



Department of Economics and Business, Thesis in Law and Economics

RENEWABLE ENERGY:
Present barriers and future developments of the most sustainable and cost efficient sector in the
energy market

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Thanks to my family and to my friends,
To my father and my sister for the generous help,
To my mother and my brother for the compassion,
To Pietro for the tolerance.

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INTRODUCTION:

WHAT IS THE RENEWABLE ENERGY

Nowadays the word 'renewable' is used in many environments. In the sphere of the electric energy this is directly related with the mean of 'sustainable', which, as just the single word suggests, refers to something that can be sustained by our planet and doesn't deprive it of something basics or, even more, destroys it. This is why the production of energy through renewable resources could be a real and durable solution for the current critical level of CO₂ in our atmosphere, which is creating the heard so much 'greenhouse effect'. Renewable resources, such as wind, sun, water, biomass and many more, are inexhaustible, meaning that we could live with them for an infinite lapse of time. Nevertheless, is renewable energy only helpful in saving our planet and our health? Let's think to the amount of people required in order to create it: someone to create the right location in order to construct on it a hydroelectric power plant or a photovoltaic field, someone who builds the machine to capture sun or water, someone that installs such machine and someone who keeps it forever.

This is only a very little part of the renewable electricity market, which can create thousands of jobs and, above all, can create them forever.

Moreover, in the following chapters, it will become clear why this type of energy is more efficient with respect to other alternatives, such as nuclear power energy.

The only obstacle (even if the word 'only' is not appropriate for a so huge problem), comes from subsidies, which, in particular in Italy, are a lot but not so effective. The confusion created by such subsidies brings important related costs and, especially, a sort of 'fear' on national and international investors who want to invest their money in this type of technology.

It is difficult to find a simple way to solve totally and immediately the problem, but some changes could be effective and, over time, could give to Italy, and also to all the other countries, a competitive advantage that will bring huge profits useful for the economic upturn.

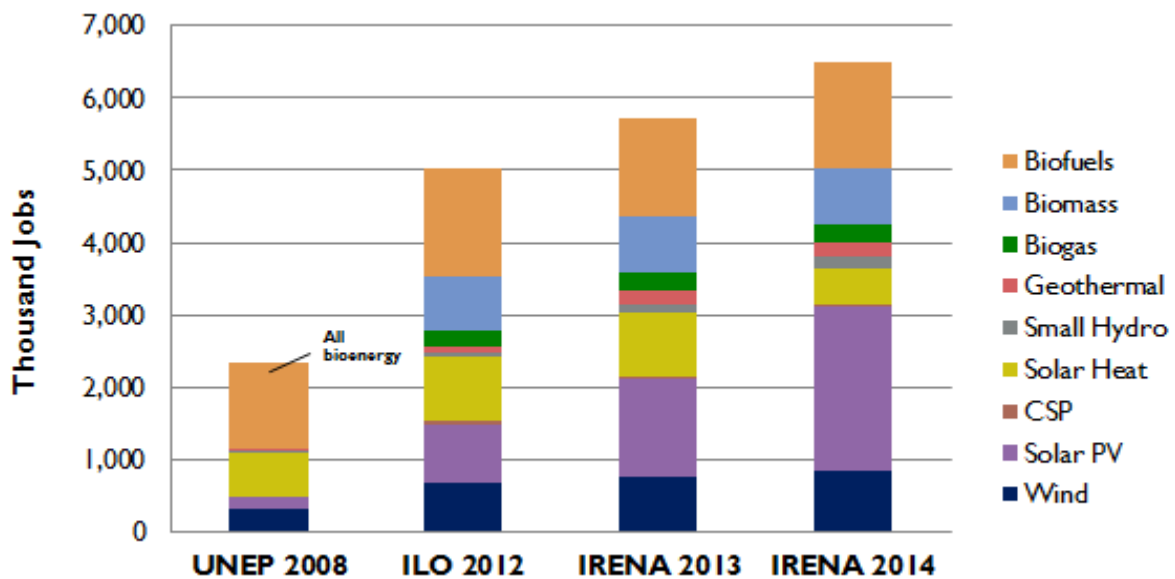
CHAPTER 1:

PROS AND CONS WITH RENEWABLE ENERGIES

1.1 Employment

With respect to fossil fuel technologies, the renewable energy industry is more labor intensive and it creates more employment opportunities for each unit of electricity produced. In particular, at the end of 2013 renewable energy industry gave job to 6.5 million of people all over the world, 4.2 million more than in 2008 and 1.5 million more than in 2012. For its dynamic nature, the renewable energy industry demonstrated to be able to offer job perspectives to an increasing number of people who, in this time of crisis, are in search of work. The photovoltaic was the main sector that employed, approximately, one third of the total people employed in the renewable energy industry. It confirms itself as the first source for employment detaching considerably the other sectors such as wind-energy, liquid biofuel and biomass' energy, which respectively accounted for 1.4 million, 834,000 and 782,000 (See Figure 1.1).

Figure 1.1: Global Renewable Energy Employment Assessments

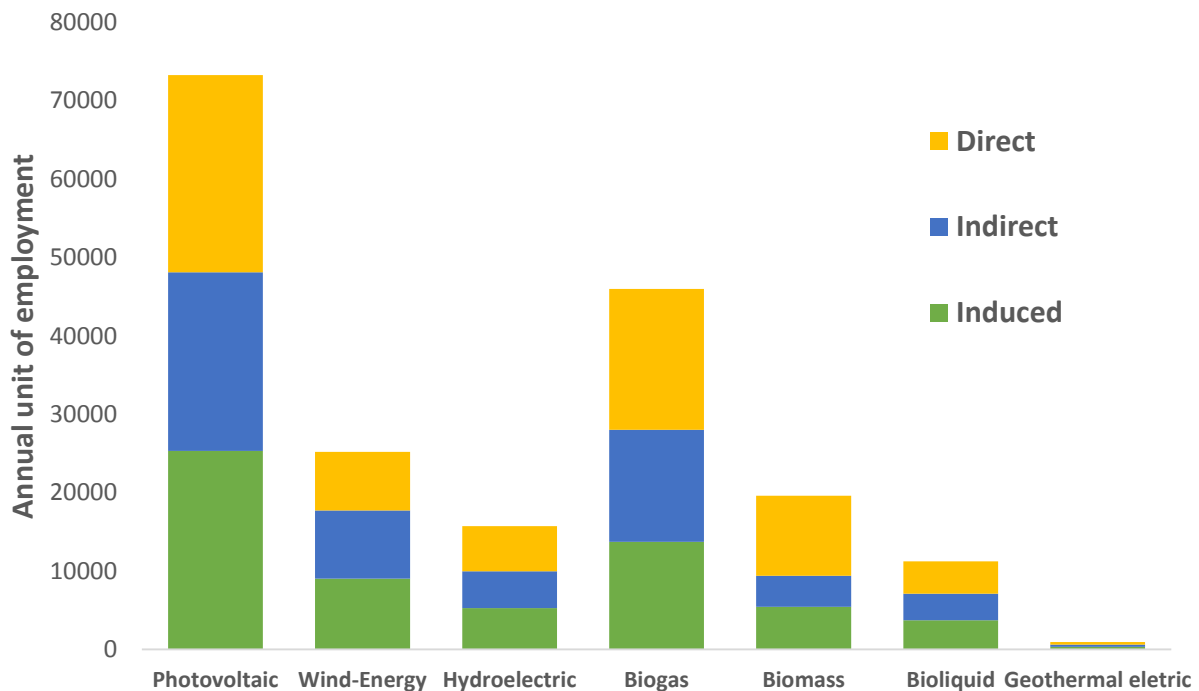


Source: Worldwatch institutes

China, with 2.6 million of people employed in this sector, is the global leader, not only for the production of solar panels and other components for renewable energy plants, but also for its investment in the green energy for the internal economy. In only two years, the number of solar plants installed increased by 500%. At the second place there is Brazil, with 900,000 of jobs, especially in

the bioenergy sector, followed by United States with 625,000 almost all employed in the photovoltaic sector. Italy filled a lower position in the rank, with 190,000 employees, in particular, as shown in *Figure 1.2*, most of them employed in the photovoltaic sector.

