets" on changes in the value of financial packages disconnected from reality and from reasonable warranties.

The current financing model for economic activities must be replaced not only for ethical reasons (which would already be enough), but also because it has exceeded the limits of its efficiency, sustainability and reliability.

The so-called "markets" demonstrate it to the financial stabilization measures required by the European Union or the IMF, which now no longer produce the expected results in terms of spreads and stock market values, but are more linked to factors that combine exchange manipulations and asymmetries information (the known "bubbles") with a strong volatility of decision-making processes, in which sentiment risks overwhelming the most objective evaluation criteria, driven by the imperative of over-profit.

This system ignores and devastates the actual processes of financial recovery or creation of real value of the economy of a particular country or of a given company.

In conclusion, for every job lost in the oil and hydrocarbons sector, which is capital intensive and low labour intensity, dozens of them are created in "substitute" sectors (renewables, energy efficiency, internet of energy and things) to meet the satisfaction of needs hitherto covered by fossil fuels according to a labour-intensive and much weaker capital-intensive model. So the sooner we close existing oil plants and the sooner we start creating jobs again.

Now, keeping the above in mind, let's ask ourselves the question: **Is life in Taranto possible after the Ilva?** To give us a credible answer it is necessary to analyse the state of the art of the digital economy in Taranto.

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[494] *Globally, the problem of subsidies to fossil fuels is well known: the latest complaint is contained in the IEA's World Energy Outlook 2013, which quantifies them as 544 billion, five times those for renewable sources. According to estimates by environmental NGOs, only by eliminating these aids would global CO_2 emissions be reduced by 750 million tons, that is 5.8% by 2020, contributing to the achievement of half of the climate objective necessary to contain the increase in global temperature of 2°C.*

[495] *Source: QualEnergia.it*

Taranto of the future

"This is the PA the country needs: with determination, with people who don't give up, innovation, hopes, dreams, projects, strategies to make the present and the near future better than the one in where we are. Taranto is not prepared to look at the scrolling time feeling sorry for itself. "

