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**European Energy and Environmental Policies, Italy's
performance and a case study on ENEL**

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INTRODUCTION

The importance of energy is undeniable not only in political matters, but also in every day's life. This importance and the correct attention given to energy at all levels, regional, national and international have been among my main drivers in electing this topic. Another issue that drove me in electing it, is climate change, which every day is more worrisome and intrusive.

With This thesis, I reviewed the EU history on the matter by doing firstly an *excursus* on how energy and environmental policies became one of the central issues of European policies.

The first chapter starts with the beginning and it highlights the issue of energy security, which means the “uninterrupted availability of energy sources at an affordable price”¹. The concern about this issue increased more and more during the second half of the twentieth century. The European Communities were born in the fifties, but in the sixties energy policies were still handled at a national level only. During the first years of the seventies, a common energy policy was found necessary and discussed. It can be said the EU's first approach to the energy issue was driven by economic reasons such as the accomplishment of the internal energy market².

The comeback of the inadequacy of a national policy made the member states more decisive about a common policy strategy on energy. Furthermore, because the various States were trying to adapt to the demand of a low-emission economy and, at the same time, to ensure energy supply, this was seen as an opportunity for sustainable growth by drafting climate friendly policies. In addition, there was also the concern about energy dependency from non-EU countries which contributed to the conviction about the necessity of a path that would lighten the EU from major energy imports.

Thus, the Community, in 2007, drafted one of the most important strategies which is nowadays still in force and whose goals are in line with the solution of all the problems

¹ International Energy Agency (IEA)

² EU Energy policy: From the ECSC to the energy roadmap 2050, Susanne Langsdorf, Green European Foundation, 2011

mentioned: the 20/20/20 European Strategy. It was enacted in 2010 and its goals, to be attained by 2020 (20% reduction of greenhouse gas emissions vs the emissions of 1990, 20% energy production is to come from renewable energy sources and 20% reduction of energy use by enhancing energy efficiency vs 1990³), became legally binding after the issue of specific directives contained in the energy and climate package. With the treaty of Lisbon, the energy matters became even more relevant for the Union and the object of specific policies. The treaty came into force in 2009 and it amended some articles of the previous treaties that constitute the basis of the EU: the Maastricht treaty, the Treaty on European Union (TEU), the Treaty on the Functioning of the European Union (TFUE) and the treaty establishing the European Atomic Energy Community (EURATOM).

Among the innovations brought about by the Treaty of Lisbon there was also the power to operate in the field of energy. With this energy gained more importance within the EU scope. Through the specific article 194 of the TFEU⁴, as modified by the Treaty of Lisbon, the energy issue was addressed and an internal market that included the energy market was outlined, the energy supply of the Union and the promotion of energy efficiency with a look at renewables⁵ were mentioned as topics to focus upon.

After this treaty, the EU was able to develop other strategies, such as “Energy 2020” (which reinforced the 20/20/20 strategy goals) and the Energy Roadmap 2050 whose goals are even more ambitious (80% to 95% GHG emission reduction compared to 1990, decarbonisation and 20% of energy saving).

³ “These targets refer to three 20% goals, to be reached until 2020: 1) A reduction in EU greenhouse gas emissions of at least 20% below 1990 levels (to be increased to 30% in the event that other industrial countries and economically more advanced developing countries also contribute adequately). 2) 20% of EU energy consumption to come from renewable resources and. 3) a 20% reduction in primary energy use compared with projected levels, to be achieved by improving energy efficiency.” – pag. 6, *EU Energy policy: From the ECSC to the energy roadmap 2050*, Susanne Langsdorf, Green European Foundation, 2011

⁴ *Consolidated Version of the Treaty on the Functioning of the European Union*, Part three, Union policies and internal actions, Title XXI, Energy, 2009, <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A12012E194>

⁵ “The article 12 first refers to the “functioning of the internal market” sticking to its roots, but then enumerates several innovations: (a) ensure the functioning of the energy market; (b) ensure security of energy supply in the Union; (c) promote energy efficiency and energy saving and the development of new and renewable forms of energy; (d) promote the interconnection of energy networks.” – pag. 6, *EU Energy policy: From the ECSC to the energy roadmap 2050*, Susanne Langsdorf, Green European Foundation, 2011

In the sequence of topics upon which the EU started focusing attention, the Environment came along afterwards, after the Community realized the correlation between correct energy use and production with correct protection of the environment and the consequent influence on life quality of these two elements of the equation. This awakening came about in 1972, when the Environmental issues were openly spoken about at the Paris Summit. In the aftermath of this summit the first Environmental Action Program (EAP) was launched in 1972 and six more followed.

It was understood that the correlation between energy and the environment is related to economic reasons, too. Indeed, growth may be harmful to the environment or beneficial, depending on how environmental issues are taken into account. When talking about nature and the environment the market fails, because elements like water and air do not have a price that can be incorporated into economic calculations. Thus, the environmental policy makers, in order to have a better picture of the situation and enhance transparency in their decisions, started to use a modified version of the classical cost and benefit analysis, in order to give a value to natural goods and to incorporate the effects on them onto investment decisions. Therefore, in order to draft the right policies, a glance at the market and a proper analysis have become mandatory in the EU system.

I also reviewed the process followed in the Union in order to emit a policy, the different passages and the institutions involved: starting with the Commission, then through the EU Parliament to the Council and, if there is a problem like an infringement of the treaties, to the European Court of Justice.

The acknowledgment of this journey leads us to the second chapter where the green paper and the white paper have been presented and discussed. These papers have great importance in the history of the EU environmental and energy policies. One leads to the other, i.e. with the green paper the Commission launches the problem and the proposal(s) on how to fix it and then the white paper is issued, which is a formal request of solutions, which leads to legislative actions in order to make the solutions proposed effective.

Thanks to the EU's presence and participation in the international community, the goals fixed by the strategies and the solutions proposed by the papers can be seen in

the framework of the UN Sustainable Development Goals, which in a certain sense give ground and support to them. Thus, after the climate change awakening, the United Nations developed these goals on different topics. The seventh is about the access to affordable and clean energy, which must be granted to everybody. This goal is the further confirmation that the EU is not only on the right path, but also that it is on the front line in this field.

As a matter of fact, in order to be as effective as possible into achieving the fixed goals, the EU has drafted a Strategic Energy Technology plan (SET-Plan) which focuses on the way to finance the projects. Since 2007, when it was firstly launched, it has been playing a fundamental role in areas of research and innovation in energy and environmental policies. Therefore, the EU can have a better prospect on where to intervene in order to invest correctly and help renewables to be more widespread, because they are the key of the decarbonisation path and the way to be independent from energy imports. Indeed, renewables are foreseen as the ones that will have the biggest share in Europe's energy matrix by 2050. Some member states, like Italy, have progressed a lot during the last few years and even already achieved some of the 20/20/20 goals in advance.

The above leads to the third chapter, which talks about Italy's performance within the EU strategy. This is the climax of the Thesis, because my idea is to highlight the importance of energy and policies related to it in today's world and in the EU but also to show Italy's excellent results in this field. The data shown in the third chapter are further evidence of the remarkable capability of the country to get in line with the target, notwithstanding its late start on the subject matter.

In 2017 Italy issued its National Energy Strategy, drafted within the juridical scenario of the EU's "Clean Energy Package", which is a further important step on the way of strengthening Italy's commitment in achieving the EU goals. Furthermore, as an example of Italian excellency in the world, I took Enel as a case study, i.e. a multinational successful company, which was born in Italy as a State-owned monopoly and expanded worldwide into more than 30 countries, with operations in 10 more. I interviewed some top managers of the company and found out that not only Enel is a successful company under an economic standpoint, but it is a company that has gained

a worldwide standing, which is visible in the quality and quantity of the stakeholders it refers to. Governments not only in Europe, but also outside of the continent, regularly consult the company on energy matters when drafting national strategies and in order to be updated on technologies and prospects for the future.

CHAPTER I

1.1 Energy and the environment: from the European Coal and Steel Community (ECSC) to today

In the earliest treaties that created the European Communities, the environment was not mentioned, but energy security⁶ was. Up to the 60's, energy policies were designed and enacted only at national level, because cooperation between member states was not easy to achieve, due to the fact that each state saw autonomy about energy matters as a strategic issue not to be shared with any other country.

A common energy policy was beginning to be discussed during the first years of the seventies, together with the beginning of common environmental policies. In the eighties, energy policy was boosted and the need for closer coordination between member states was pointed out, in order to focus also on the problem of energy supply⁷. The main thing that drove the member states, though, was not environmental concern or energy supply, but economic reasons like the accomplishment of the internal energy market⁸. A sensitive point, especially because the Commission did not succeed into bringing this topic into the Maastricht Treaty. The vacuity of these approaches made it possible only between 1996⁹ and 1998¹⁰ to have single directives that brought substantial advancement on the matter¹¹.

Thanks to the strong concern about climate change and environmental protection and thanks to the Panel on Climate Change, the Rio conference and the adoption of the

⁶ “The IEA defines energy security as the uninterrupted availability of energy sources at an affordable price”, *International Energy Agency (IEA)*

⁷ *EU Energy policy: From the ECSC to the energy roadmap 2050*, Susanne Langsdorf, Green European Foundation, 2011

⁸ *ibid.*

⁹ *The directive 96/92/EC of the European Parliament and of the council of 19 December 1996 concerning common rules for the internal market in electricity*, Official Journal L 027, 30/01/1997 P. 0020 – 0029, <https://eur-lex.europa.eu/legal-content/LT/ALL/?uri=OJ:L:1997:027:TOC>

¹⁰ *Directive 98/30/EC of the European Parliament and of the Council of 22 June 1998 concerning common rules for the internal market in natural gas*, Official Journal L 204, 21/07/1998 P. 0001 – 0012, www.eur-lex.europa.eu

¹¹ “Neither the “Treaty of Amsterdam” (1999) nor the Treaty of Nice (2003) brought major advances for a common energy policy. Therefore, the important energy regulation in the years after, such as the Renewables Directives (2001 and 2003) and the introduction of emissions trading in 2005 were based on environmental regulation (Art. 175 (1) EC)”. – pag. 5, *EU Energy policy: From the ECSC to the energy roadmap 2050*, Susanne Langsdorf, Green European Foundation, 2011

Kyoto protocol, energy and the environment became main points of the global agenda. After this global awakening, within the Community it was realised that policies at a national state level were not effective and so the idea of a common policy strategy about energy and the environment gained momentum.

After this, the EU outlined a few Energy Action Plans and with “An Energy policy for Europe”, defined by the Commission, a common energy policy began to acquire importance. Because of the increasing importance of the matter, action programs were defined, that I will discuss later, which outlined the goals of a common energy policy. With the 2007-2009 action plan, the Commission adopted a European strategy called “20/20/20”, which is the European energy policy strategy of today.