Figure 1.2: Italian Renewable Energy Employment Assessment at the end of 2013



Source: GSE

Up to future estimations, the number of employments will strongly increase, in particular in project and installation sectors.

To these numbers we can add also other data which remain difficult to quantify, especially in the hydroelectric energy system, where are necessary, for the fulfillment of plants, important excavations of ground and a considerably big in size construction works.

1.2 Nuclear vs. Renewable: economic point of view

By following the directive of Europe 2020, which set a target for the reduction of CO₂ emission up to 20% until 2020, renewable energy fights directly with the biggest CO₂ emission free economy: the nuclear power. In order to understand which, between the two, could be the best one, the only mean is looking at their cost effectiveness. In the US, the first generation of nuclear power plants proved to be so costly to build that half of them were abandoned under construction and those that were completed, registered huge costs that, at the end, passed to end consumers in the form of tax increase. Nowadays things don't seem to be changing: between 2002 and 2008, in the US the estimated cost

for building a new nuclear power plant rose from \$4 billion per unit to \$9 billion per unit¹. The largest empirical demonstration of the construction high-costs of nuclear power plants is that all investments were made by the state and not by private entities.

For renewable technologies, especially for the solar and wind energy, on the other hand, cost effectiveness seems to be very low thanks to its high learning rates. Indeed, for every second installed solar photovoltaic plants, module costs will decrease of 22%². It will also contribute to stabilize energy prices for the future. The costs of renewable energy technologies are falling down steadily, and it's previewed dropping down even more. For example, the average price of a solar panel has dropped almost 60% since 2011³. The cost of generating wind energy dropped more than 20% between 2010 and 2012 and more than 80% since 1980⁴.

The cost of renewable energy will drop down even further as markets get mature and companies increasingly will take advantage of economies of scale. Even if renewable facilities require large upfront investments to build, once built they work at a very low cost and, above all, by using a 'fuel' which is free and infinite. Consequently, energy prices will remain over the time.

Moreover, compared with fossil fuel prices, that are more volatile and subjected to strong changes, renewable energy can even lower prices of and demand for natural gas and coal by increasing competition among the energy supplies.

1.3 Asbestos and photovoltaic installation

In Italy, another benefit of renewable energy is the asbestos-photovoltaic subsidy, which put together the benefits of eliminating asbestos from roofs and putting a photovoltaic plant on them.

Asbestos (or Ethernit), is an extremely dangerous material whose fibers, if inhaled or ingested, can cause cancer.

In 1992, Italy prohibited the production and the use of products with this component and any product that contained it.

The subsidy denominated 'European bonus', was an economic support provided to users who decided to install a photovoltaic plant entirely built through European Union made components. The subsidy took part of the IV Feed-in Tariff, which is a policy mechanism designed to accelerate investment in

¹ "Nuclear Loan Guarantees Another Taxpayer Bailout Ahead?" David Schlissel, Michael Mullett, Robert Alvarez, UCS USA, March 2009

² "Summary for policy makers: Renewable Power Generation Costs", IRENA, November 2012

³ Solar Market Insight report, Q3 2012, SEIA

⁴ Federal Production Tax Credit for the Wind Energy, AWEA, 2012

renewable energy technologies. With this policy, 26 thousand roofs were eliminated, for a surface equal to 20 km², gaining an energy power of about 2.5 GW⁵. From July 2013, the subsidy ended and with it ended also the possibility to remove asbestos with an economic advantage.

In case of direct use of energy below a roof with asbestos components, it remains, however, the possibility to balance the cash outflow necessary for the total reconstruction, including the costs of removing the asbestos and costs to installing a photovoltaic plant, in about 10 years, and removing so the danger that the asbestos could affect people's health.

1.4 Environmental externalities

Through the protocol of Kyoto and Europe 2020, renewable energy is considered one of the only possible solutions to reach the imposed level of carbon emission.

The Kyoto Protocol adopted in Kyoto, Japan, on 11th December 1997 entered into force on 16th February 2005. Its first commitment period started in 2008 and ended in 2012. It was an international treaty that set binding obligations on industrialized countries to reduce emissions of greenhouse gases. In particular, for those states which at that time were members of the European Union, was imposed a target of -8% as maximum amount of emission.

After 2012, EU proceeded with these measures by creating the Europe 2020 and imposing to all EU countries to reduce by 20% the emission of greenhouse gases and increase up to 20% the amount of energy produced by green energy through renewable resources, and reducing so by 20% energy savings until 2020.

In addition, generating electricity from renewable energy rather than fossil fuels offers significant public health benefits. Replacing fossil fuel with renewable energy reduces the premature mortality, the loss in working and healthcare costs. Wind, solar, and hydroelectric systems generate electricity without associated air pollution emissions and, although the geothermal and biomass energy systems emit some air pollutants, the total air pollution is lower than the one of coal and natural gas fired power plants.

Wind and solar energy are environment friendly, they don't contaminate the air, the ground and the important natural resources. Hydroelectric systems, moreover, oxygenate and move water with important advantages. In contrast, fossil fuels have a large effect on water resources. For example, both coal mining and natural gas drilling can pollute sources of drinking water. Natural gas extraction,

⁵ *"Rimozione amianto e fotovoltaico, l'accoppiata conviene ancora?"*, Alessandro Codegioni, 8th of May 2014

by hydraulic fracturing, requires a large amount of water and all thermal power plants, including those powered by coal, need water for cooling.

1.5 Disadvantages of a green economy

1.5.1 Wind power energy

Wind power energy plants need to be installed in highly windy areas, both in frequency and intensity, in order to generate enough energy, and so, at the end, enough profits to cover initial investments and future costs.

Moreover, auditory pollution has found to be a real disadvantage for wind power plants, as people who lived closed to them, display light unease due to the constant movement of blades.

1.5.2 Solar power energy

The first disadvantage that comes out from the use of solar power plants is the discontinuity: due to day-night interchanges and instable weather conditions, power generated by solar panels is not constant over time. If, for example, a firm needs to use such energy during the day, it follows that energy cells have to be installed, and so costs tend to increase.

In order to construct a highly productive plant, extended areas are needed. The possibility to construct plants in uninhabited areas is relatively expensive, as long grid connections have to be created in order to transport power generated by panels into the cities.

Finally, panels' disposal can lead to very high cost, as degradation may happen only after about 20 years. The question could be how much it could be advisable to install such plants with so high initial investments, an intermediate unexpected production of electricity and a final cash out due to disposal.

1.5.3 Hydroelectric energy

As for the other types of renewable energy resources, hydroelectric plants present some disadvantages such as the need to install them closed to rivers that are characterized by some specific standards. Hydroelectric plants require large flow rates and have to be built in particular areas: near to the point where the plant will be placed, rivers have to be subjected to a real jump, sufficiently high and strong in order to create enough energy. Moreover, dams are required to contain water and their creation is possible only when appropriate geological characteristics are met. Upheaval of flora and fauna is an inevitable consequence that has to be taken into account.