Section developed with the contribution of Francesco "Piersoft" Paolicelli

In Taranto there is a digital and sustainable future after ILVA and the system of Taranto businesses has already begun to notice it even if in a contradictory and intermittent, and not yet systemic and programmed way.
There is a Taranto projected into the future that speaks of innovative start-ups, Open Data, Arduino, Pink digital.
It is a city made up of dynamic people, bodies and associations that promote the territory and enhance its natural and human resources, putting the city of the two seas on a par with much more advanced realities. It is a community that continues and progresses with effort and tenacity, which does not give up if the path is uphill, it adjusts the pace and proceeds. It is the challenge of new languages, of innovation, of the world that changes too quickly to stop and, although many are pretending nothing is happening, Taranto is in all of this.
On March 5, the first Open Data Day Taranto 2016 was held, promoted by OpenPuglia a community that, with its process of freeing up environmental data and culture in Apulia from below, wants to stimulate regional policies so that the work of public data opening continues. Thanks to open data, according to a recent study, only this year in Europe 75 thousand new jobs will be created in the private sector, which will become one hundred thousand in 2020.
Both the events took place in the headquarters of the **Chamber of Commerce of Taranto** and were organized with the collaboration of the Chamber of Commerce which confirms and reaffirms its leading role in the economic promotion of the area with particular attention to innovation. For the third consecutive year on April 2, the Citadel of companies will host Arduino Day, the international day dedicated to the infinite applications of the open source board, organised in collaboration with CNA and Taranto Lab.
So there is a Taranto that operates with seriousness and competence, made up of young and less young people who believe in the possibility of a new development starting from the bottom. A development that is not imposed from above and has no vetoes. Where institutions and associative realities accompany change and make their know-how available. An "open" mode outside the box and rigid affiliations, where knowledge is a heritage to be shared, not to be hidden. It is still a valuable microcosm for now, but it is growing significantly. And it is a path that La Ringhiera wants not only to narrate as an organ of information, but to support. For this reason we were media partners of Start-up Europe Week Taranto and we are among the partners of Pink Digital. We not only ask for change, we participate in its realisation."[369]
" The difficulty of writing programs with literal languages and therefore "**the possibility of freeing computational thinking**" is also demonstrated by the fact that in the world of automation and industrial robotics, even if for different purposes (lack of time related to software design, tight commissioning times, need for clarity of the software itself for maintenance purposes), **block languages are used almost exclusively and it is usually "prohibited" by customer specifications to use these literal languages.** So if I had a language that would allow me to program in a simple, intuitive and fluent way, which was not an obstacle, but naturally indicated the actions I want to perform on the computer, I could use it as a teaching **tool** and not as the **purpose** of my teaching . Luckily, this tool exists, it's called **Scratch** and it's also OpenSource. There is also an environment called **Blockly** which is actually a library of functions for expert programmers (on which the code.org site or the WEB application "MIT App Inventor" is based, which is used to create apps for smartphones ...) but I prefer Scratch and its derivatives.
This type of approach can also be used for **Physical Computing** and **Educational Robotics** using mBlock (derived from Scratch) together with the Arduino Hardware platform. I would add in particular that **Arduino represents a good "entry level" for the teaching of the electronics of Physical computing and Educational Robotics**, starting from primary school, up to the 5th year of secondary school (in specialised schools, we should go deeper into more complex electronic and IT systems) ".
Umberto Talamo on http://ischool.startupitalia.eu/ and CoderdojoTaranto.it
"From the first edition of Arduino Day, thanks to the support of the President Luigi Sportelli, the Secretary Francesco De Giorgio and Francesca Sanesi of the Chamber of Commerce of Taranto, we have discovered that there are many people who want to change this now obsolete , passed type of capitalism. People who know the sharing economy well, who have read Jeremy Rifkin's books on the third industrial revolution, on society at zero marginal cost. Adult people, very young, students, entrepreneurs and teachers (like prof. Umberto Talamo) who, alone or in small groups, passionate about technology, innovative applications, 3d printers, drones, digital drawing, cultivate the passion of the new, of the company with zero environmental

[369] *Michele Tursi on the online magazine www.laringhiera.net*

impact, zero km, zero waste. We have tried to put together what was scattered and the idea of the community of the "Economy of knowledge, of innovation", well-being in a holistic sense that concerns the present and the future, respect for nature and the environment, culture, history, etc, is developing. Since then sharing, (the coopetition as Prof. Marinella Levi of the Milan Polytechnic calls it), has become an ever-present topic in the various events, Linux day, Start-up Weekend, Start-up Europe, Pink Digital, Open Data Day, etc.

Certainly in respect for the environment, awareness of the choice of use of energy from renewable sources is created, a position different from what is structured around the economy that uses energy from fossil sources; hydrogen, wind, solar thermal, geothermal, etc.

Makers who want to work together, far from entrepreneurship linked to the usual mining policy that exploits the territory and the local population in favour of a few large groups that, once the resources are finished, leave the desert, the contaminated environment, the integrated workers, the unemployed, the many skills created and abandoned to their destiny. We have approached and given hope and voice to young people who trained in universities far from their native lands; they can hope to return to bring added value and wealth to their territory instead of living in Northern Italy or abroad, to grow companies and structures far from families of origin, from the institutions, which have invested resources for the purpose. We will continue to do all this with the hope and openness to the institutions that want to support this movement that advances, self-feeds, grows and creates new and healthy energy."

Critical success factors (csf) - legal factors

Legal and administrative critical issues, necessary changes to the legislative framework to encourage the rapid expansion of the energy internet and the prosumers

First of all, critical legal factors must be considered: Energy communities, prosumers and the digital economy require profound changes to the legislative framework in order to be implemented. In this chapter we will analyse the most crucial. ″ Internet of Things" (IoT) - is the expression used for some years now to define the network of equipment and devices, other than computers, connected to the Internet: they can be cars, radios, air conditioning, but also household appliances, light bulbs, cameras, pieces of furniture, containers for the transport of goods. In short, any electronic device equipped with software that allows it to exchange data with other connected objects. Introduced by Kevin Ashton, co-founder and executive director of the Auto-ID Centre (Massachusetts Institute of Technology-based research consortium) in 1999, the concept was later expanded and developed by the research agency Gartner.