The European Strategy 20/20/20 climate and energy package and the Emission Trading System (ETS)

The year of 2007 was a decisive one for the EU energy policy, because there was an agreement that outlined the soon to be legally binding goals.

In fact, until 2010, the year when the 20/20/20 strategy was enacted, the Member states did not have any obligation to follow the line of strategy of the community until an appropriate directive was issued, that made the goals legally binding among the member countries.

The goals of the strategy are: 20% reduction of greenhouse gas emissions vs 1990, 20% energy production have to come from renewable energy sources and 20% reduction of energy use by enhancing energy efficiency by 2020¹².

Furthermore, the strategy talks about the regulation of the internal market for gas and electricity (in order to create them and/or complete them) and deals with the question of energy supply security.

¹² “These targets refer to three 20% goals, to be reached until 2020: 1) A reduction in EU greenhouse gas emissions of at least 20% below 1990 levels (to be increased to 30% in the event that other industrial countries and economically more advanced developing countries also contribute adequately). 2) 20% of EU energy consumption to come from renewable resources and. 3) a 20% reduction in primary energy use compared with projected levels, to be achieved by improving energy efficiency.” – pag 6, *ibid*.

Because the economy was trying to adapt to the demand of low-emission economy and, at the same time, ensuring energy supply, this was seen as an opportunity for sustainable growth by drafting climate friendly policies.

The goals were in line with the purpose of alleviating energy dependency from non-EU countries. In fact, the reduction of greenhouse gas emissions and the increment of renewables is the right path to decrease energy import from other states¹³.

The strategy lies on five key principles that inspired the goals. The first one is ensuring the EU citizens that the Community was actually taking action towards climate change and, at the same time, ensuring the international community of the seriousness of the EU in order also to convince investors to invest. The second key is about the fairness of the efforts from the member states, i.e. recognizing that member states are not equal to each other. Some are indeed more capable than others¹⁴. In fact, in the impact assessment that was published months after the communication of the “20/20/20” strategy, it was stated that those member states with a GDP/capita below the EU average could reduce less compared to the those above the average¹⁵. Thus, the member states that have GDP/capita above the average have to reduce more than the others. In fact, this last category has a maximum reduction of -20% below the 2005 levels, while the ones that have low GDP/capita can emit more than they did in 2005, as the graph below shows in the first part¹⁶. The graph also shows how this differentiation affects costs and it can be seen that if the EU is intended as a whole, the

¹³ “This reduces the exposure of the EU economy to rising and volatile energy prices, inflation, geopolitical risks and risks related to inadequate supply chains that are not keeping up with global demand growth” – pag. 3, *20 20 by 2020 Europe’s climate change opportunity*, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, Brussels, 2008

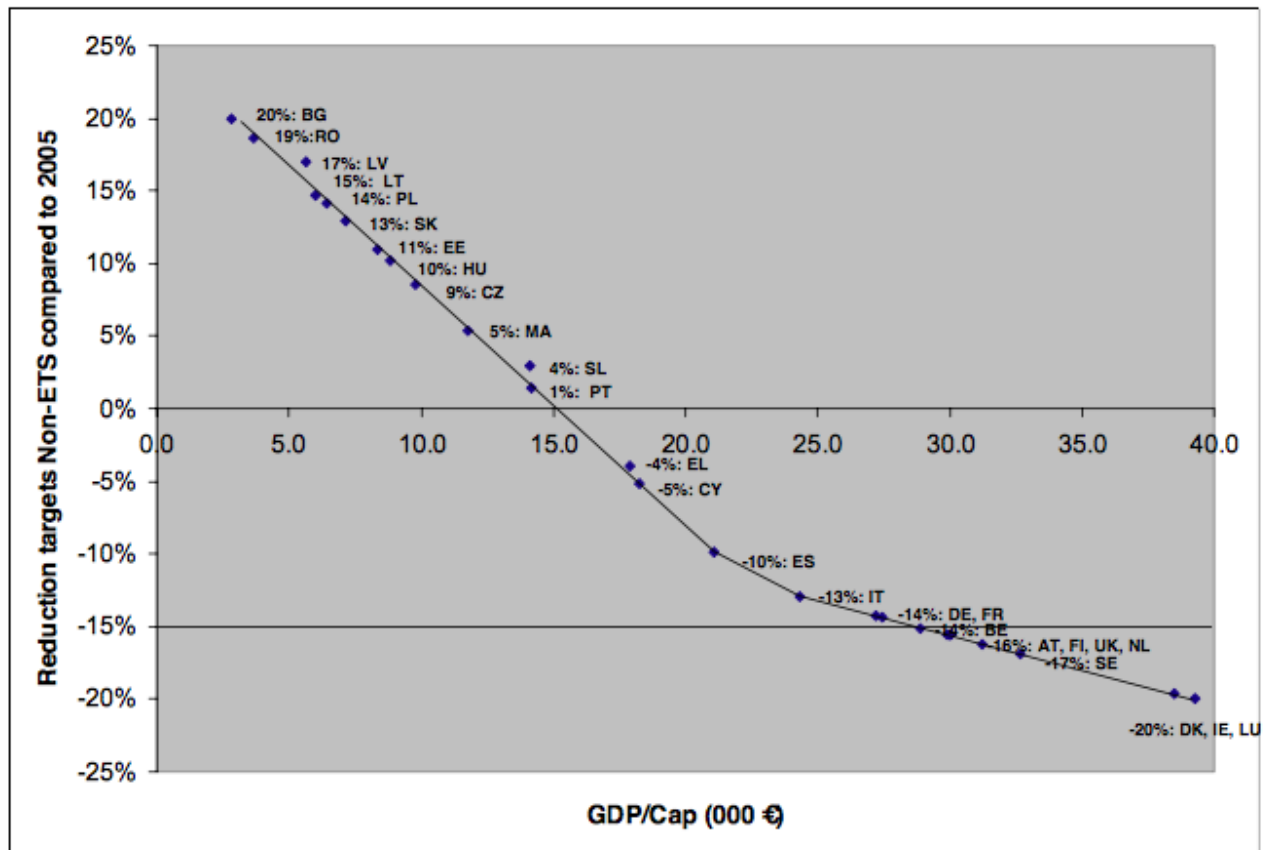
¹⁴ “In particular, some Member States are more able than others to finance the necessary investments. The proposals must be flexible enough to take account of Member States’ different starting points and different circumstances.” – pag. 5, *ibid.*

¹⁵ “(i.e. around -10% below 2005 levels) and in some cases even be allowed to increase their emissions above 2005 levels in the sectors not covered by the EU ETS with a maximum of +20% above 2005 levels” – pag. 9, *Impact Assessment Package of Implementation Measures for The EU’s Objectives on Climate Change and Renewable Energy For 2020*, Commission of the European Communities, Brussels, 2008

¹⁶ *ibid.*

cost has increased¹⁷ and so, the reduction of costs can be crucial for those countries that have a very low GDP ¹⁸.

Figure: Country specific targets for non EU ETS modulated on the basis of GDP/capita



Source: impact assessment package of implementation measures for the EU's objectives on climate change and renewable energy for 2020

The third key is about the awareness that the EU must go further the 2020 goals and set more ambitious goals at 2050. This means that since the beginning there was the acknowledgment that the targets fixed for 2020 could be not enough and that greenhouse gas emissions needed to be cut even more through investments in

¹⁷ “[...] from 0.58 to 0.61% of GDP” – pag. 10, *ibid*.

¹⁸ “Overall, the range of direct cost increase per Member State in this modulated allocation is much closer to the EU average compared to the cost-effective allocation. Thus, the modulated allocation leads to a more equal and fair effort across EU Member States.” – pag. 10, *ibid*.

technology¹⁹, in order to get the double goal of improving the environment and at the same time make the market more competitive and encourage innovation²⁰.

The fourth key is aiming to limit the price tag of adaptation for the internal economy to keep in mind that things like competitiveness, employment and social cohesion have to be positioned in the first place.

The last key is about promoting international cooperation in the goal of cutting greenhouse gas emissions²¹.

In order to achieve the targets, the Commission found it necessary to update the Emission Trading System (ETS), which was considered an important tool to incentivize the investments needed. Furthermore, the operating of the ETS stimulate trading, because companies have to stick to a certain level of CO₂ emission allowed which is allocated by the national governments after the approval of the Commission on the national plans²². Thanks to this system, a market of carbon allowances was developed, which means that if a company emitted below its permitted level, it could sell the unused quantity to another company in deficit with emissions. The possible risk that was thought about was of a possible distortion in the competitiveness and in the internal market caused by the national allocation system.

Then, because of the positive outcome that was achieved within the EU, it was decided to update the system in order to achieve an eco-friendly economy. There were improvements: the first one was about the aiming of the ETS (cutting the emissions)²³, the second one was about harmonising the system covering the whole Union, a measure that would benefit the internal market. Thus, the national allocation system should have been replaced by auction²⁴ (with the obligation that at least 20% of the

¹⁹ “Stimulating technological development and ensuring that the system can take advantage when new technology comes on stream” – pag. 5, *2020 by 2020 Europe's climate change opportunity*, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, Brussels, 2008

²⁰ *ibid.*

²¹ “The proposals are conceived to show that the Union is ready to take further action as part of an international agreement, stepping up from the 20% minimum target for greenhouse gas reductions to a more ambitious 30% reduction.” – pag 5, *ibid.*

²² *ibid.*

²³ “To lessen the administrative burden, industrial plants emitting less than 10 000 tonnes of CO₂ would not have to participate in the ETS, provided equivalent measures are in place to ensure their adequate contribution to reduction efforts.” – pag. 6, *ibid.*

²⁴ “The power sector – representing a large part of emissions – would be subject to full auctioning from the start of the new regime in 2013. Most other industrial sectors, as well as aviation, would step up to full auctioning gradually, reaching full auctioning by 2020. Auctioning would be handled by Member

income should be directed into investments on research and innovations for energy purposes) or free allocation through a “single EU-wide rules”²⁵. Furthermore, because of the Kyoto Protocol, which is an international treaty that pledges to reduce GHG emissions that cause global warming, it was estimated that if industrialised countries invest into emission-saving projects²⁶ thanks to a Clean Development Mechanism (CDM)²⁷, the targeted emissions could have lower costs and promote low-carbon technologies, especially in developing countries²⁸. Thanks to these projects, the impact assessment took into account that carbon price could be low. This reduction of the carbon price could not lead to a significant change within the energy system and therefore there will not be a boost for investments in new technologies²⁹.