1.5.4 Biomass power energy

The highest disadvantage that bottles up biomass power plants construction are the heavy related costs, largely higher than those for other renewable energy resources. In fact, a biomass power plant present a higher complexity in its structure with respect to normal fossil fuel plants, which leads to higher costs for the maintenance.

Moreover, in order to equalize fossil fuel production, huge amounts of biomass are required.

1.6 ‘NIMBY’ effect

The installation of every type of renewable energy plant, even though it’s an already widespread awareness of the importance of such production in the ecological future of our planet, especially in Italy, it is affected by the classical aversion to all that happens *in our back yard*. This is called ‘NIMBY’ (“*Not In My Back Yard*”) effect.

In some Northern Europe countries, such effect is largely inferior, for example in some Danish and Norwegian areas, the whole communities produce all the energy needed for their towns with waste to energy plants, wind power energy plants and hydroelectric power plants.

One question that we have to ask ourselves in order is why in some Italian advertising campaigns of car companies, a wind power energy plant represents the future. This lead us to meditate on how much we have to work and we still have to do in Italy, and in the rest of the world, to achieve the awareness to consider the protection of the environment important above all.

CHAPTER 2:

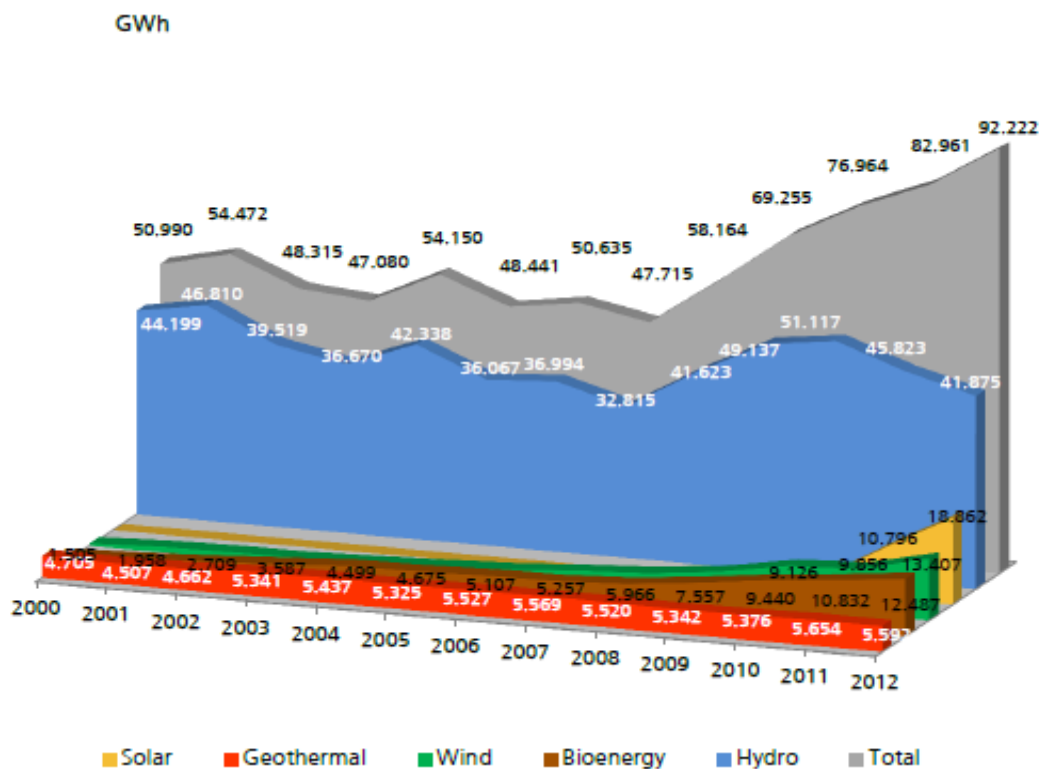
STATE OF THE ART

2.1 Electricity generation and investment data⁶

In 2012, renewable-energy power plants in Italy accounted about 21% of total gross generation of energy. The number of installations spread through the country in 2012 amounted to 484,587, most of all thanked to photovoltaic installations.

Renewable generation scored a new record touching 92,222 GWh, an increase of 11% comparing with the year 2011(see Figure 2.1). Such increase modified also the position among the EU-15 countries, placing Italy in third position just after Germany and Sweden.

Figure 2.1: 2012 Electricity Generation from Renewables in Italy



Source: *Rapporto statistico impianti a fonti rinnovabili in Italia 2012*, GSE

Until 2008, the energy production through renewable resources was almost totally related to hydro resources, just in the last few years the new renewable resources (solar, wind and traditional biomass) started becoming important in the energy production. Hydro generation kept on decreasing due to

⁶ All data refers to the 'Renewable Energy Power Plants Statistical Report of 2012', the latest available on GSE website.

adverse climatic conditions, even if future data will probably show different trends, as in the last 2 years level of rainfall increased.

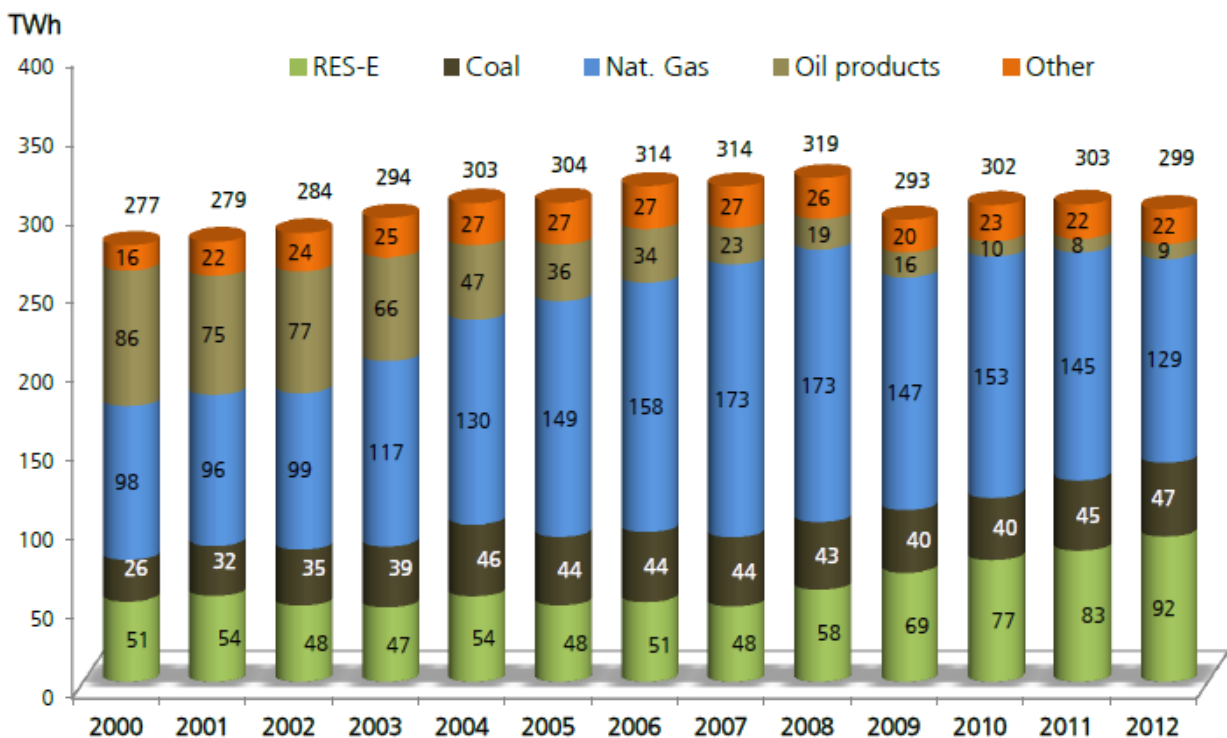
Solar generation represented the second principal resource having growth up to 18,862 GWh, which is an increase of 78.5% annual average, between 2000 and 2012, although the real growth is referred to the last 5 years.