The Internet of Things is seen as a possible evolution in the use of the Internet. The objects become recognizable and identifiable, they acquire intelligence thanks to the mere fact of being able to communicate data about themselves and access information gathered by others.

All objects can take an active role thanks to the connection to the network. The goal of the internet of things is to make the electronic world draw a map of the real world, giving an electronic identity to the things and places of the environment around us. The fields of applicability are manifold: from industrial applications (production processes), to logistics, to energy efficiency, remote assistance and environmental protection.

Since its creation, the Internet has always had the primary purpose of connecting and making people talk to each other. Users started talking to each other and exchanging information, data, or simply words, from one part of the world to another. Almost half a century has passed since then, and the Internet has grown exponentially. But like everything that grows, the Internet has also evolved, gaining greater awareness of its potential, and has become stronger. In fact, today we no longer communicate only among human beings through a computer (or smartphone) and through the internet. Today it is possible to communicate with real objects that surround us. Making these objects communicate with each other, and with a computer (or with us) through the internet is possible today, with applications that go beyond the imagination.

In this regard, we report some concrete examples. Internet-connected refrigerators that can be controlled directly from the mobile phone, or refrigerators that order groceries when the refrigerator is empty (still experimental areas), or intelligent traffic lights that turn green when cars in the opposite direction do not pass (as already attested in Switzerland), or "smart" bracelets and watches that control your heart beat, temperature and more.

The Internet of Things is increasingly being followed and increasingly represents an opportunity for development. Connected devices are increasing, and there is a strong trust in Italy towards the most consolidated IoT solutions and technologies and resistance to trying the most innovative Internet of things. The Internet has evolved by extending its range of action to hyper-connected objects and real places ("things"), which can now communicate with the network and transfer data and information. The object interacts with the surrounding world, as it is endowed with "intelligence", that is, it stores and transmits information between the network and the real world. In this way, an "electronic identity" can be given to everything forming the world around us, through, for example, RFID (Radio Frequency Identification) and other technologies (such as the better known QR code). Objects connected in the world through this new technology are now several billion, and new areas of work and the economy are affected. But many people wonder: "What is the Internet of things really?" and "What is the Internet of Things for?"

Before answering these questions, it is necessary to first recognize that this phenomenon has been present long before this definition was coined. Users who have objects that can be traced back to the Internet of things often don't know they can say they are using an IoT (connected) object.
From some studies on the Internet of things, it emerges that many Italian people do not know what the Internet of Things really is, even if they have devices that are based on this new technology. For example, the IoT observatory of the Polytechnic of Milan summarises the Italian situation that emerges from the report: "*Internet of Things Smart Present or Smart Future?".* All the "intelligent" objects that are called to communicate in an increasingly interconnected form. The Internet of Things can indicate a set of technologies that allow you to connect any type of device to the Internet.
In the city environment, for example, a detector placed in a street could check the street lamps and indicate if a lamp is working, but the same detector could, if properly equipped, also report information on air quality or the presence of people. But how many objects are connected? In a rapidly expanding sector such as the IoT, which is also worth many billions of dollars, the major research companies claim that we will reach over 25 billion IoT devices by 2020.
Many operators in the sector believe that the number will be widely exceeded and this already represents an extraordinary business opportunity for all operators in the sector. So much so that the government also becomes aware of this situation, and the crisis does not seem to slow down the development of intelligent objects. Above all, we discuss how winning ideas and products will need to connect objects of everyday life with the Internet and technology. And as the diffusion of devices and sensors grows, so the amount of data that will have to be managed and the number of applications that will have to be developed will grow even more. From this point of view, an important business opportunity is foreseeable in terms of the diffusion of development platforms and also in terms of connectivity IoT solutions.
Another area of fundamental growth is represented by consultancy companies and ***system integrators***, that is, by those companies or specialists who have the task of making different systems communicate with each other in order to create a new functional structure that can synergistically use the potential of the original systems and thus create functions that were not originally present. "IoT" therefore means integration and opens up very important perspectives in terms of reviewing company information systems. Also from this point of view, the IoT could represent an important development opportunity in perspective.
But where are we in Italy? After several years of curiosity and experimentation of the Internet of Things, even in our country some glimpses appear through the first concrete results that present different degrees of application: the most consolidated, experimental and embryonic realities. The report analyses over 300 IOT applications launched by private companies or public administrations in Italy and abroad. In Italy, the consolidated applications coincide with the simplest ones, the applications currently in the experimental phase are those that come closest to the parameters of the Internet of Things and embryos are the plans for the future.
For greater convenience, however, in the following discussion we will combine experimental and embryonic applications in a single group.