The strategy is not only about cutting emissions but also about promoting the usage of renewables. The required share of this kind of energy (in all its forms, i.e. mainly wind, solar and hydro) is fixed at 20% by 2020.

Even in this case, the achievement of the target will be differentiated among the member states³⁰ as to the way they can achieve their part of the goal³¹. Through a national action plan, every member state will focus on where to place the investments and each will clarify how it intends to achieve the fixed target and monitor progresses on the matter.³²

States, and the revenues would accrue to Member States' treasuries. However, auctions would be open: any EU operator could buy allowances in any Member State” – pag 6, *ibid*.

²⁵ *ibid*.

²⁶ “[...] projects overseas – notably in developing countries, through the Clean Development Mechanism (CDM)” – pag 6, *ibid*.

²⁷ “CDMs have proved their worth in cutting emissions, and offer access to more cost-effective options than sometimes available within Europe. However, there is a risk that too generous a use of CDMs can dilute the effectiveness of the ETS by increasing the supply of credits and thereby cutting demand for allowances, and reducing the incentive for governments and companies to promote emission reductions at home.” – pag 6, *ibid*.

²⁸ *ibid*.

²⁹ “In addition, the 20% RES target would become much more difficult to achieve, and significantly more support for renewable energy technologies would be required. This approach would mean less EU leadership on climate change and a smaller impetus to develop and deploy advanced energy and low carbon technologies” – pag. 14, *Impact assessment, package of implementation measures for the EU's objectives on climate change and renewable energy for 2020*, European Commission Staff, Brussels, 2008

³⁰ “The Commission's proposal is based on a methodology according to which half of the additional effort is shared equally between Member States. The other half is modulated according to GDP per capita.” – pag. 7, *2020 by 2020 Europe's climate change opportunity*, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, Brussels, 2008

³¹ “Some have potential in wind power, others in solar power or in biomass.” – pag. 7, *ibid*.

³² “[...] the European Council chose to fix a specific minimum target for sustainable biofuels of 10% of overall petrol and diesel consumption” – pag. 8, *ibid*.

Countries need flexibility in exploiting renewables, because investment costs may vary a lot, due to the saturation of the places with best recourses, that would drive prices up, and to the economies of scale that can be obtained by increasing production, which would pressure costs downwards³³. As a matter of fact, as long as the EU target is achieved, there is some flexibility on this matter because a member state can make a contribution even only by supporting the EU's effort through helping the development of renewables in another member state or even outside the EU³⁴.

Keeping in mind that the main objective is reducing emissions, in the strategy not only renewables are being addressed in order to achieve the hoped-for reduction: energy efficiency has its part, too. The target is fixed at a 20% of saving of energy consumption by 2020. Efficiency, according to the strategy, is really important because it could save 100€ billion and 800 million tonnes/year of CO₂ in emissions. Energy efficiency is relevant to all, because it needs a coordinated effort by public institutions, economic operators and citizens.

This strategy is very important, because it is a turning point for the EU energy and environmental policy. It backs up the vision that growth is possible while considering the environment.

The Commission's proposal of this strategy led afterwards to specific directives that legally bound member states in achieving the previously mentioned targets. Furthermore, it is thanks to this that the Lisbon Treaty includes a section that deals with the energy issue.

The Treaty of Lisbon

The treaty of Lisbon was ratified by the EU Member States in 2007 and entered into force in 2009. It amends some articles of the previous treaties that constitute the basis of the EU: the Maastricht treaty, the Treaty on European Union (TEU), the Treaty on

³³ "With the overall cost to the European economy estimated at just under 0.5% of GDP by 2020, the Commission believes that no Member State should be asked to make an investment which diverges too far from this broad average" – pag. 10, *ibid*.

³⁴ "[...] they can reduce their own compliance costs and at the same time provide the other Member State with a useful extra income stream." – pag. 8, *ibid*.

the Functioning of the European Union (TFUE) and the treaty establishing the European Atomic Energy Community (EURATOM). It is thanks to this treaty that the European Parliament can propose amendments to treaties, as the Council, the Commission and Member States' national governments could already do³⁵.

The contents of the treaty vary from addressing the changes of the Union's powers³⁶ to the clarification of them by outlining the three kinds of competences³⁷ it has. Furthermore, thanks to the treaty, the EU have a full legal personality which permits the signing of international treaties in certain areas and join the international organisations that are in line with the EU law.

A procedure has been provided, too, for those States that want to exit the Union, which is article 50³⁸ of the Treaty.

³⁵ Article 48 of the TEU specified that the ordinary procedure: "1. The Treaties may be amended in accordance with an ordinary revision procedure. They may also be amended in accordance with simplified revision procedures. Ordinary revision procedure: 2. The Government of any Member State, the European Parliament or the Commission may submit to the Council proposals for the amendment of the Treaties. These proposals may, inter alia, serve either to increase or to reduce the competences conferred on the Union in the Treaties. These proposals shall be submitted to the European Council by the Council and the national Parliaments shall be notified. 3. If the European Council, after consulting the European Parliament and the Commission, adopts by a simple majority a decision in favour of examining the proposed amendments, the President of the European Council shall convene a Convention composed of representatives of the national Parliaments, of the Heads of State or Government of the Member States, of the European Parliament and of the Commission. The European Central Bank shall also be consulted in the case of institutional changes in the monetary area. The Convention shall examine the proposals for amendments and shall adopt by consensus a recommendation to a conference of representatives of the governments of the Member States as provided for in paragraph 4." – *Consolidated version of the Treaty on European Union – Title VI: Final Provisions*, <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A12012M%2FTXT>

³⁶ "[...] it changes the way the Union exercises its existing powers and some new (shared) powers" – *The treaty of Lisbon*, Fact Sheets on the European Union, European Parliament, <http://www.europarl.europa.eu/factsheets/en/sheet/5/the-treaty-of-lisbon>

³⁷ "[...] exclusive competence, where the Union alone can legislate, and Member States only implement; shared competence, where the Member States can legislate and adopt legally binding measures if the Union has not done so; and supporting competence, where the EU adopts measures to support or complement Member States' policies." – *ibid*.

³⁸ "1. Any Member State may decide to withdraw from the Union in accordance with its own constitutional requirements. 2. A Member State which decides to withdraw shall notify the European Council of its intention. In the light of the guidelines provided by the European Council, the Union shall negotiate and conclude an agreement with that State, setting out the arrangements for its withdrawal, taking account of the framework for its future relationship with the Union. That agreement shall be negotiated in accordance with Article 218(3) of the Treaty on the Functioning of the European Union. It shall be concluded on behalf of the Union by the Council, acting by a qualified majority, after obtaining the consent of the European Parliament. 3. The Treaties shall cease to apply to the State in question from the date of entry into force of the withdrawal agreement or, failing that, two years after the notification referred to in paragraph 2, unless the European Council, in agreement with the Member State concerned, unanimously decides to extend this period. 4. For the purposes of paragraphs 2 and 3, the member of the European Council or of the Council representing the withdrawing Member State shall not participate in the discussions of the European Council or Council or in decisions concerning it. A qualified majority shall be defined in accordance with Article 238(3)(b) of the Treaty on the Functioning of the European Union. 5. If a State which has withdrawn from the Union asks to re-join, its request shall be subject to the procedure referred to in Article 49." – *Consolidated Version of the Treaty on European Union*, Title VI, Final Provisions, Official Journal of the European Union, 2012

Furthermore, the treaty concerns the areas of freedom, security and justice. It makes them complete, by introducing judicial cooperation on criminal issues. It eliminates the former intergovernmental structure for what concerns the police and judicial cooperation in criminal matters, because the acts adopted in this area are now subject to the ordinary legislative procedure through the legal tools of the Community method³⁹. It is also specified that in case the ordinary legislative procedure is not enacted, there is also the possibility of amending the treaty by a simplified revision procedure⁴⁰.

Thanks to this treaty there has been an enhancement of democracy and better protection of Human Rights⁴¹. In fact, it is thanks to this treaty that the EU has accession to the European Convention on Human Rights (ECHR)⁴² which is the one that permits to the EU to be signatories through “the 14th protocol to the ECHR”⁴³.

³⁹ *The treaty of Lisbon*, Fact Sheets on the European Union, European Parliament, <http://www.europarl.europa.eu/factsheets/en/sheet/5/the-treaty-of-lisbon>

⁴⁰ “6. The Government of any Member State, the European Parliament or the Commission may submit to the European Council proposals for revising all or part of the provisions of Part Three of the Treaty on the Functioning of the European Union relating to the internal policies and action of the Union. The European Council may adopt a decision amending all or part of the provisions of Part Three of the Treaty on the Functioning of the European Union. The European Council shall act by unanimity after consulting the European Parliament and the Commission, and the European Central Bank in the case of institutional changes in the monetary area. That decision shall not enter into force until it is approved by the Member States in accordance with their respective constitutional requirements. The decision referred to in the second subparagraph shall not increase the competences conferred on the Union in the Treaties. 7. Where the Treaty on the Functioning of the European Union or Title V of this Treaty provides for the Council to act by unanimity in a given area or case, the European Council may adopt a decision authorising the Council to act by a qualified majority in that area or in that case. This subparagraph shall not apply to decisions with military implications or those in the area of defence. Where the Treaty on the Functioning of the European Union provides for legislative acts to be adopted by the Council in accordance with a special legislative procedure, the European Council may adopt a decision allowing for the adoption of such acts in accordance with the ordinary legislative procedure.” Article 48, *Consolidated Version of the Treaty on European Union*, Title VI, Final Provisions, Official Journal of the European Union, 2012

⁴¹ *The treaty of Lisbon*, Fact Sheets on the European Union, European Parliament, <http://www.europarl.europa.eu/factsheets/en/sheet/5/the-treaty-of-lisbon>

⁴² “The Convention for the Protection of Human Rights and Fundamental Freedoms, better known as the European Convention on Human Rights, was opened for signature in Rome on 4 November 1950 and came into force in 1953. It was the first instrument to give effect to certain of the rights stated in the Universal Declaration of Human Rights and make them binding.” – *European Convention*, European Court of Human Rights, Council of Europe, <https://www.echr.coe.int/Pages/home.aspx?p=basictexts&c>

⁴³ “Accession still requires ratification by all states that are parties to the ECHR, as well as by the EU itself. Negotiations between Council of Europe and EU representatives led to the finalisation of a draft agreement in April 2013, which, however, was deemed incompatible with Article 6 TEU by the Court of Justice of the European Union in its Opinion 2/2013. Further negotiations will be necessary before accession can take place.” – *The treaty of Lisbon*, Fact Sheets on the European Union, European Parliament, <http://www.europarl.europa.eu/factsheets/en/sheet/5/the-treaty-of-lisbon>

Furthermore, the treaty also establishes a new institutional set-up by making the EU Parliament made up by representatives of the citizens of the Union and not by representatives of the citizens of the States⁴⁴. Its legislative powers have been increased by replacing the former co-decision procedure and the possibility of electing the President of the Commission by majority⁴⁵ exists. The treaty acknowledges the European Council as an EU institution and changes the way in which the president of the Council is elected⁴⁶. The Council still had the principle of double majority until 2014 when it was introduced the use of previous voting weights⁴⁷ and when it votes or deliberates, it is done in public⁴⁸. The changes for the Commission concern the increase in political legitimacy and the election of the President which is chosen depending on the outcome of the European elections⁴⁹. The European Court of Justice has seen an extension of its jurisdiction with the permission to institute specialised courts (after Parliament's approval) and the European Public Prosecutor's Office has been introduced with the task of investigating, prosecuting and bringing to judgement "offences against the Union's financial interest"⁵⁰.