Wind generation climbed to 13,407 GWh (+36% in 2011), with a yearly average growth rate of 30.2%. Generation from biomass grew at a rate equal to 15.3% comparing with 2011 and geothermal generation continued remaining fairly stable.

Lombardia is the Italian region with the highest renewable energy production (16% of total Italian production). Generally speaking, production in macro areas are distributed as follow: 54.4% in Northern Italy, 14.3% in Central and 31.3% in Southern Italy.

In 2012, total gross net generation of electricity fell down 300 TWh. The economic crisis caused a sudden reduction of energy consumption of 2008 and 2009, and in the last years, the trend resulted discontinuous and strictly related with the general economic and structural situation of the country. Natural gas use decreased and increased the use of renewable resources and coal (see Figure 2.2).

Figure 2.2: Total Gross Generation in Italy



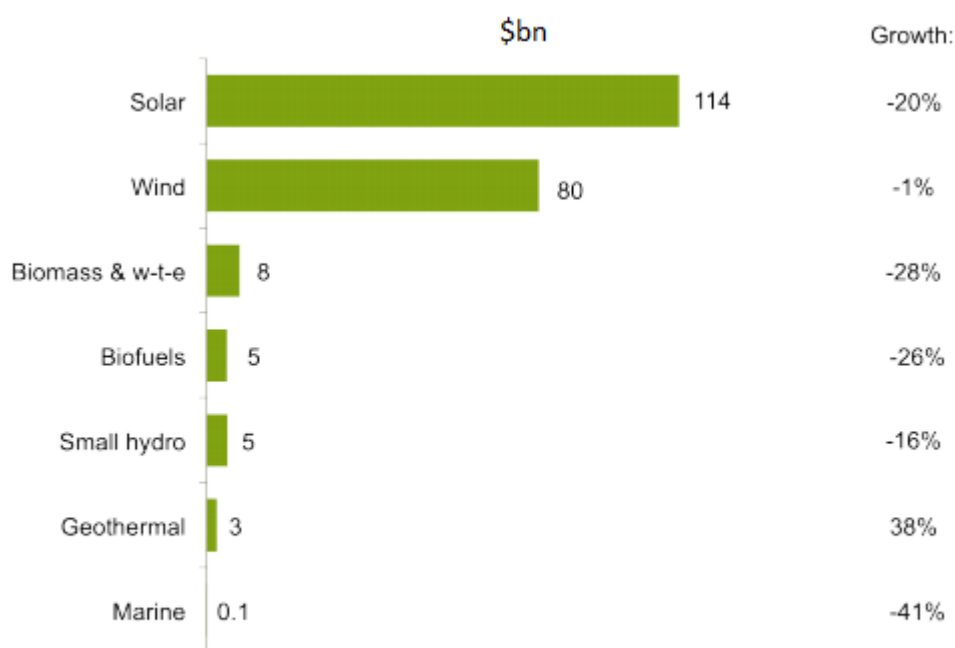
Source: *Rapporto statistico impianti a fonti rinnovabili in Italia 2012, GSE*

Total global investments in renewable energy industry accounted for 214.4 billion of dollars in 2013⁷.

With respect to 2012, it was registered a decrease of 14% and of 23% comparing with the year 2011. The fall was mainly due to political and economic uncertainty that, in this period, affects many countries all around the world, but also to a huge price decrease for photovoltaic plants. In fact, in this sector, after a decrease of 20% in investment (*see Figure 2.3*), from 135.6 billion of dollars in 2012 to 114 billion in 2013, it was registered a growth equal to 26% in annually plant installations.

Investments in the other sectors remained constants, with a decrease of 1% in wind power energy, a decrease of 28% in biomass power energy and of 16% in hydroelectric energy. The only one that increased between 2012 and 2013 was the geothermic energy sector, with an increase in investments equal to 38%, 2.5 billion of dollars more with respect to 2012.

Figure 2.3: Global new investment in renewable energy by sector, 2013, and growth on 2012



New investment volume adjusts for re-invested equity. Total values include estimates for undisclosed deals.

Source: Global trends in renewable energy investment 2014, UNEP, Bloomberg Energy Finance

China in 2013 invested in renewable energies, for the first time, more than the whole Europe. The decrease in 2013 accounted for 6% (56 billion of dollars), while in Europe the drop touched 44% less (48 billion of dollars) comparing with the year 2012.

⁷ "Global trends in renewable energy investment 2014", UNEP, Bloomberg Energy Finance.

Americas (US and Brazil excluded) invested 12 billion, an increase of 26%, while Japan saw an incredible increase of 80%, leading total investments up to 29 billion of dollars.

Italian investments dropped for the second year, with a decrease of one-fifth comparing with the year 2012. In particular, in 2012, investments amounted to 15.2 billion of dollars, 73% more with respect to 2013 (with 4.1 billion).

In the whole vision, in 2013, investments in fossil fuels exceeded those in renewable resources, respectively 270 billion of dollars and 227 billion. However, renewable resources are increasingly more competitive than fossil fuel even without subsidies. A significant number of wind power and photovoltaic projects, in particular in Latin America, Mid East and Africa, are realized without subsidies. For example, in Chile, a photovoltaic plant of 70 MW and 3 wind power plants for a total of 213 MW, were realized without any helps by government.

If investments were decreased, is not the same for renewable energy company stocks listed in the Stock Exchange: after 4 years and a half of decline, their total values rose of 54%. 2013 saw an increase in the interest of long-term investors, such as insurance companies.

2.2 The liberalization of the electricity market and the detriment of ENEL monopoly

The liberalization of the electricity market was launched in Italy with the legislative Decree n. 79 of 16th of March 1999, known as Bersani State Decree. The Decree imposed to ENEL a limit to the generation of energy equal to 50% of total energy produced in Italy and the sale of a portion of its production capacity in order to permit to other electric power transmission system operators to enter the market.

Moreover, the Decree ratifies that the electrical grid had to be controlled with a monopoly system in order to minimize costs for new producers that could not economically replicate it. Terna and GRTN (*Gestore della Rete di Trasmissione Nazionale*) were so created for that purpose. The first one had, and still has, the total grant of the entire infrastructure grid. GRTN, on the other hand, had the transmission and dispatching management, which, after the enter in the Milan Stock Exchange by Terna, with a block of shares equal to 50% and the sale of 13.86% of ENEL corporate stocks to institutional investors, changed its purpose to supply energy subsidies for the production of renewable energy with the name GSE (*Gestore Sistemi Elettrici*). This because transmission and dispatching management were re-absorbed by Terna which became dealer and manager of the grid.

The decrease in energetic consumption in Italy after the liberalization Decree, nevertheless, didn't prevent from the possibility of some new distributors to construct new energy plants, so that some plants nowadays result to use negligible percentiles of energy, also causing firms crisis of remarkable dimensions. (ex. Sorgenia).

2.3 How to sell renewable energy

With the liberalization of the electricity market, producers can sell self-generated energy in different ways.