a) Consolidated application

The most widespread and successful applications in Italy are those related to the simplest and most immediate IoT solutions. Think, for example, of video surveillance and security in "smart homes" aimed at control and anti-intrusion; the traceability of valuables as well as the monitoring of city traffic in the "smart city". Within these areas, the Italian Internet of Things is growing more and more, given the immediate and user-friendly application and management. However, these simple applications severely limit the potential for openness and reachability typical of the Internet of things.

Anyway, solutions closer to the typical standards of the Internet of Things are slowly starting to spread. These include smart metering to measure consumption, home automation solutions, personal safety, info-mobility services and the recording of driving parameters. The market for these application solutions in our country is proceeding very slowly, but by working and thinking about the real value they produce in the long term, it will be possible to reach their diffusion in a short time. For this to happen, companies must redefine communication strategies with potential users and it would also be desirable that the Italian legislation provides for significant incentives for them for the concrete development of such strategies.

b) Experimental and embryonic applications: the advantages of the Internet of things

The second range includes solutions that reflect the concept of the Internet of Things. For example, the solutions based on RFId technologies for the "supply chain", that is, for the management of the distribution chain with the aim of controlling performance and improving its efficiency (for example, the systematic cataloguing of products), which are the basis of the Internet of things, in Italy find it hard to take off. This is due to a lack of collaboration among the actors in the supply chain.

The same slowness is found in e-Health technologies (IoT for health and medicine), in which patient remote monitoring could drastically reduce hospital costs. There should be a strong commitment by the public sector that should think about the long-term advantages and benefits and act accordingly by financing the projects. Finally, there are several areas where the Internet of Things has only been imagined. This occurs in small-scale experiments and among these the most advanced are found in the energy sector with Smart Grids, that is, the set consisting of an information network and an electrical distribution network in such a way as to allow the management of the electricity grid in an "intelligent" way in various aspects or functions or in an efficient way for the distribution of electricity and for a more rational use of energy while minimizing any overloads and variations in the electric voltage.

The sectors most affected by IoT applications are the Smart Home, the Smart Building, the Smart City and the Smart Mobility, but also, and for a long time now, the Smart Manufacturing. In the field of energy, Smart Metering is widespread, while in the world of mobility new opportunities are coming in the field of Smart Cars. IoT brings "intelligence" to information processing systems. Through the Internet of things objects can be controlled remotely (remote control of things), and are capable of transmitting data from which useful information can be extracted on the functioning of these objects, and on the interaction between these objects and those who use them (the consumer). Hence the criticisms relating to privacy in relation to the IoT, and transparency in the processing of personal data, as well as security.

Applications of the Internet of Things can be found in:

- Home automation (i.e. technology applied to homes, for example to manage refrigerators, washing machines, telephones, etc.);
- Robotics (ie engineering and technology that allow robots to "come to life", that is, to make robots do tasks today performed by human beings);
- Avionics (i.e. technology applied to aircraft and piloting, such as aircraft communication systems, autopilots, etc.);
- Automotive industry (which studies new applications for cars, such as smart wipers that activate themselves when it starts to rain, up to "smart" cars, that is, capable of driving alone and assisting the driver, as Apple and Google are trying to do);
- Biomedical Industry (i.e. the IoT applied to medicine, such as the remote management of patients, up to remote surgical interventions);
- Telemetry (which deals with developing the transmission of data and information between media).

c) Critical issues relating to the development of the Internet of things in Italy

But can this be enough for Italy? Even though there has been an increasingly conspicuous growth in the sector, in our country the "Internet of Things" revolution marks a so great discontinuity as to pose unprecedented challenges to the regulation of various sectors: telecommunications, antitrust, privacy. In other words, it risks undermining those principles on which the protection of market balances, consumer rights and innovation has so far depended.