⁴⁴ "Pursuant to Article 14(2) TEU, the EP is now 'composed of representatives of the Union's citizens', not of representatives of 'the peoples of the States' (Article 189 TEC)." – *The treaty of Lisbon*, Fact Sheets on the European Union, European Parliament, <http://www.europarl.europa.eu/factsheets/en/sheet/5/the-treaty-of-lisbon>

⁴⁵ "The EP now elects the President of the Commission by a majority of its members on a proposal from the European Council, which is obliged to select a candidate by qualified majority, taking into account the outcome of the European elections." – *ibid*.

⁴⁶ "A long-term presidency replaces the previous system of six-month rotation. The President is elected by a qualified majority of the European Council for a renewable term of 30 months. This should improve the continuity and coherence of the European Council's work. The President also represents the Union externally, without prejudice to the duties of the High Representative of the Union for Foreign Affairs and Security Policy (see below)." – *ibid*.

⁴⁷ "The use of previous voting weights could still be requested by any Member State until 31 March 2017. A qualified majority is reached when 55% of members of the Council, comprising at least 65% of the population, support a proposal (Article 16(4) TEU). When the Council is not acting on a proposal from the Commission or the VP/HR, the necessary majority of Member States increases to 72% (Article 238(2) TFEU)." – *ibid*.

⁴⁸ "To this end, each Council meeting is divided into two parts, dealing respectively with legislative acts and non-legislative activities. The Council Presidency continues to rotate on a six-month basis, but there are 18-month group presidencies of three Member States in order to ensure better continuity of work. As an exception, the Foreign Affairs Council is continuously chaired by the VP/HR." – *ibid*.

⁴⁹ *ibid*.

⁵⁰ *ibid*.

In addition, the treaty also makes improvements in the area of policy making through new policies and new competencies for the EU, such as the “*passerelle clauses*”⁵¹, the principle of subsidiarity and the common security and defence policy⁵².

But, most importantly, with the treaty of Lisbon, the energy question has been included in a clearer way, through the specific article 194 of the TFEU⁵³ that speaks about the internal market including the energy market, the energy supply of the Union and the promotion of energy efficiency with a look at renewables⁵⁴. Not only the article speaks about energy and climate, because these issues are mentioned also in articles 191⁵⁵,

⁵¹ “Several so-called ‘passerelle clauses’ allow a change from unanimous decision-making to qualified majority voting and from the consultation procedure to codecision (Article 31(3) TEU, Articles 81, 153, 192, 312 and 333 TFEU, plus some passerelle-type procedures concerning judicial cooperation in criminal matters)” – *ibid*.

⁵² “[...] the Lisbon Treaty introduces a mutual defence clause which provides that all Member States are obliged to provide help to a Member State under attack.” – *ibid*.

⁵³ 1. In the context of the establishment and functioning of the internal market and with regard for the need to preserve and improve the environment, Union policy on energy shall aim, in a spirit of solidarity between Member States, to: (a) ensure the functioning of the energy market;(b) ensure security of energy supply in the Union; (c) promote energy efficiency and energy saving and the development of new and renewable forms of energy; and (d) promote the interconnection of energy networks. 2. Without prejudice to the application of other provisions of the Treaties, the European Parliament and the Council, acting in accordance with the ordinary legislative procedure, shall establish the measures necessary to achieve the objectives in paragraph 1. Such measures shall be adopted after consultation of the Economic and Social Committee and the Committee of the Regions. Such measures shall not affect a Member State's right to determine the conditions for exploiting its energy resources, its choice between different energy sources and the general structure of its energy supply, without prejudice to Article 192(2)(c). 3. By way of derogation from paragraph 2, the Council, acting in accordance with a special legislative procedure, shall unanimously and after consulting the European Parliament, establish the measures referred to therein when they are primarily of a fiscal nature.” – *Consolidated Version of the Treaty on the Functioning of the European Union*, Part three, Union policies and internal actions, Title XXI, Energy, <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A12012E194>

⁵⁴ “The article12 first refers to the “functioning of the internal market” sticking to its roots, but then enumerates several innovations: (a) ensure the functioning of the energy market; (b) ensure security of energy supply in the Union; (c) promote energy efficiency and energy saving and the development of new and renewable forms of energy; (d) promote the interconnection of energy networks.” –pag.6, *EU Energy policy: From the ECSC to the energy roadmap 2050*, Susanne Langsdorf, Green European Foundation, 2011

⁵⁵ “1. Union policy on the environment shall contribute to pursuit of the following objectives: a) preserving, protecting and improving the quality of the environment; protecting human health; b) prudent and rational utilisation of natural resources; c) promoting measures at international level to deal with regional or worldwide environmental problems, and in particular combating climate change.2. Union policy on the environment shall aim at a high level of protection taking into account the diversity of situations in the various regions of the Union. It shall be based on the precautionary principle and on the principles that preventive action should be taken, that environmental damage should as a priority be rectified at source and that the polluter should pay. In this context, harmonisation measures answering environmental protection requirements shall include, where appropriate, a safeguard clause allowing Member States to take provisional measures, for non-economic environmental reasons, subject to a procedure of inspection by the Union. 3. In preparing its policy on the environment, the Union shall take account of: d) available scientific and technical data; e) environmental conditions in the various regions of the Union; f) the potential benefits and costs of action or lack of action; g) the economic and social development of the Union as a whole and the balanced development of its regions. 4. Within their respective spheres of competence, the Union and the Member States shall cooperate with third countries and with the competent international organisations. The arrangements for Union cooperation may be the subject of agreements between the Union and the third parties concerned. The previous subparagraph

192⁵⁶ and 193⁵⁷ of the title XX of the TFEU, it also confirms the commitment of the Union to the targets fixed for fighting climate change.

In addition, some parts of the treaty specifically focus on energy supply and take into consideration energy security. As mentioned earlier, this topic was previously reserved to the single states only.

Even though collaboration among member states has been improved and institutions have been changed within the organisation, there are topics still dealt with at national level, such as the energy mix of each country and the conditions for exploiting local energy resources.

On the other side, decisions of fiscal nature are voted by the council by following the rule of unanimous consent, after getting the advice of parliament. This is the first approach as a Community to the issues in question and it is thanks to this that the Commission has had the possibility to state a list of proposals that in 2009 were implemented into directives concerning emission trading.

shall be without prejudice to Member States' competence to negotiate in international bodies and to conclude international agreements.” – article 191, *Consolidated Version of the Treaty on the Functioning of the European Union*, Part three, Union policies and internal actions, Title XX, Energy, Official Journal of the European Union, 2012, <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A12012E194>

⁵⁶ “1. The European Parliament and the Council, acting in accordance with the ordinary legislative procedure and after consulting the Economic and Social Committee and the Committee of the Regions, shall decide what action is to be taken by the Union in order to achieve the objectives referred to in Article 191. 2. By way of derogation from the decision-making procedure provided for in paragraph 1 and without prejudice to Article 114, the Council acting unanimously in accordance with a special legislative procedure and after consulting the European Parliament, the Economic and Social Committee and the Committee of the Regions, shall adopt: (a) provisions primarily of a fiscal nature; (b) measures affecting: town and country planning, quantitative management of water resources or affecting, directly or indirectly, the availability of those resources, land use, with the exception of waste management; (c) measures significantly affecting a Member State's choice between different energy sources and the general structure of its energy supply. The Council, acting unanimously on a proposal from the Commission and after consulting the European Parliament, the Economic and Social Committee and the Committee of the Regions, may make the ordinary legislative procedure applicable to the matters referred to in the first subparagraph. 3. General action programmes setting out priority objectives to be attained shall be adopted by the European Parliament and the Council, acting in accordance with the ordinary legislative procedure and after consulting the Economic and Social Committee and the Committee of the Regions. The measures necessary for the implementation of these programmes shall be adopted under the terms of paragraph 1 or 2, as the case may be. 4. Without prejudice to certain measures adopted by the Union, the Member States shall finance and implement the environment policy. 5. Without prejudice to the principle that the polluter should pay, if a measure based on the provisions of paragraph 1 involves costs deemed disproportionate for the public authorities of a Member State, such measure shall lay down appropriate provisions in the form of: temporary derogations, and/or financial support from the Cohesion Fund set up pursuant to Article 177.” – article 192, *ibid*.

⁵⁷ “The protective measures adopted pursuant to Article 192 shall not prevent any Member State from maintaining or introducing more stringent protective measures. Such measures must be compatible with the Treaties. They shall be notified to the Commission.” – article 193, *ibid*.

The actions described so far made it possible to design the strategy that nowadays is used and known as “Energy 2020”.

Energy 2020 and what's next

The “Energy 2020” strategy is a long-term strategy published in 2010, when it appeared clear that the Community would not achieve the 20/20/20 targets⁵⁸. Therefore, the new strategy focused on new priorities still in line with the old targets: “achieving an energy efficient Europe; building a truly pan-European integrated energy market; empowering consumers and achieving the highest level of safety and security; extending Europe’s leadership in energy technology and innovation; strengthening the external dimension of the EU energy market”⁵⁹.

The focus on energy efficiency is correlated to goals such as the improvement of energy security and the creation of a greener economy.

The main tool within this framework can be devised in the so-called Energy roadmap. The strategy underlines the need to take some actions in order to deal with problems such as the restructuring of the energy markets in the Union and to achieve some goals in connection with climate change, within a healthy competition framework⁶⁰.

Even if this strategy does not have renewables as its main goal, other targets are still important and they include renewables. The goals on which the strategy is more focused on are: the extension of EU’s authority on technology and innovation, the improvement of safety and security and the enhancement of EU’s presence.