2.3.1 Purchase and Resale arrangements

The first one is by the supply of energy through the simplified purchase and resale arrangements ("ritiro dedicato"), which consists in an agreement entered between the producer and GSE. GSE purchases and resells the power energy to be fed into the grid at the zonal price or at a minimum guaranteed price, which allows producers to obtain a fixed selling price (into the so called 'protected market'). Producers with small-sized plants (with a nominal electrical capacity of up to 1 MW) benefit from minimum guaranteed prices for the first 2 million kWh per year and they may get more if the hourly zonal prices prove to be more advantageous.

Such prices, with the latest decrees, were considerably decreased and will open, when the current regulation will be clearer, a real free energy market between producers and end consumers. Such vision, as it will be largely described in Chapter 3, creates substantial worries to historic players of distribution and production and also large pressures on traditional lobbies upon the legislator.

Nowadays emerges that a renewable energy producer can't supply its own produced energy directly to the end consumer with his own dedicated lines.

2.3.2 Bilateral contracts and Power Exchange

Alternatively, the producer can sale energy in the free market through two processes: by the supply to wholesalers with bilateral contracts or by Power Exchange.

With bilateral contracts, producers can privately mediate through private regulations decided between the two parties. The two, consequently, mediate upon the value of the energy, which can reflect the Exchange price. Such negotiations have to be registered on PCE ("*Piattaforma Conti Energia a termine*") managed by GME ("*Gestore Mercati Energetici*") on behalf of Terna.

Producers have also the opportunity to supply energy produced across the negotiation system of Power Exchange managed and organized by GME. The Power Exchange is a telematics market in which energy is traded through a supply and demand mechanism and where prices are in equilibrium.

2.3.3 Acquirente Unico S.p.A.

Acquirente Unico (AU) is a GSE subsidiary that has the task to guarantee electric energy to families and small companies in trust of GSE. It is such entity that purchased the energy generated by photovoltaic plants in the Feed-in tariff (*see 2.4.5*) and of other renewable power energy plants, not included into the overall tariff ("*tariffa omnicompresiva*"), with grid insertion, and re-sold it to distributors who resale it to end consumers in a protected regime. It takes part also in importation processes of electric energy from foreign countries and, based on requested capacity, stipulates contracts with foreign suppliers.

2.3.4 "Sistema Efficiente di Utenza"

The efficient systems of consumption (SEU) are production and consumption electricity systems for photovoltaic plants that put in a direct connection the producer and the end consumer. This is the main advantage. It is worthwhile for photovoltaic producers who decide to generate energy without auto-consumption. These systems permits to plants to supply directly firms without having to pass through third parties (GSE). Producers can directly sell to the end consumers with the advantage to bypass the grid, intermediaries and all costs related with them. Essentially, they are an advantage both for producers, who sell directly the energy to end consumers, and for consumers, who purchase the energy at a favorable price without paying transmission and dispatching related costs.

SEUs are systems thought in order to advantage auto-generation and auto-consumption directly in place where the energy is generated by renewable resources. Customers who decides to adhere to a SEU have to purchase for a definite number of years the available energy generated by the plant. This in order to guarantee the right economic security for the producer who decided to invest in the photovoltaic plant.

2.3.5 Net Metering: Prato allo Stelvio

Another way to sell self-generated power energy is with the net metering. Net metering is a service that allows residential and commercial customers, who generate their own energy, to feed electricity they do not use back into the grid. For example, if a residential customer has a photovoltaic system on the home's roof, it may generate more electricity than the home uses during daylight hours. If the home is net-metered, the electricity meter will run backwards to provide a credit against what

electricity is consumed at night or other periods where the home's electricity use exceeds the system's output. Customers are only billed for their "net" energy use. In other words, it consists in a value appreciation of the alternative energy recommended for small production units. It is limited to cogeneration plants with high power potential (up to 200kW) and to renewable energy plants.

Prato allo Stelvio is a village in the Northern Italy where its 3550 residents are almost artisans and farmers. This village has the most self-produced renewable energy in the whole country. All the electricity needed is supplied by green energy. Born in 1925, Prato allo Stelvio constructed its first hydroelectric plant in 1927, when a small group of residents decided to bring electricity into the village. However, the costs of such innovation were high: therefore, they established a cooperative, named E-Werk Prad, for the management of the electrical grid. With the pass of time and the increase of the activity, E-Werk Prad decided to invest in R&D for new alternative methods to produce energy. For this, in 1980, run-of-river plants were tested and few years later, the first hydroelectric plants were under construction. Nowadays there are 1200 members up to 3500 residents, who use a heating grid created with biomass and biogas energy to warm up their houses. Savings for residents are high: bills are 30% cheaper than the national average price.

2.4 Subsidies

In Italy there are many types of subsidies, some founded on a fiscal regime, other on an administrative regime.

2.4.1 Green Certificates

Green Certificates (GCs) are tradable instruments that GSE grants to qualify renewable energy power plants (except for the photovoltaic that is related with the Feed-in tariff), which have been commissioned before the 31st of December 2012 as per Legislative Decree 28/2011.

The number of certificates issued is proportional to the electricity generated by the plant/system and varies depending on the type of renewable resource used and of project.

It is demanded for GC support scheme to all producers and importers of non-renewable energy to inject into the power system a minimum amount of renewable energy every year.

GCs issued that respect electricity generation in a given year can also be used in the following two years toward a compliance (GCs are valid for 3 years). Producers and importers who do not inject renewable energy into the grid have to purchase an equivalent number of GCs from other renewable energy producers.

2.4.2 White Certificates

Unlike the Green Certificates, which work on energy resources, White Certificates or Energy Efficiency Certificates (TEE), are tradable instruments that have the purpose to work on the energy use. TEE are economic compensation systems for the end-user energy savings. They certify savings achieved through energy efficiency improvement initiatives and projects. The White Certificates scheme was introduced into the Italian legislation by the Ministerial Decrees of 20th of July 2004. Under the scheme, electricity and natural gas distributors are required to achieve pre-determined targets of quantitative primary energy. If they don't achieve such targets, they can (as for GCs) purchase White Certificates from other parties in the Energy Efficiency Certificates Market that is organized by GME.

2.4.3 Heating and Cooling

The Ministerial Decree of 28th of December 2012 (the so-called “Renewable Energy for Heating & Cooling Support Scheme”) has the scope to subsidize the intervention of small enterprises for the increase of the efficient energy use and for the production of heating and cooling energy from renewable resources. The subsidy, given by GSE in annual rates for 2 o 5 years, depends upon the type of intervention objected to the compensation and it is equal to about 40% of related costs. Entities that can beneficiate from the subsidy could be public administrations and private entities. The subsidize interventions are divided in two categories: interventions for the increase of energy efficiency and interventions of small energy production dimension from renewable resources and of high efficiency. The annual amount that the Decree makes available is equal to €900 million, of which 200 for public administrations and 700 for the others.

2.4.4 Feed-in tariff

The feed-in tariff (“*Conto Energia*”) for the renewable power energy market is the so-used name of the European plan of fiscal compensation for the electricity production by photovoltaic plants, which are permanently grid connected. The subsidy consisted in a fiscal contribution per kWh of energy produced for a certain lapse of time (up to 20 years), and variable depending on the dimension or of the typology of the plant. It had the purpose to stimulate the installation of photovoltaic plants with the effect and the advantage to guarantee a shorter lapse of time needed to cover costs related to plant installation or related to initial investment capital, to obtain future higher profits. In Italy there were 5 different Feed-in tariff. The latest ended in July 2013 without new emanations to subsidize energy generated, but with the replacement of the possibility to deduct up to 50% of plant costs exceeding peak power of 200kW, as building renovation. In such way, the possibility to sell auto-generated

energy in excess is still possible, circumstance in which the investments still result convenient in term of time to cover the investment and future profits.