Some issues - such as roaming and, in particular, privacy - have come before others under the lens of the regulator, also in Italy. But the regulatory dossiers are many and varied, confirming how large and disruptive the phenomenon is now. This is learned by reading the investigations carried out in the Internet of things field by the competent authorities, such as our Agcom.

One of the issues is that there is no specific license or general authorisation to operate in this area. According to the rules, the license required from telephone operators depends only on the type of frequency or technology used for communication between connected objects. This creates uncertainty about service levels, notifications and consumer obligations. Therefore the regulation of this phenomenon and its implications in a unitary and non-fragmentary way would be essential for our legal system. This does not mean generalising such a complex matter, but implies the adoption and regulation of multiple sectors in a single large container.

The same uncertainty depends on the fact that there are still no frequency bands dedicated to these technologies. Instead, it is a rather chaotic front: some services even use non-licensed frequencies and unconventional transmission methods, making the regulator's task to establish a set of obligations for suppliers and rights for users more difficult. A big knot concerns numbering. Regulators fear that the growth of the phenomenon could lead to the exhaustion of available numbering resources.

However, the problem is upstream: in fact, there is a need for harmonisation of the rules in Europe, given that countries other than Italy are more flexible in granting numbering resources and in allowing their use abroad. In some Member States, operators have requested the introduction of a new numbering, specific for M2M services.

According to the Authority for the Guarantees in Communications, in a long-term perspective, the use of IPv6 could become the best solution. Telephone operators fear two things. On the one hand, the depletion of their scarce resource (mobile numbers). On the other hand, that the European regulations will disadvantage them, towards internet service providers, who can freely (albeit indirectly) take advantage of the telephone numbers given to operators who have requested authorisation. Subjects who, leveraging on their being international, escape the national rules and reach the end user by relying on the resources of the operators. In this case the service is based on a strong agreement with an operator.

The analogy remains valid in substance given that for the roaming mechanism the other operators must also transport that service on their networks. The weak link in the chain are likely to be end consumers too, who in this situation of regulatory uncertainty cannot count on rights that are now well established in the world of telecommunications. For example, the right to change the operator that provides Internet of things connectivity: this is another of the dossiers on the table of European regulators. The issues are so many, complex and new that it will not be easy to unravel the skein.

Of course, not only strong and coordinated intervention by the various regulators of the European Union (Telecommunications Authority and Antitrust Authority) will be necessary, but above all it must be timely, given that the market grows with great speed. So far, Europe has not been able to deal decisively with the major regulatory issues raised by the global impact of the web, as evidenced by the ado about privacy and copyright in the EU. In fact, the interconnection of objects and systems - which not only affects smart phones and PCs, but also wearable devices, home automation systems and geolocation - involves the collection, registration and processing of data of often unaware users.

These data allow not only to build detailed profiles of people, based on their behaviours, their habits, their tastes, even on their state of health, but also to carry out a particularly invasive monitoring of their private life and to implement potential conditionings of their freedom. For this reason, on the Internet of things, the Guarantor for the protection of personal data had decided to launch a public consultation in March 2015 (Official Journal no. 101 of 4 May 2015) with the aim of evaluating the phenomenon in its complexity, but above all of defining measures to ensure users maximum transparency in the use of their personal data and to protect them against possible abuse.