⁵⁸ “The quality of National Energy Efficiency Action Plans, developed by Member States since 2008, is disappointing, leaving vast potential untapped. The move towards renewable energy use and greater energy efficiency in transport is happening too slowly. While we are broadly on track for the 20% target for renewable, we are a long way from achieving the objective set for energy efficiency” – pag. 3, *Energy 2020 A strategy for competitive, sustainable and secure energy*, European Commission, Brussels, 2010, COM (2010) 639 final

⁵⁹ *ibid.*

⁶⁰ *EU Energy policy: From the ECSC to the energy roadmap 2050*, Susanne Langsdorf, Green European Foundation, 2011

Other ways are also chosen in order to have the desirable reduction and to have a strong green energy market, i.e. the transport systems and buildings. This, because these two sectors are the ones that use energy almost like the industry sector, where the EU has been successful in promoting reduction in energy use.

Another target that the EU wants to focus on with “Energy 2020” is the accomplishment of the energy market. This is explicitly stated, because it is desirable to avoid higher costs and enhance energy security⁶¹.

With all these focuses and the approaching of the deadline (2020), the EU drafted another strategy called “Energy Roadmap 2050”. The purpose of this strategy, apart from indicating the way after “Energy 2020”, is stimulating investments in energy infrastructures. Furthermore, it has goals like reducing the greenhouse gas emissions⁶² and decarbonisation by still ensuring energy security and competitiveness⁶³.

In Energy Roadmap 2050, which envisages almost total decarbonisation by 2050 (compared to the emissions level of 1990), the Commission outlines the future energy system, that will imply higher capital expenditure and lower costs for fuels due to lower consumption of them. Other possible scenarios have been outlined, in which the energy systems will not be more expensive. According to these scenarios, only electricity will have a peak of higher costs in the short term, to decrease after 2030. For what concern renewables, the analyses that have been made depict a scenario with their growth thanks to the decarbonisation goal⁶⁴.

Backed by the decarbonisation scenario, the Commission has outlined five working areas such as: re-examination of the energy market, renovation of the energy system, development of a change at an international level (also), development of public acceptance and enhancement of investments.

For what concerns the first working area, with the re-examination of the energy market, the main focus is on the internal market. Since it is still incomplete, it is desirable that the member states abate barriers in the electricity and in the gas markets.

⁶¹ *ibid.*

⁶² "to 80-95% below 1990 levels." – pag.7, *ibid.*

⁶³ *ibid.*

⁶⁴ “[...] energy savings are needed and decentralised and centralised elements of the power system need to be interconnected.” – pag. 8 *ibid.*

The second working area, the renovation of the energy systems, is focused on managing the side that concerns energy efficiency and the smart energy technology, within the direction of renewable energy in a decentralised system of renewable heating and cooling. Furthermore, in this area, it is envisaged that carbon sequestration could make gas and coal greener. Nuclear energy also plays a role in this roadmap. These positions have received some critics from environmental groups and green parties. The promotion of nuclear energy as a low-carbon option is controversial, especially after what happened in Fukushima. Still, the Commission hopes to have better control over it, due to new technologies, which will bring in positive developments and lower costs.

Another major point in this outline of working areas is the investments which are needed in order to build new technologies. It has been pointed out that the major investors are the private ones, focusing especially on energy companies⁶⁵ which are the most interested in investing in new technologies.

In order to achieve the completion of these working areas, the Commission has pointed out that this long-term strategy is going to have the support of other developing strategies until 2030, starting with the implementation of “Energy 2020”.

The criticisms that have been moved against this strategy are numerous and deep, but it is important to have received them, because given the most likely failure of energy 2020, it is useful to have a backup plan that would project the community into a greener future⁶⁶.

The roadmap has some controversial points, the document does not abandon fossil fuels completely, because it relies on the technology of Carbon Capture and Storage (CCS), which many see as unviable from an economic stand point and potentially dangerous in case of accidents in the storage, which is to be kept for an indefinitely

⁶⁵ “Only in exceptional cases do investments have a public good character and shall receive support” – pag.8, *ibid*

⁶⁶ “The Commission’s on-going reliance on fossil fuels and nuclear energy provoked harsh criticism from environmental groups and Green Parties. They excoriated not only the focus on outdated technologies, but also the scenarios on which these assumptions were built. They object to the Commission’s estimates of future price and security development of nuclear energy and carbon capture and storage (CCS) as overly positive whereas underestimating the potential of renewable energies.” – pag. 8, *ibid*.

long period. Furthermore, it still relies on nuclear which many consider dangerous and non-economic⁶⁷.

“Roadmap 2050” still envisages decarbonisation as its main goal, more as an absolute necessity, because if we keep on using fossil fuels the environment would be seriously damaged, if not destroyed. Yet, there is still the question of how to get to this goal and what to use as a back-up to renewables.

1.2 Environmental issues: from the European Economic Community (EEC) to nowadays

Correct use and production of energy leads to correct care for the environment. Environmental policies and Energy policies therefore are strictly correlated. Energy production and consumption causes pollution of the environment and in turn pollution of the environment makes life unhealthy.

As mentioned earlier, in the beginning, the economic motive was the one that drove the Community to make the first steps towards a common energy policy. The environmental concern came along afterwards, after correlating the two issues.

Europe as a political entity means the joining of several States into a Union. The Union saw many stages, from the “Communities” that were created in the very beginning, to the European Economic Community (EEC), which is the embryo of the EU as we know it. The Community at first only approached economic and social problems. Other items, like the environment, came at a later stage. The first time that the environment was brought up was in 1972, after a United Nation conference that was held in that year⁶⁸.

As a matter of fact, in the first Treaty there was no specific article that dealt with the problem of the environment, it only dealt with the problem of energy security.

⁶⁷ *ibid.*

⁶⁸ *Environmental action programmes in the European union - evolution and specific*, Vasile Popeangă, Professor PhD, University “Constantin Brâncuși” of Târgu-Jiu Faculty of Economics and Business Administration, 2013

Only in 1972 the Environmental issues were openly spoken about at the Paris Summit and, in the same year, the first Environmental Action Program (EAP) was launched. There was an economic reason behind this approach, because there was widespread concern of possible barriers to trade in the Common Market due to the environmental standards of each country, that could differ from country to country. For example, some cars could not be sold in one country due to its environmental regulations, whilst perfectly sellable in another. Because of this, the leaders of the member States asked the Commission to draw an action programme on the environment, in order to protect it and to have a common policy that would be applied within the community. This action program was adopted the following year and it was the very first environmental policy of the EU, which led afterwards to the formation of the Directorate General for the Environment. With this first action program, it was established that economic development walked along with the environmental protection and thus the program dealt with some points that only in the nineties with the European Sustainable Development program would be structurally set up.

After this first EAP, there came six more. The second one took a period between the last years of the seventies and the first years of the eighties. This program helped to define the range of issues that the Community had to focus on. In these two first EAPs, the Community found more urgent to deal with the quality of air and water⁶⁹. Thus, throughout the seventies, as we have seen, the energy policy continued to be discussed, because there was a strong impulse in doing so but in a different and specific way for each member state⁷⁰.

This continuous development, though, was based on a double veto, since the EU was an international organization: the first one in the CoM⁷¹ and the second one during the process of implementation. Both vetoes were based on the principle of *acquis communautaire* which allowed the states to choose the best fit policy for them⁷².

With the seventies, the environmental role of the EEC was put forward, but only in the eighties and with the Single European Act, the environment was expressly defined as

⁶⁹ *ibid.*

⁷⁰ *Environmental Policy in the European Union: Actors, Institutions and Processes*, Andrew Jordan, Camille Adelle, Earthscan, 2016

⁷¹ "...proposals had to secure the support of every state in the CoM before they could be adopted." – *ibid.*

⁷² *ibid.*

a goal of the Community. This Act was added to the Rome Treaty with a specific paragraph (Title VII), it outlined the goals that had to be achieved⁷³ and it compelled the Member States to choose sustainable measures for the environment.

Indeed, in the 1980s, activities of the Commission, the Council and the European Parliament's Environment Committee focused on environmental issues. During these years the policies of the EU took a more consistent form and marked the beginning of awareness for what concerns prevention of pollution and emission reduction⁷⁴.

The third EAP was drafted during the early years of the eighties and it was another important step, because it acknowledged the important correlation between environmental policies and the internal market. Furthermore, it outlined the EU environmental strategies in order to have more prevention of possible future damages and it pointed out the fact that environmental policies brought some risks and benefits on the internal market⁷⁵. The repercussion on the internal market was the driving element for editing these policies, because it emphasized the importance (for example) of reducing emissions⁷⁶.

With the fourth EAP in the late eighties, the Community introduced things as taxes and emission permits, in order to consider the environment as an “integrated activity”⁷⁷ more than only an addition to the goals of the Community.

This new approach was also driven by the decision of the Community to reduce energy consumption and waste streams.

With this program, it was established that economic goals did not collide with the protection of the environment. On the contrary, the protection of the environment was the key to achieve the best economic competitiveness, with an output of improved

⁷³ “...such as conservation, protection and improvement of the environment, health protection and rational use of natural resources.” – pag. 26, *Environmental action programmes in the European union - evolution and specific*, Vasile Popeangă, Professor PhD. University “Constantin Brâncuși” of Târgu-Jiu Faculty of Economics and Business Administration, 2013

⁷⁴ *The Evolution of EU Policy and Law in the Environmental Field: Achievements and Current Challenges*, Emanuela Orlando, working paper, IAI, 2013

⁷⁵ *Environmental action programmes in the European union - evolution and specific*, Vasile Popeangă, Professor PhD. University “Constantin Brâncuși” of Târgu-Jiu Faculty of Economics and Business Administration, 2013

⁷⁶ “...economic benefits provided by implementing environmental policies, in particular the positive effects on the labour market sector.” – pag. 26, *ibid.*

⁷⁷ *ibid.*

economic performance and was a basic element to have growth and development⁷⁸. As a matter of fact, some “win-win situations”⁷⁹ were identified where both the environment and economy could gain benefits from environmental policies.

The EU policy began a fast-forward transformation with sudden public concern for the environment in some Member States. The Single European Act (SEA) made it possible for the EU to have some institutional means⁸⁰ to have higher environmental standards, even by altering the decision of the CoM⁸¹. Indeed, the SEA made it possible for the EU to have a legal basis for matters that concerned the environment. With this and the Treaty of the European Union (TEU), the Council (unanimously) acquired, along with the consultation of the European Parliament, some competences on environmental matters.

The inclusion of environmental issues and the introduction of an explicit legal basis, was a big step forward in the progressive integration of the EU, especially for what concerns the goal of the single market. It was a goal, because with the introduction of this legal basis, a common policy plan could be made and so there would be no impediments for what regards trade within the EU.