2.4.5 CIP 6

CIP 6 is a deliberation of the Interministerial Price Committee adopted the 29th of April 1992, with which incentive prices for renewable electric energy were established. After the deliberation, who produces energy from renewable energy resources has the right to resell it to GSE to a price higher than those of the market. Costs related with this subsidy are financed through an extra charge of 6-7% of electricity energy cost, which is charged directly to end consumers in the bill total calculation (A3 component of system charges).

2.4.6 “Decreto Spalma Incentivi”⁸

The so-called “*Spalma incentivi*” provision, Art.26 of the Law Decree no. 91/2014 created on 25th of June 2014 and starting on 1st of January 2015 (strongly tackled by renewable power energy producers), applies a reduction of the target imposed by the latest Feed-in tariff of 50% on nominal peak power exceeding 200kW to between 17% and 25%.

Together with this reduction, it is applied also an extension in the lapse of time applicable to the subsidy from 20 to 24 years.

Table 2.3: Reduction on Feed-in premium

Remaining Incentive Period	Reduction Ratio
12	25%
13	24%
14	22%
15	21%
16	20%
17	19%
18	18%
19 or more	17%

Source: Art.6. Law decree no. 91/2014

Another change with respect to the latest Feed-in tariff is that the actual Decree doesn’t pay off for relative inflation and losses of interest from the delayed payment of subsidies. *Table 2.3*, shows the reductions to be applied on the Feed-in tariff.

For photovoltaic plants that are entitled to the overall tariff, the “*tariffa onnicomprensiva*”, which includes the price for the sale of electricity, the reduction applies only to the incentive component of the overall tariff.

Those firms who incur in economic problem due to the tariff reduction, will be able to obtain

⁸ “Italian Decree on the Cut of Incentives for Photovoltaic Plants Enters into Force”, *Mc Dermott Will & Emery*, 25 June 2014/21

a financing on the difference between the Feed-in tariff and the amount resulting from the reduce rate settled by the Decree. The State-owned “*Cassa Depositi e Prestiti SpA*” will therefore either fund or guarantee the financing based on special agreements made with the banking sector.

In order to guarantee the extension to 24 years, the Decree granted to producers to obtain the right number of permits issued by local and regional institutions for the construction and operation of their future plants. However, this does not include entities such as ANAS (“*Azienda Nazionale Autonoma delle Strade*”), Terna and ENEL.

Moreover, with an 8% reduction of the current Feed-in tariff, producers of photovoltaic plants exceeding 200kWh can decide to be not affected by the redistribution of the subsidies over a 24 year period.

Although this, given the forgone deterioration of plants components in the years, net present value of photovoltaic plants will decrease and so, also their related expected income stream. It is doubtful that the redistribution will be useful over a longer period in order to result in the payment of the full nominal amount of subsidies. This reduction will manly serve to cover current debts and avoid risk of default. Nevertheless, it will be not without costs.

If such Decree will be find as unlawful, individual investor could not directly challenge it. They can, on the other hand, challenge the GSE’s administrative resolutions and decisions.

Such challenges will have to be brought in the Lazio Regional Administrative Court (TAR), which, after having check the legitimacy of a GSE decision, it has to verify the legitimacy of the underlying new Decree. If the TAR discover that the Decree may be, as individual investor conjectured, unlawful, it can report the question to either the European Court of Justice or, more commonly, to the Italian Constitutional Court.

One principle of the Italian constitution that may be violated by the Decree is the need for legislative measures to be proportional and rational, as guaranteed by Articles 3 and 41 of the Italian Constitution, which protect the legitimate rights and trust of the private investor in existing economic activity. Another is the principle that laws must not have retroactive effect, as expressed in Article 11 of the “*preleggi*” of the Italian Civil Code, to which Italian case law attributes constitutional rank.

CHAPTER 3:

PRESENT AND FUTURE DEVELOPMENTS

3.1 What's wrong with the "Spalma Incentivi" Decree

After the approval of the "Spalma Incentivi" Decree by the Chamber of Deputies, the Italian Government has scarce possibilities to prevent the break of foreign investors from Italy and to avoid thousands of legal arguments, which will submit Italy to huge economic compensations.

Let's see in detail which are, and will be, the main problems related with the Decree.

3.1.1 *The critique in details*

1) EFFECT ON GOVERNMENT AND ITALY REPUTATION

I. Government image will give a bad impact

With this measure, Italian Government risks to become the main reason for renewable energy sector depression, a sector which has large support from the population and which involves many companies and 500.000 non-professional producers who, thanks to old subsidies, installed a plant on their house or warehouse roofs. The fact that Government decided to change unilaterally thousands of contracts with a duration of 20 years with an Italian public company (GSE S.p.A), is sufficient in order to create some worries of other renewable energy producers. With this Decree, the message that goes inside and also outside the country is that legal rights written on contracts can be violated.

II. Government will have a sudden interruption in the position of Italy into the EU

In many occasion, the European Commissioner Günther Oettinger affirmed that retroactive cuts to subsidies for renewable energies don't have to be introduced in any way. The European Commission confirmed it in one of the latest emission of the Guidance for state intervention in electricity: "*Unannounced or retroactive changes to the support schemes must be avoided. Investors' legitimate expectations concerning the returns on existing investments must be respected*"⁹. It follows that probably Italy will receive a sudden interruption in its process for the positioning into the EU, which is get worsen for its actual position of Presidency of the Council of the European Union in the current semester, which, in this moment, is adopting a decision on the future climate-energy package and on the targets for 2030.

⁹ "Guidance for state intervention in electricity", European Commission - MEMO/13/948, 5th of November 2013

III. Investors will shelve all development projects in Italy and the infrastructural plan will be obstruct

The retroactive action largely damages Italian credibility with respect to Italian and foreign investors as basic principles of a “state of rights” are called into question, so reducing any possibility of interest to invest in the renewable sector and originating also reputation damages for the other sectors. With a large probability, investors will obstruct the development project for infrastructures and privatizations. This intervention on the renewable energy resources is creating a real uncertainty abroad and investors, together with international medias, are beginning to put in doubt the Italian credibility, as it has already happened on the Wall Street Journal: “*“Mr. Renzi may believe that the markets have short memories, and that this route is easier than reforming the blatant inefficiencies in the Italian energy sector or cutting horrendously high taxes on energy users. Maybe he’s right, but good luck in attracting foreign investors in the future. Don’t come knocking on my door.”*”¹⁰ Micheal.Bonte-Friedheim, CEO of Next Energy.

The obligations of the Decree brought also to long series of appeals by operators that, with time and costs difficult to calculate, could subject Government to billions of compensations (ex. AssoRinnovabili).

Examples as Spain, Portugal and Bulgaria, where retroactive subsidies were imposed, can be prime examples. In the Spanish case, there exists international arbitrates started from some investors for an amount of compensation greater than 10 billion of Euros, with good probabilities for the claimants. The lack of specific rules in Italy leads investors to run away, investors who are essential in this time of crisis.

2) MACROECONOMIC EFFECTS

IV. Credit system will have strong pains and will slow down the economic upturn of the country

Financial institutions, Italian and foreign, public and private, contributed largely to finance the 50 billion of Euro invested in the latest years in the Italian photovoltaic sector. The need to issue new stocks before being able to realize new loans to companies will have the effect of slowing down new credit emissions and an economic upfront. Moreover, from the default risk of projects, it derives a necessity to have more information about banks’ balance sheets, from which will ensue less taxable income and so less earnings for the state.