In particular, the Authority intended to acquire elements on how to inform users, also in view of a possible consent; on the possibility that from the design phase of the services and products the operators involved adopt technological solutions to guarantee user privacy; on the use of information encryption and anonymisation techniques; on the interoperability of services; on the adoption of certification tools. So it is quite clear that the Internet of things underlies a whole series of problems that would deserve to be adequately treated and investigated. If on the one hand Italy will surely be pervaded by the exponential growth of the phenomenon, on the other it cannot be overlooked that a decisive regulation is needed that seriously addresses the issue in order to avoid the risks of a distorted use of technologies.

To this end, Italian legislation should provide for the creation of a system that allows the controlled management of the exchange of information whenever a dialogue is initiated between networks and related equipment. This implies the creation of ad hoc infrastructures with the preparation of an operational centre for data monitoring and the provision in this regard of a third authority with control functions.

The Italian system, therefore, is called to respond decisively to the new technological challenges of the future. Italy can no longer turn to the other side in the face of the expansion of a phenomenon that could prove to be an unprecedented success or yet another missed opportunity to adapt the rules to the changed times of technological innovation. This does not mean generalising such a complex matter, but implies the adoption and regulation of multiple sectors in a single large regulatory container, capable of giving concrete answers to the innovation needs that would allow Italy to go hand in hand with the big industrialised countries in the world. A challenge that is already reality, but that can suddenly turn into the usual illusion!

Smart Grid calls Italy[370]

The *prosumer*, as defined by Jeremy Rifkin in "The company with zero marginal cost", is a user who becomes producer and consumer at the same time thanks to the revolution of the internet of things. An economic system that manages to combine technology, renewable energy and communication would be able to reduce the costs of goods and services, including those of energy that could become totally free in the future.

Part of the energy we use today comes from renewable sources and is self-produced, from simple users connected to the electricity grid we have become energy producers and we are able to introduce into the system clean energy produced by our plants.

The Authority for Electricity and Gas has defined the *prosumer* as a person who is at the same time producer and end customer of electricity and has dictated an ad hoc regulation that provides for the establishment of a front office for the energy consumer who has become a producer so that he can be facilitated in finding the information necessary for accessing the network and regarding the marketing of energy. A conciliation service is also provided for the *prosumers* who have a relationship with the network operators from which disputes may arise.

In the Acknowledgement Consolidated Text of Electric Production drawn up by the Authority, two methods of sale are identified that are alternative to the normal sales regime, reserved for renewable energy plants. The *prosumer* who feeds clean energy into the network can choose between the Dedicated Withdrawal regime or the Exchange on the spot

The Dedicated Withdrawal system is governed by Legislative Decree 387/2003 and by Law 239/04, is reserved for plants that produce energy from renewable sources and consists in the sale of electricity fed into the grid at the request of the manufacturer, applying the economic market conditions. The GSE is the intermediary that deals with withdrawing energy from the *prosumers* and reselling it on the electricity market, pursuant to a tacitly renewable annual agreement stipulated between the producer and the GSE, in which it is expected that the price paid to producers is the one formed on the electricity market on the basis of the hourly input profile of the individual producer (hourly zonal price). As part of the management of the dedicated collection agreement, it is verified that the operator applies higher costs for the producer deriving from the service management costs.

On the other hand, Exchange on the spot was introduced by Legislative Decree 387/2003 and the relative provisions are defined in Resolution 570/2012/R/efr of the Authority for Electricity and Gas. It is a service that can be defined as self-consumption and allows to compensate the energy introduced into the network at a given time with that drawn and consumed at a different time.

The electricity produced and not consumed is thus virtually stored, the user of the exchange on site, energy producer, delivers the entire amount of energy fed into the network to the GSE which sells it on the market and gives the producer-seller a contribution aimed at the economic compensation of the surplus value of energy introduced compared to that actually consumed as well as the refund of the tariff charges deriving from the use of the network. Also in this case the intermediary manager of the service is GSE. The user who wants to benefit from the exchange on the spot must become, after checking the requirements, part of an agreement in which he can choose whether to benefit from the surplus of energy produced at the end of the year or as a credit for the following years.

The necessary condition for the operation of this system is that the plants for the production and consumption of electricity refer to a single connection point with the public network.