Problems arose when some Member States began to make some infringements to the legislative measures and this caused some concerns about the effectiveness of the legislation. For this reason, the Commission started to consider new ways to implement the environmental rules⁸² and reinforce legislation more. A legal basis on the matter would be applied more easily into national legislations, it would show the competence of the EU on the matter and it would make the EU international presence in environmental fields stronger.

⁷⁸ *ibid.*

⁷⁹ *ibid.*

⁸⁰ “The Single European Act (SEA), adopted in 1986, introduced an explicit legal basis for environmental legislation at the European level, thus representing a significant step forward in the process of progressive consolidation of European environmental policy” – *The evolution of EU policy and Law in the environmental Field: achievements and Current Challenges*, Emanuela Orlando, The transatlantic relationship and the future Global Governance, IAI, 2013

⁸¹ *Environmental Policy in the European Union: Actors, Institutions and Processes*, Andrew Jordan, Camille Adelle, 2016

⁸² *The evolution of EU policy and Law in the environmental Field: achievements and Current Challenges*, Emanuela Orlando, The transatlantic relationship and the future Global Governance, IAI, 2013

In fact, the EU was paying attention to the international community and it was clear that the environmental concern began to be not only economical for the EU but also an international political concern and the EU took action in line with this worldwide concern. Indeed, some new global agreements were drafted in preparation of The United Nations Conference on Environment and Development (UNCED) of 1992, a conference where some instruments were selected in order to support the economy and the new attention of the EU to the environmental protection⁸³.

With the fifth EAP it was reiterated that this global line of ecology was still the main point during the years between the nineties and early 2000's. This EAP itself was nominated "Towards sustainability" in order to be on the same page with the Rio Conference and the Agenda 21. This time, it was established that the environment is the key to sustainable development and it has an important role for the progress of the poorest countries, which are more likely to be subjected to bad repercussions, because of environmental disasters. The fifth EAP has some innovative points compared to the others, such as an emphasis on the necessity for new market-based instruments like taxes⁸⁴, facilities and tax deductions to help sustainable production, environmental auditing to aid economic agents that want to create an internal management system in order to improve their performance in environmental protection. Furthermore, the Union wanted institutional authorities to collaborate in order to create public awareness about environmental protection and to help on creating coherence in fields such as the legislative, economic and financial ones⁸⁵.

Thus, the fifth EPA had the instruments to foster environmental change and its priorities were boosted by the principle that environmental considerations should be integrated into specific policies (in order to sustain the interdependence between

⁸³ *ibid.*

⁸⁴ "...grouped into two categories: on emission (discharge of pollutants, noise) and on product; by the use of these tools is intended that through taxation to ensure a change in behaviour of economic agents and the responsibility of their application lies with the Member States and represent revenues for national budgets." – pag. 28, *Environmental action programmes in the European union - evolution and specific*, Vasile Popeangă, Professor PhD. University "Constantin Brâncuși" of Târgu-Jiu Faculty of Economics and Business Administration, 2013

⁸⁵ "...An important contribution of the program was also in ensuring coherence of the instruments used in environmental policy: legislative (imposing environmental standards, integration of environmental policies into sectoral policies and territorial planning), economic (encouraging the production and use of products and technologies does not affect the environment, internalisation of environmental costs), horizontal (dissemination of information about the negative effects that can print uncontrolled activities on the environment, education, research), financial (community support programs, taxes, fees)." – pag. 28, *ibid.*

economic and social objectives and environmental protection) and by the principle of taking action ex ante vs ex-post, i.e. prevention and precaution in preference to remedies once the damage is done.

Even if the fifth EPA was a step forward in the goal of environment protection and sustainable development, the Community drafted another EPA, the sixth one, which was approved in 2002 and whose validity was extended up to 2012⁸⁶.

This one was called “Our Choice, Our Future” and outlined some principles and goals about important topics such as pesticides, recycling, fresh air, resources etc. Furthermore, it outlined some coordinates such as: the integration of environmental principles and policy goals into other policies, thus ensuring that environmental law be applied into the EU countries, promoting citizen contribution in order to improve measures for environmental protection and ensuring a dialogue with society through information about the effects of the different policies on the environment. Thanks to enacting this new perspective about protecting the environment, the EAP6 was well received by Member States.

Environmental policy strategy nowadays

Because of this success, EAP6 was extended and a new action program called “A good life within our planet” was implemented, which outlined the environmental policies up to 2020. With this new program, it was proposed to put a focus on increasing “the ecological resilience of the EU economy and the transformation of the European economy into a green, sustainable and inclusive growth”⁸⁷. This because the emphasis on a sustainable development was considered the “overarching conceptual paradigm of environmental policy”⁸⁸.

⁸⁶ *ibid.*

⁸⁷ *ibid.*

⁸⁸ Pag 21, *The evolution of EU policy and Law in the environmental Field: achievements and Current Challenges*, Emanuela Orlando, The transatlantic relationship and the future Global Governance, IAI, 2013

After EAP6, the Community put down some other keys in order to outline the seventh EAP, such as: promoting an efficient use of resources by protecting the natural capital and the transition to a low-carbon economy. With this objectives in mind and with the progression of an even more globalized economy, the EU put an extra effort on the topic of the environment and changed its fundamental documents, by including the environment in its new Agenda2020. The adaptation was made also in order to face the new realities of the twenty-first century such as the necessity of sustainable energy sources⁸⁹.

With this in mind, the Community then drafted the EAP7 which had an unusual background. Indeed, the Union was going through a time of uncertainty, because of a financial crisis. With this scenario, the implementation of EAP7 reinforced such goals as urban sustainability, maximisation of EU policy effectiveness, ensuring financial resource to invest in environmental policies, improvement of natural capital, improvement of the benefits of the EU legislation about the environment and continuation with the transition to a greener economy.

Nowadays, the present European environmental policy is based on the EAP7 which was implemented in the framework of the Agenda 2020.

Remembering that it was an economic goal that drove the first approaches to the energy issues and consequently to the environmental protection, it has been pointed out that not only the preservation of the environment and the common strategy about energy means improving the life of the EU citizen, but also that there would be improvement for the economy by the carrying out of sustainable economy.

⁸⁹ *Environmental action programmes in the European union - evolution and specific*, Vasile Popeangă, Professor PhD. University “Constantin Brâncuși” of Târgu-Jiu Faculty of Economics and Business Administration, 2013

1.3 A glance at the correlation between the environment and the market

It is today common opinion that there are incorrect relationships between economic growth and environment degradation. Taking into consideration the errors of the past such as the uncontrolled consumption of natural resources and our constant need for material things that damage the environment⁹⁰, there appeared a need to reconsider our approach to the market in a way to fulfill the goal of sustainable development.

This relationship mentioned earlier is due to the lack of consideration of the environment as an economic resource until the sixties. Up to then, only the neoclassical conception of economy was considered, i.e. the maximisation of the individual well-being without any ethic consideration about the environment⁹¹.

The problem is that environmental resources were seen as public goods or goods that one could take for free. They did not enjoy any rights of property. For this reason, the market fails towards the environment because it is not able to put a price on the environmental resources in order to distribute them in an efficient way⁹².

A way to face this problem is that the public operator should intervene in order to mend the gap in the market, but there is no easy way to intervene on the issue, because there is lack of information that could be used to put rules on resources. Furthermore, this method of involving the public operator does not provide long term solutions, which should be the main focus in order to preserve the environment for future generations⁹³.

Furthermore, talking about tax facilities in order to improve the knowledge of the environment as an economic resource, it was noticed that, for example, the discount rate gives distorted messages when we want to take the environment into account, because by calculating the economic value only, it does not give any indication as to the effects of investments on the environment. We could arrive at the absurd message of increasing investments even though they may be very bad for the environment⁹⁴.

⁹⁰ *Economia e politiche dell'ambiente*, Giorgio Panella, Carocci editore, 2007

⁹¹ *ibid.*

⁹² *ibid.*

⁹³ *ibid.*

⁹⁴ *ibid.*

Thus, Giorgio Panella, in his book “Economia e Politiche dell’ambiente”, proposed not to adjust the discount rate, but instead to include the environment in the economic decisions in order to introduce a link of sustainability into them. With this link, the environment would be protected and it should be considered as a public good⁹⁵ that helps the development of countries, if the approach to it is not just a utilitarian one. In his opinion, there is positive correlation between the development level and the level of pollution, which could be offset if some investments are devoted to the protection of the environment.

For a growing economy, the market has to put prices on resources, because they are not unlimited and thus, by putting prices, the market helps to give them the right value. The market in itself is not quite capable of putting prices on natural resources, because natural resources such as air, water and soil, cannot be traded as any other good.⁹⁶ Protecting the environment and, at the same time, developing the economy means having a sustainable economy. This concept has taken such momentum that nowadays an economy that does not take into account the environment is simply unconceivable.

In order to have sustainable development, integration of the environmental and social dynamics into the political ones is needed. Thus, sustainable development is the one that includes the economic sphere, the social one and the environment, a combination that at the same time allows to have an increase in GDP.

Once that the allocation of resources is done, the policies are drafted in order to have the right instruments in order to evaluate costs and benefits of actions.

Because it is not easy to put a value on resources, as we said earlier, it is enough to think about the individual preferences towards them. The market then developed a way to put a price on these preferences based on how much someone is willing to pay⁹⁷ and

⁹⁵ “In this case, the preservation of the environment should be considered as a public good where the total volume of it is defined at a political level and not from the individual actions that occur in the market. This way of doing could be seen as a way to make the operation approach as a non-utilitarian one” – *ibid.*

⁹⁶ *ibid.*

⁹⁷ It is the maximum sum that an individual is capable of paying in order to have some benefits which could be represented by an environmental good or by a good that must be decided if it has to be supplied *ex novo*. – *ibid.*

how much he is willing to accept⁹⁸. These measurements are a way to approximately measure the utility⁹⁹ and to achieve a cardinal measure.

The policies drafted allow us to define the right strategy and to analyse the instruments that are needed for this purpose, which are different from one another and they can allow us to achieve the same benefits but they may not have the same costs¹⁰⁰.

The Cost-benefit analysis and the correlation with policy making

When we talk about measuring the costs and benefits of a policy, we actually are talking about measuring the gains and losses of a new policy. It is an analysis that economists do, which is usually made by using the neoclassical economy theory to establish what effects and what results can have a specific action. This kind of theory, though, does not take into consideration the ecological concerns that are, nowadays, part of our knowledge.

In a cost-benefit analysis, the environmental services are not estimated correctly, because it has to be considered that there are costs of public administration which are also an economic instrument that can be used in drafting the policies¹⁰¹.