¹⁰ “*Renzi Tilts at the Windmills Renewable power is not driving Italian energy costs, so why attack its investors?*”, Michael Bonte-Friedheim, Wall Street Journal, 19th of June 2014

V. Most of operators will go bankruptcy, with serious employment impacts

Such Decree will cause many business defaults with serious problems in term of employment and tax income revenues. The measure could give a lethal blow to the employment of the sector, in contradiction to its intention to create jobs especially in the green economy.

VI. The State will loss important tax income revenue

Together with those mentioned above, the State will probably loss tax payments such as IRAP, IRES or IRPEF, for an amount between to 500 and 700 million of Euros.

3) EFFECT ON THE RELATIONSHIPS BETWEEN PRODUCERS AND OTHER STAKEHOLDERS

VII. When negotiations with banks will be possible again, they will have huge costs

In the case in which it will be possible to negotiate again contracts of leasing and project financing, in order to avoid the possibility to default of the single projects, there will be huge costs. This costs will be due mainly to: higher interests and commissions for companies; costs related to the break of hedging contracts required from financial banks; difficulties in evaluating technical performance of plants after the 20 years; extraordinary maintenances for component substitutions due to the extension of the exercise period. All without mentioning human commitments, which could be used in more profitable functions in a so delicate phase of the national economy.

VIII. Local entities that have been issued authorizations, will have to open new procedures

The Decree entails the need to intervene on authorized titles in order to allow the progression of the production activity, with risks related to procedures timetables, which have also a plethora of public entities. It will cause a bureaucratic increase, a decrease in economic and human resources and other activities related to public entities' jurisdictions.

IX. Rental and surface right contracts will be roll over

There is also a serious problem related to the need to roll over, often with a large number of different subjects, of contracts related with the use of surfaces where there are located the plants and the connection infrastructures that, usually, have a duration equal to that for the subsidies. The negotiation needed, for those contracts, subjects producers to the possibility to contractual extortions by surface owners.

3.2 Proposal to overthrow bill related costs

To solve to the above long list of negative effects created by the Decree, it could be useful for Italy to evaluate other options that could bring some advantages, also more significant, for electric bills and, more in general, for the country. AssoRinnovabili proposed the following solutions¹¹.

3.2.1 Revision of the dispatching service market

It could be useful to intervene in particular on the Balancing Market, which is the mechanism that involves the purchase by Terna S.p.A. of electricity reserves, even though the country produces more than double of electric power with respect to energy requirement in its maximum peak. Such procedures, needed to ensure reserves on excessive energy, are translated into costs on ancillary markets.

3.2.2 Revision of improper taxes, actually in the SME's bills

Nowadays there still are very high taxes on bills. At this purpose, it could be useful to underline that CIP6 conventions, related to assimilated energy resources, are universally recognized as unfair with respect to environmental benefits, and that its beneficiaries are a restrict group of big operators with a huge per capita costs (the biggest operator earns 400 million of Euros per year) who also decided to not join to the anticipated resolution.

3.2.3 Reduction of A3 taxes through securitizations of commercial credits claimed by GSE

It is a hypothetical change already considered by the Government, at which most demonstrated to be in favor, both for the impact that it could be registered on bills and because it couldn't place heavy offsets at the expense of producers.

Moreover, it could have the considerable aim to decrease immediately (and without heavy normative changes) electric energy costs related to greater volumes with respect to the re-modulation expected with the "*Spalma Incentivi*" Decree.

With such removal, the amount will be divisible year by year by following the specific needs of each SME. It could be, for example, bigger in the first phase in order to restart the economy and to be reduced progressively.

¹¹ "*Posizione di assoRinnovabili su eventuale provvedimento "spalma incentivi" obbligatorio e proposte per la riduzione del costo della bolletta elettrica per le PMI*", AssoRinnovabili, 16th of May 2014

Furthermore, the moment will be extremely in favor to an operation on capital market, which has related costs at a historical low level. The measure is maybe stalemate due to the prudent approach of the Ministry of Economy and Finances, which considers the relative possible debt of GSE as public debt and so with the implications that could have with respect to Europe and to Fiscal Compact.

3.2.4 Package of options really voluntary

Another proposal that could concern the implementation of a package of measures with a voluntary character. In particular, it could be possible the simultaneous introduction of the following two measures, in order to leave the choice to the different types of producers, and so by choosing the appropriate instrument related with their own characteristic, in the case that they decide to join 1) to a “*Spalma Incentivi*” that give rewarding conditions. It could be appropriate a rate of return of deferred subsidies greater than government bonds and/or a decrease in bureaucracy for administrative and fiscal compliances towards GSE, AEEG (“*Autorità per l’Energia Elettrica e il Gas*”) and Custom and Excise. For example, a voluntary “*Spalma Incentivo*” could find a good acknowledgment from plant owners who use the net metering or the partial auto-consumption in regime of minimum guaranteed prices, if in exchange they obtain the warranty that they could use, under such regime, at the same conditions of today for the whole residual period, together with the security that in any case they will be ascribed from grid and system taxes; 2) producers can adhere also to a mechanism of anticipated voluntary resolutions from the conventions of Feed-in tariff with GSE to be implemented through auctions based on discounted price competition. Resolutions will be paid by a public entity outside the Eurostat area, which will finance with financial bonds together with the charge of a part of the debt existed on the plant. Savings relative to this measure will be so derived from the difference between interest rates on bond emission and average discount rates offered during the auction by producers. The difference will be so traduces in a profit that will be transmitted in form of reduction on A3 components of the bill, with the advantage to bring liquidity to citizens and to companies and so, to support the economic upturn.

3.2.5 Implementation of virtual SEUs

It permits to renewable energy producers to stipulate a selling contract directly with SMEs located in geographic areas different from those of production, and so by accelerating the process of liberalization of the electricity market. GSE could favor the equilibrium between supply and demand by managing publicly the Producers Register of Renewable Energies who decided to sell energy in the form of virtual SEUs to SMEs. Such initiative will bring the benefit to create a new development and more job perspectives for all the renewable energy sectors.

3.2.6 *Transfer into the bill advantages generated with renewable resources*

It would be correct to maintain into the electricity system, advantages generated by renewable energy resources and of relative increase in fiscal and regulatory taxes, at the expenses of such renewable energy resources and so by channeling them toward the electric bill. In particular with respect to:

1. economic advantages relative to the decrease, created mostly by renewables, of prices of wholesale electric energy. Renewable resources, in fact, which have limited variable costs, beat in the market the traditional thermoelectric, which instead, have high variable costs due to fossil fuel costs: in the last year and a half, it was registered a large decrease of wholesale prices from 75 to 43 €/MWh (-43%). If such reduction will be bring totally to the retail market and if such price will be stabilize, savings will amount in between 7 and 8 billion of Euros per year. Nevertheless, prices for end consumers, in particular for SMEs, saw purely symbolic decreases;
2. economic taxes that, in this moment, flow into general tax system and which are the results of fiscal and regulatory actions paid by renewable energy resources and by photovoltaic in the last period. In particular they are the Robin Hood Tax (a suggested set of taxes on banks and financial transactions that should provide money to protect public services and the environment), the IMU (*“Imposta Municipale Unica”*, tax related to the ownership of the property) and to the Change of Rate of Depreciation Tax and of Taxation Special for Farms with renewable plants, for a total forecasted amount equal to 800 million of Euros.