Both systems described so far are part of distributed energy generation, i.e. the production of energy in small self-production electric units located in several points of the territory and all connected to the electricity distribution network, and differs from the traditional centralised model which instead, provides for the production of energy located in large plants.

The distributed generation of energy produced from renewable sources has innumerable advantages which, however, are not fully exploited to date, since the regulatory system of the energy sector is still quite in plaster. One of the most important features of distributed generation is the possibility of connection to a low voltage network where, if small production plants are located near the places of use, the dispersion of energy is zeroed and the system is economically more efficient, not to mention the effects on pollution that would be significantly reduced with the spread of clean production sources.

So what are the barriers that our system places today in the field of energy development?

First of all, the problem lies in having foreseen and regulated the phenomenon of *prosumers* and of the distributed generation in a standard way without being able to grasp its potential.

To date, the energy produced from renewable sources by the *prosumers* is taken and fed into the network, and it is precisely with this step, which implies the management of an operator and a distributor and the use of a common network , which decreases the advantage of green energy production. The operator uses high voltage lines to distribute the energy drawn over a vast territory, incurs costs and charges that increase its cost. Therefore, the intelligent management of the distributed generation system is missing, the Smart Grid is missing.

A Smart Grid is nothing more than the management of the electricity grid through an information network that merges with the distribution network. The information network is the cornerstone of an intelligent and efficient distributed generation.

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[370] *Written by Lawyer Carmelo Giurdanella and drs Giulia Campo*

The exchange of information allows to analyse and monitor the progress of a given area, the average consumption of users of that place and therefore manage the exchange of energy at the level of the areas based on their needs. In a more restricted area, the energy distribution system could use a low voltage network, supported by the technology necessary to make up for voltage dips and drops that can normally occur within a system powered by renewable sources.
The electricity grid should be integrated into an ICT (Innovation and Communication Technology) system that connects small production centres with the grid and large plants in order to harmonize the entire system and optimize production and distribution. A system that allows all nodes and participants of the electricity network to communicate and avoid waste.
To date, the implementation of a Smart Grid has led to the creation of bi-hourly rates allowing the end consumer to save money by changing their habits and choosing a conscious consumption.
However, we are very far from reaching a high level of evolution that sees few large production centres and many user-producers despite the implementation of such a system would lead energy consumers to benefit from a drastic reduction in energy costs following the collapse of management, production and distribution costs. Redesigning the production and distribution of energy on a smaller territorial scale, (for example at the level of the neighbourhood or inhabited centre), through the exchange among the producers living in that area, would allow monitoring habits and information among the *prosumers* in order to achieve an efficient and zero-cost energy exchange.
In order to create a distributed generation system that is also Smart, substantial incentives should be provided by law for the installation of plants for the production of renewable energy in civil homes, at the same time the ICT infrastructures that allow free trade should be developed of information on consumption among users of a network and which allow to skip the passage of the network manager and distributor which today represent a cost for the producer-consumer.
The promotion of the use of low voltage networks within local realities would be of fundamental importance. In this regard, the Authority for electricity and gas for the 2015/2018 four-year period considered it strategic and priority to guarantee non-discriminatory access to data and information on energy consumption by various users. They are owned by the end user who must have the opportunity to access detailed information on their consumption in order to encourage a more active participation in the market and to evaluate the possibility of becoming producers themselves.
The Authority also deemed it important to identify the activities to be regulated and those to be left to free competition and above all to eliminate tariff obstacles in accordance with the provisions of Legislative Decree 102/2014. Emphasis was placed in particular on the need to guarantee the third-party nature of those who manage user consumption information, whose independence from market operators must be guaranteed.
In Europe and in Italy, innovative Smart Grid projects have already been carried out from which it is possible to take a cue to change the legislation on energy in order to make it current and efficient.