This kind of analysis is made because useful in order to decide about the introduction of a particular policy or a particular investment.

With a cost-benefit analysis that includes the environment, it is possible to measure more correctly if a policy is going to have more benefits than costs¹⁰². It has six stages and it is an important analysis because it faces the problem mentioned before: i.e. how to allocate resources. Knowing that resources are scarce, when a policy maker drafts a

⁹⁸ It is the willingness to accept a compensation which is the minimum sum that someone asks for in order to bear a cost, a loss or the waiver to something that he/she owns. – *ibid*.

⁹⁹ “Utility is a term used by economists to represent those factors that make people happy, or that explain people’s choices” – pag 15, *Pricing Nature: Cost-benefit Analysis and Environmental Policy*, Nick Hanley, Edward B. Barbier, Edward Elgar Publishing Limited, 2009, USA

¹⁰⁰ *Economia e politiche dell’ambiente*, Giorgio Panella, Carocci editore, 2007

¹⁰¹ *Pricing Nature: Cost-benefit Analysis and Environmental Policy*, Nick Hanley, Edward B. Barbier, Edward Elgar Publishing Limited, 2009, USA

¹⁰² “If the benefits are indeed bigger than the costs, then the project or policy makes society better off as a whole.” – *ibid*.

policy he is to take into consideration that the resources used for one purpose may not be used again for other purposes¹⁰³.

The cost-benefit analysis is the one tool that helps policy makers in making the right choice on how to use the available resources.

This analysis, as said before, has six stages that help the policy maker to deal with the drafting of the policy. The first stage is the one that defines the policy and it points out what is being analysed, the welfare of the country that is taken into consideration and a period of time¹⁰⁴.

The second stage involves the identification of the effects of the project and the physical results at the end of it, because a policy has its implications for the allocation of resources. Usually, in order to predict some of the effects, an environmental impact analysis is conducted, that could change the allocation of resources previously settled even if there is uncertainty in the outcomes. At the time when the physical impacts are estimated, it has to be pointed out which one is the one that could be taken into consideration for the cost-benefits analysis¹⁰⁵. Usually, the ones that could impact on quality of life are taken into consideration, or on quantity and prices of resources¹⁰⁶ even if these impacts are not valued by the market.

The third stage is the valuation of these impacts and is expressed in a monetary value, in order to be aggregated and easily featured in the cost-benefit analysis¹⁰⁷. Usually, this monetary value is a marginal social cost¹⁰⁸ which is derived from the market prices and if the impact is not big enough to change these prices of the market, then the market

¹⁰³ “For example, a proposal in 2007 to expand irrigated agriculture on the Canterbury Plains in New Zealand suggested diverting water from two rivers to a newly constructed reservoir which would then be used to supply irrigation schemes for dairy farmers. However, if land is used up to create a reservoir, that same land cannot also be used for sheep farming. If water is taken from a river to supply a reservoir and then to irrigate dairy farms, that same water is not available in the river to maintain in-stream ecological quality, or to support water-based recreation such as kayaking.” – *ibid*.

¹⁰⁴ *ibid*.

¹⁰⁵ *ibid*.

¹⁰⁶ “...may be said to be relevant if there impacts can be traced back to a link to the well-being of the relevant population.” – pag. 3 of *Pricing Nature: Cost-benefit Analysis and Environmental Policy*, Nick Hanley, Edward B. Barbier, Edward Elgar Publishing Limited, 2009, USA

¹⁰⁷ “the general principle of monetary valuation in CBA is to value impacts in terms of their marginal cost or marginal social benefit” – *ibid*.

¹⁰⁸ ““Social here means ‘evaluated with regard to the economy as a whole’” – pag 3, *ibid*.

prices can be a valid approximation of the value of costs and benefits¹⁰⁹. But, as said before, the market often fails in putting prices on resources and for this reason usually the classical market are adjusted.

The fourth stage is discounting of cost and benefit flows, which means that once the policy makers outline the monetary values of the impacts, they convert them into present value, which values time and money. In this part of the analysis, time is taken into account i.e. when benefits and cost come about. These two flows, even if they occur in different moments, are comparable, because discounted by a discount rate which usually is the interest rate¹¹⁰.

The cost and benefit analysis helps out to outline the right strategy. After stating that, beyond the fourth stage there is a fifth one that compares gains and losses. This stage consists in applying the net present value test to the sum of discounted benefits and discounted losses. It simply compares the two at present value. If that is the case, “the project can be said to represent an efficient shift in resource allocation, given the data used in the cost and benefit analysis”¹¹¹. If the policy examined passes the net present value, then the policy can do only good to the social welfare. One way of comparing is the simple calculation between time, i.e. the ratio of discounted benefits and discounted costs. If it exceeds unity, then the policy can be enacted ¹¹².

Up to the fifth stage we have represented the relative efficiency of a policy. But data and conditions may change and so alter the present value. In order to deal with this issue a sixth stage is applied, i.e. sensitivity analyses. With this method, the net present value is recalculated in light of the changing data and in light of the environmental impact which is not often so predictable.

Even if this analysis does not calculate the allocation of resources, the policymakers choose to have the results of this analysis because it is one way to predict the social welfare and the effects of the policy.

¹⁰⁹ “Where markets work well, market prices and market supply and demand curves contain useful information about social costs and benefits of more electricity produced, or more and being used up” – pag 3, *ibid*.

¹¹⁰ *ibid*.

¹¹¹ pag 6, *ibid*.

¹¹² *ibid*.

In relation to the market, the analysis can outline if the results of the analysed policy bring more benefits than costs and this is important, especially for what concerns energy policies, which are strictly correlated to the environment.

In order to outline the correct policy, after analysing the issue as outlined above, the EU policy makers have to come across other institutional steps before being implemented into the legislation.

The journey of a EU policy

A policy is when a strategy is put out through legislation, with the creation of a regulatory system. In order to draft the right policy, a glance at the market and a proper analysis are mandatory.

In the EU system, a policy goes across different institutions, because the process of the EU policymaking takes place by ordinary legislative procedure.

The journey of a policy starts with the Commission. Then, after some data collection, goes through the EU Parliament, up to the Council and, if there is a problem like an infringement of the treaties, to the European Court of Justice.

But the entire political strategy usually is done jointly between the European Parliament, the European Council (that outlines political priorities), the Council of the European Union, and the European Commission (whose president usually determines the political priorities of his mandate).¹¹³

The Commission is the one that begins the process for the legislation that puts the policy into action, after devising that there is a need for intervention in some matters and after consulting with stakeholders, experts on the subject matter and after an inception impact, which is a formal way to show the economic, social and environmental effects that the devised policy may have¹¹⁴.

Usually, it is the Commission that starts the process, but it can also be started by a EU citizen through a “European citizen’s initiative”, which in order to be eligible for

¹¹³ How EU decisions are made, https://europa.eu/european-union/eu-law/decision-making/procedures_en

¹¹⁴ *ibid.*

analysis by the Commission, needs to have at least one million signatures¹¹⁵ of citizens who have reached the age to vote, gathered in at least seven different EU countries¹¹⁶. After the drafting of the Commission, after all the information is gathered from stakeholders and after all the consultations with the interested departments within the EU structure are complete, the Commission decides if the matter is politically important to start an initiative for a policy¹¹⁷.

The further steps of the initiative proposed by the Commission are the submission to the EU Parliament, to the Council and to the EU member states.

The legislation process then has some steps on its own, because it is a decision of the Commission that there is a need for a legislative action on the matter. The ordinary legislative procedure is the one that involves the EU Parliament and the Council¹¹⁸.

Because the council and the EU parliament have an equal say about the policy, the EU Parliament has a specialist Committee of Members (MEPs) that is in charge of reading, debating and developing amendments to the proposition of the Commission and it has the possibility to appoint a negotiation team to discuss the policy with the Council¹¹⁹. Also, the Council can make amendments or choose to agree with the position of Parliament. If the Council chooses the first option, the amendments must be debated with Parliament until agreement is reached¹²⁰.

In case of no agreement, the Council and Parliament set up another actor, the Conciliation Committee. This Committee is in charge of finding an agreement and it is composed, in an equal number, of MEP and members of the council. When the Committee reaches an agreement, the final text is sent to Parliament and to the Council once more for final adoption of the law. Once it is adopted, the legislation passes through national courts and the EU court which, if it finds that the legislation makes an infringement to the treaties, or to the fundamental rights, annul it. This ordinary

¹¹⁵ *How decisions are made*, https://ec.europa.eu/info/strategy/decision-making-process/how-decisions-are-made_en

¹¹⁶ *Have your say on EU policies*, https://europa.eu/european-union/law/have-your-say_en

¹¹⁷ *How decisions are made*, https://ec.europa.eu/info/strategy/decision-making-process/how-decisions-are-made_en

¹¹⁸ *Adopting EU law*, https://ec.europa.eu/info/law/law-making-process/adopting-eu-law_en

¹¹⁹ *ibid.*

¹²⁰ *How decisions are made*, https://ec.europa.eu/info/strategy/decision-making-process/how-decisions-are-made_en

legislative procedure is also used when the Commission wants to change a policy and so the process starts again¹²¹.

Because of this journey, it can be said that the EU highlights transparency and the impact of the policy that is proposed.

This journey is applied to all the policies, also to the ones that concern the environment and energy, which are strongly interconnected to each other.

¹²¹ *Adopting EU law*, https://ec.europa.eu/info/law/law-making-process/adopting-eu-law_en

CHAPTER II

2.1 The Green Paper and the climate package

Knowing the decision-making process of a policy within the Community, we can now discuss the Green Paper and the White Paper. These two kinds of documents have a specific importance. They are used specially to create a debate and to initiate a legislative approach on the issue the first one is the one that clarifies the situation on a certain matter which needs to be disciplined and¹²².

the second one, the White Paper, is the one that usually follows the Green Paper and contains proposals for the Union in order to take action to resolve some issues. When this document follows the green paper, it is because the EU Commission wants to launch a consultation process¹²³.

The main goal is precisely launching a debate between the Council, the European Parliament and the stakeholders, aiming to have a political consensus on the matter under discussion.

The first Green Paper that was published is dated 1996, called “Energy for The Future: Renewable Sources of Energy” and it is thanks to it that the EU developed a communitarian strategy on renewables energies, with pillars that continue to remain fundamental even nowadays¹²⁴. When this first Green Paper was drafted, its starting point was an analysis on renewables, which pointed out that these kinds of resources were not used sufficiently and not in a homogeneous way. At that time, their overall

¹²² “Green Papers are documents published by the European Commission to stimulate discussion on given topics at European level. They invite the relevant parties (bodies or individuals) to participate in a consultation process and debate on the basis of the proposals they put forward. Green Papers may give rise to legislative developments that are then outlined in White Papers.” – *Glossary of Eur-lex*, https://eur-lex.europa.eu/summary/glossary/green_paper.html

¹²³ “European Commission White Papers are documents containing proposals for European Union (EU) action in a specific area. In some cases, they follow on from a Green Paper published to launch a consultation process at EU level.” – *ibid*.