3.2.7 *The introduction of a green fiscal system based on the polluter-pays principle*

A structural reduction in A3 components of bills, could come alternatively from the new taxation of polluting products, as already stated from the latest Proxy Tax (*“Delega Fiscale”*). In order to implement such operation to its best, it could be necessary to add to the costs of each good the appreciation of the environmental impact resulting from its entire life cycle (production, transport, use and disposal) through the Life Cycle Assessment methodology of products. The application of such principle will permit to confront good real costs, given a competitive advantage to those more respectful towards the environment. In such way, it could be possible to transfer indirectly into the bill economic advantages related to CO₂ and fossil fuel free electric energy production.

Moreover, such approach will give important benefits to those manufacturing companies that have done the greater efforts in term of environmental sustainability in the global competitiveness scenario. In fact, the European manufacturing sector is those that less pollute related to good added value:

emissions for average unit of industrial production results more than 50% in Northern America with respect to Europe, of 640% in China and even of 818% in India.

A real restart of European industry can't base itself on the mere competition of costs, but in the contrary, it has to base itself on environmental and social sustainability, which characterizes the model of European development. It is necessary so, to implement some solutions, which will be able to join the environmental conservation and our industrial competitiveness.

3.3 Internationalization

A new motivation for the final consolidation of the Italian renewable energy industrial chain could be the transition toward the exportation of entrepreneurial and technological models. It has to be consider not only the fact that Italian industry in such sector praises a long a recognized experience, but also that its capability to realize products and components is strictly associated with its excellent quality.

The internationalization of such category represents, therefore, an important key role for the development of a real economic opportunity for the country.

Also the Directive 2009/28/CE recognizes the importance of collaboration between different countries in the European and international environments, and it promotes the necessity to invest abroad (for example through Joint Projects) for the fulfillment of the objectives expected for renewable energy resources.

An internationalization strategy could be based, for example, on the improvement of the energy market knowledge of target countries, by collecting, coordinating and supporting the realization of reports full of information about such countries. Those reports could be essentials for operators who work inside the world of renewables in order to invest in the sector.

Moreover, the development of a crowded net of relationships with institutional and financial entities and with the main operators of target countries, could accelerate the way toward the internationalization. It could facilitate the approach to the partner market in a view not only limited to producers, but also oriented towards the entire Italian renewable energy industrial chain (developers, suppliers of components and machines, designers, etc.).

In addition, also the monitoring of already operative experiences and the coordination of possible pilot projects could be two of the fundamental points, as they could construct a register for the case histories used as a reference base for future projects.

Finally, the organization and/or participation to entrepreneurial mission in the target countries, by involving Italian and foreign institutions and other linked entities, could put in direct contact the country with the different point of views and expectations of the other countries.

3.4 Iceland: the 100% renewable country

Iceland, with a population at the end of the 2nd quarter 2014 of 327,050¹², is the first example of 100% renewable energy production in the modern era.

With its breathtaking scenery, its geysers and its Blue Lagoon, Iceland produces 75% of its electricity from large hydroelectric plants, and the remaining part from geothermal power plants. Thanks to its position, an island located over a volcano, it is easy to deduce that geothermal power and photovoltaic plant are the most widespread installation in the country.

With the hydroelectric plants, as stated above, the country produces about three-quarters of the total electricity generated and consumed. Plants utilize the flow of glacial rivers and inland small creeks by storing water in reservoirs which ensure stable production all the year-round. In total, hydroelectric plants have the capacity of about 1,900 MW and generate 12,600 GWh annually.

On the other hand, with geothermal stations, Iceland produces the remaining part of one-quarter of energy required from population. The main advantage of such energy is its low cost of production, with a total capacity of 575 MW and generation of approximately 4,500 GWh annually.

Moreover, Iceland geothermal water is directly held in central heating and used in many industries to create value.

Even if Iceland is a very small-populated country, it is the empirical example on how it is possible to pursue the goal of a fossil fuel free country. In fact, the only use coming from coal and oil is related with transportation, which, in any case, account for a very small part in CO₂ emission (the use related to transportation is very low). Indeed, the Environmental Performance Index (EPI) since 2002 ranked Iceland at the first place for the Trend in CO₂ Emission per KWh index, and into the Top 15 for the total sum of the rank indexes.

¹² “Population in the 2nd Quarter 2014”, Statistics Iceland, 24th of July 2014

CHAPTER 4:

CONCLUSION

The first question that we have to ask ourselves is if this world of renewable energy could have a future in a country such as Italy, given the global will to bring CO₂ emissions to zero.

In Italy, as for all the other fields, there is no confidence about the rules, no clarity on what we can and cannot do and no certainty on the procedures. The most damaging fact is given by the “*Spalma Incentivi*” Decree, which through the “*Cassa Depositi e Prestiti S.p.A.*” grants loans to SMEs but by illegitimately robbing them after through public institutions. Everything by showing renewable energy as a costs on the bills for end consumers, whereas the reality is that all those fiscal taxes, such as IRA, IRPEF, IMU and many more, inhale benefits generated by renewable energy resources.

It could be interesting to think about how our building sector would become without the photovoltaic sector in the latest 4-5 years. How it would be the disposal of some biomasses without bio-generation plants.

It is evident that some clearness has to be applied on the investment terms, because it is not thinkable, as it happened in 2013, that it will occur for another time the getaway of investors from our country due to no respected rules by the Government.

A big consideration has to be done upon one of the most important objective related with renewable energy: the energy efficiency (as there are efficient areas in every company and family). In some large companies, saving rates related to renewable energy use touched 15% in the first year and 7% in the second. By bringing it in a perspective point of view, in Italy and in the whole Europe, the effect on renewable producers' taxes will be astonishing and probably it could give an incredible incentive for the competitiveness of our country.

All of that mention above could be realizable, in condition that transportation and dispatching lobbies of the different energies will be really liberalized. It is not imaginable how natural gas price in Switzerland is 5 cents of Euro per m³ less than in Como, only due to a passage through Alps ridge almost totally owned by the Italian Government. It is not possible to think that only a difference of few cents in energy production could cause double costs for the industry and for end consumers.

Costs related to renewable energy production, as explain extensively in the previous chapters, are in a continuous downturn. However, bureaucratic diligence adopted by our country is translated in time and costs absolutely not downhill. All seems to be always more complicated and uncertain, and the modern system of business needs faster answers.

Too words about energy national projects have been said on websites where we can activate renewable energy, but, to this day, a simple rejection by a single entity who can issue an “*Autorizzazione Unica Ambientale*” (AUA) can impede or even block a plant construction. An example could be the simple process needed to obtain an AUA for the installation of a small hydroelectric plant. We are talking about 50 meters of cable of 10 cm of diameter in an earthwork of 50 meters. The entities related with the issuing of such authorization go since the Command of Italian Army, to the Italian Air Force, to ENAC (“*Ente Nazionale per l’Aviazione Civile*”), to the Office of Mines, to the Italian Navy, and many more. It is a very tragic situation, which get worsen in the moment in which untouchable entities, such as the Ferrovie Dello Stato, are called into question, and decided systematically to not grant opinion and so by not respecting the norms related to the AUA.

It has to be explicated in a clearer view where and what we can do, and such answers have to be rapid and efficient and, above all, suitable in order to not discourage investors in our country.

It seems necessary to liberalize the relationship between producers and consumers by subsidizing electric energy production where there is the need and possibility to consume, eventually by acting on a fiscal neutrality, thanks to the profitable environmental impact of renewable energy resources.

As it happen for the communication world (successor of few networks and newspapers), we can reach also in the energy sector to a liberalization of the electric energy, giving to every single company and family, the liberty to auto-produce basic necessities by increasing investments and by boosting the classical efficiency typical of SMEs.

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