The promotion of Taranto TRI.0 at local, national and European level

Given the bad image situation conferred on Taranto for its ideal association with ILVA, (and the problem also affects the Ionian province to a lesser extent), above all operators in the agriculture sector are forced to delete the reference to the abbreviation TA in the indication of the origin of their products to avoid the psychological backlash of the consumer inclined to avoid edible products associated with the pollution of ILVA, which unjustly penalises Taranto companies on the markets forced to suffer the historical prejudice that identifies Taranto with the part most recent and disastrous in its economic history. A masterful lesson in this sense comes from the incessant reconstruction of the Taranto image started with the Taranto Spartan City project by the activist from Taranto Marco Di Bartolomeo. You may or may not agree with his ideas and proposals, but his intuition that the city of Taranto must quickly emancipate itself from the negative image to which the last 50 years of heavy industry have condemned it, being reborn starting from its history, its art, its culture and its archaeology, remains an intuition that cannot be ignored to promote Taranto TRI.0.
From this point of view, the way in which from the beginning of the Spartan experiment, the international users of the network reveal a change of perception on the City of Taranto, passing from the prevalent (almost total) association of the word "Taranto" with "ILVA ", to the current prevalent association of the word " Taranto" with the word" Sparta "remains impressive. It was enough to launch the challenge of Taranto Spartan City on the net, on social networks and in a series of well-selected events to determine this change of association. Clearly the change of perception in real life and not only on the net is a much more complex operation, but let's imagine what could be done with a coalition of economic stakeholders in support of the idea of a rapid transition of Taranto towards a future of the Third Industrial Revolution associated with entering into the future from the past. A communication campaign must therefore be brought to the attention of the public opinion that in Taranto there is a plan aimed at economic redemption through the transition to the Third Industrial Revolution, and that this plan, originated by the European Parliament and inspired by one of the most successful and impact concrete experiences of Rifkin's vision, that of the TRI Master Plan of Nord Pas de Calais (now Hautes-de-France), sees the economic operators of the future as active subjects: digital economy, quality agriculture and fisheries, agricultural and historical experiential tourism, decarbonisation of energy, new materials and circular economy, participatory learning, sharing economy and diffusion of production / consumption practices (prosumers). In this promotion phase, the study will be able to take advantage of the contribution of prestigious and authoritative "third" figures who are members of the CETRI Scientific Committee both internationally and nationally, such as Professor Livio de Santoli, who contributed to the preparation of the Taranto TRI study. .0 with its experience gained both academically and professionally and already expressed in the drafting of the Master Plan for Roma Capitale and subsequently in the elaboration of the SEAP (Action Plan for Sustainable Energy) recently approved by the European Commission in the context of the Covenant of Mayors. This communication campaign should take place through the presentation of the Observatory and the Taranto TRI.0 Study in three progressive and successive phases: Local phase - presentation in Taranto with the involvement of local and regional media structures. National phase - presentation at Italian level with one or more events in the main cities and in particular Rome, Milan and Naples. European phase - Presentation to the European Parliament, as part of a specific event on the reconversion of Taranto. Of course all three presentations will be discussed, planned and decided by the Observatory for Taranto TRI.0 in agreement with the MEP from Taranto who is promoter of the study.

TARANTO TRI.0

FUTURE IS NOW

The third industrial revolution in Taranto.

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TARANTO
THE FUTURE IS NOW

LA 3^ RIVOLUZIONE INDUSTRIALE
A TARANTO

European Parliament

Study commissioned by
Rosa D'Amato - MEP

Made by **CETRI - TIRES** Institute
Third Industrial Revolution European Society

Trizero.taranto.it

THE OLD WORLD
THE NEW WORLD
The transition from the Second to the Third Industrial Revolution with focus on Taranto.

A premise becomes necessary and inevitably becomes the key of an articulated study, full of ideas, based on profound reflections on the possible, leavened on the concepts of **possible and necessary**, fueled step by step by the desire to set up a new horizon.

Taranto TRI.0 is the synthesis of this concrete horizon, the analysis and the proposal of how the steel industry, as we know and suffer it, is the past that still looms even if its structural crisis is objective, beyond the damage to health and the environment that the production logics impose every day.

Taranto TRI.0 recognizes the symptoms of an irreversible socio-economic pathology. We need to look beyond those fumes. In this case the metaphor of the "long breath" is really appropriate and adherent to the proposal that we detail here as if it were a long journey towards TOMORROW.

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