¹²⁴ *The Role of Natural Gas in the EU Decarbonisation Path*, Simone Tagliapietra, Fondazione Eni Enrico Mattei, 2015

internal use was less than 6%¹²⁵ and these data made it difficult to keep the international promises towards environmental protection. Furthermore, this analysis showed that, in the long term, some problems could arise for what concerns energy security and economic competitiveness in the energy market¹²⁶.

After fixing goals of renewables, the paper highlighted the problems that prevented the diffusion of renewables. Problems such as: scarce knowledge of the possibilities offered by technologies for renewables, scarce funds, because renewables did not have reliable outcomes, the necessity of upgrading the structures for biofuels and the necessity to set up expensive installations to elaborate such resources¹²⁷.

Hence, the paper proposed some solutions to these obstacles, and these solutions were backed up by a study called TERES II¹²⁸ and backed up by the fact that the EU realised that there was an energy supply problem, because the scenario pictured for the next 25 years from that date showed increase in energy import from outside the Union¹²⁹.

Because of this scenario of almost total dependence from other states, the EU realised that it was time to develop renewable energy sources, that relied upon more accessible sources, like the sun and the wind.

After this green paper, another one followed in 2006, which was the result of a summit where globalization and the changed international scenario were the main topics. The summit aimed to clarify the position and the response of the EU to the above issues,

¹²⁵ *Le politiche energetiche europee e nazionali: quali strategie?*, Romina Giovannoli, università degli studi "G. D'Annunzio", Chieti-Pescara, 2015-2016

¹²⁶ *ibid.*

¹²⁷ *ibid.*

¹²⁸ "The main objective of The European Renewable Energy Study (TERES) was to assess the long-term prospects for renewable energy technologies in the Member States of the European Union and the countries of Central and Eastern Europe. The study, undertaken on behalf of the European Commission's programme for renewable energy (ALTENER), investigated: The situation with regard to the current performance of the various renewable energy technologies (RETs); the costs of existing technologies at current prices; The prospects for developing these technologies; The foreseeable reduction in costs as a result of technical progress and mass production; The technical and economic potential of each technology; The possible penetration of technologies up to the year 2010 on the basis of four scenarios, using the forecasts of overall energy demand and of electricity demand set out in "Energy in Europe - A View to the Future"; An analysis of the constraints on further penetration of renewable energy technologies, and policy and other actions to overcome these restraints." – *The European Renewable Energy Study (TERES)*, Community Research and Development Information Service (CORDIS), www.cordis.europa.eu

¹²⁹ *ibid.*

but most importantly, it discussed a plan proposed by the British Prime Minister¹³⁰ of the time that aimed at creating a common energy policy. Furthermore, in this summit, it was established that the EU should take action in the energy field, in the most advanced possible way¹³¹.

This Green Paper, after highlighting the problems and the possible future scenarios, proposed six areas “for implementing a European energy policy, ranging from the completion of the internal market through to the implementation of a common external energy policy”¹³².

Because of the success of this green paper, the European Council urged the Commission to take further actions, and so it did. The Commission then drafted the “Energy Climate Package” which are measures that established the European new energy policy according to what was written in the Green Paper. Adopted in 2008, then two years after the release of the Green Paper, the Package established the well-known paradigm that is still present in the EU policy: sustainability – competitiveness – security. The package not only established this paradigm but also marked an important advancement known as 20-20-20 energy policy targets, i.e. decreasing greenhouse gas emissions, improving energy efficiency and increasing the role of renewable energies. After the green paper of 2006, the Commission drafted another paper in order to face the new problems that would arise¹³³.

The Green Paper: A 2030 framework for climate and energy policies

The targets established in the package were very important, because during the last decade the share of renewables, within the Community, increased¹³⁴ as the graph below is showing.

¹³⁰ “During the British presidency of the EU in 2005, Prime Minister Tony Blair pushed the European energy policy issue to the top of the EU’s agenda.” – *Towards a European Union the Need to Focus on Security Energy Supply*, Simone Tagliapietra, Fondazione Eni Enrico Mattei (FEEM), 2014

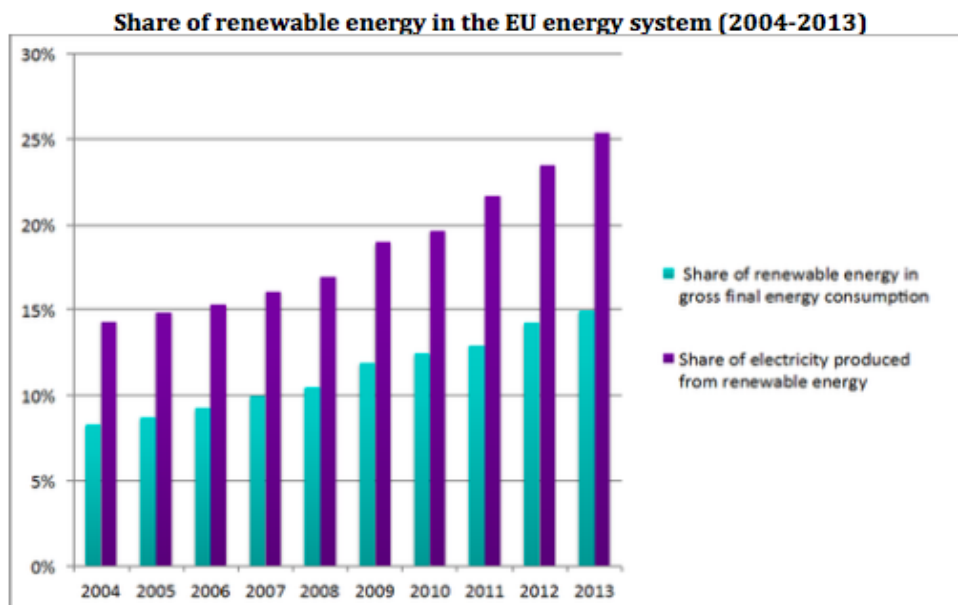
¹³¹ *ibid.*

¹³² *ibid.*

¹³³ *ibid.*

¹³⁴ “...the share of renewable energy in the EU energy system grew substantially over the last decade, reaching a share of 15% of EU gross final energy consumption and a share of 25% of EU electricity

Conscious of this increased share, the last green paper, which was drafted in 2013, sets out the achievements reached so far and the possible solutions to achieve the goals fixed by 2030. This new paper was drafted because the EU realised that the targets of strategies like “Energy 2020” could not be achieved by the 2020 deadline, notwithstanding the efforts made¹³⁵.



Source: *The Role of Natural Gas in the EU Decarbonisation Path*, Simone Tagliapietra, 2015

The first thing that the paper points out is the energy policy situation within the EU and what the strategy achieved since the implementation of the previous one. The framework that is pictured takes into consideration the economic wealth and the different energy mixes of every Member State, besides the ability to act of each of them.

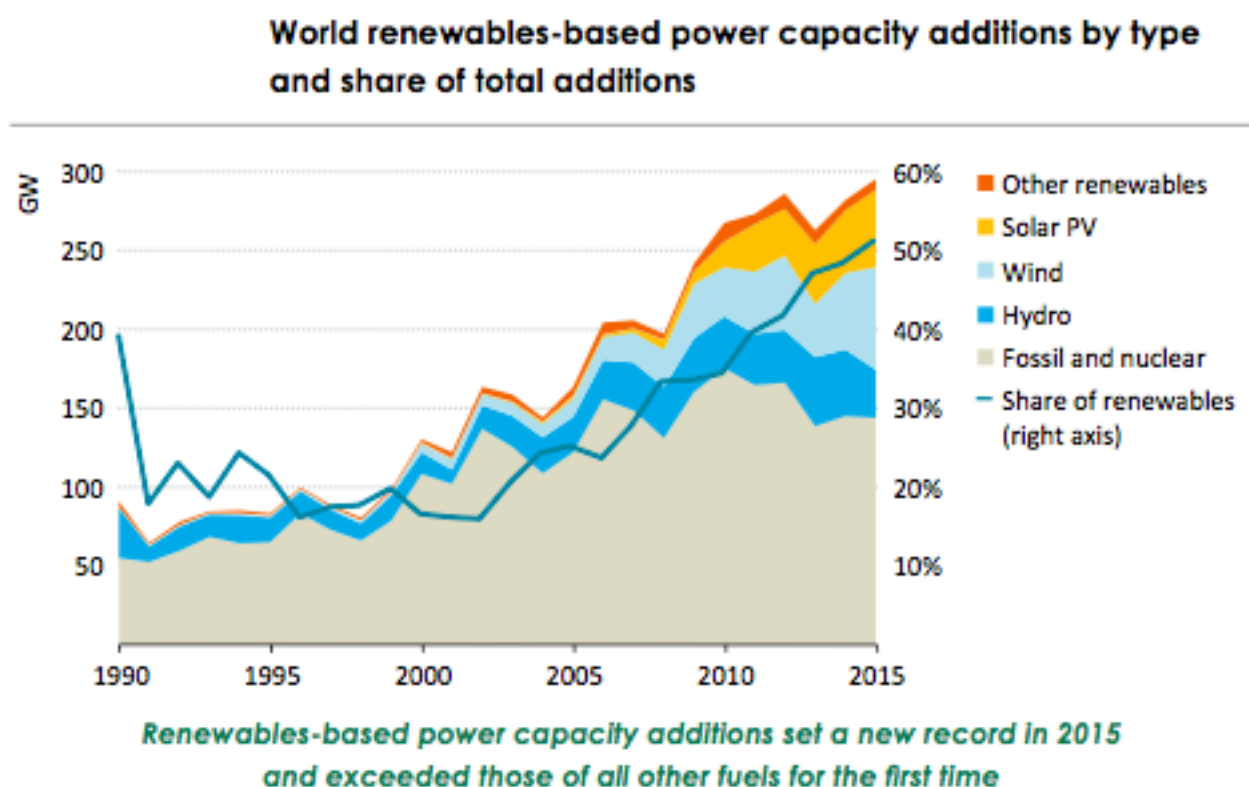
Knowing the situation of every Member State and the policies that have been drafted so far, i.e. the well-known 20-20-20 targets with the reduction of greenhouse gas emissions (as compared to 1990), the increase in the role of renewable energy sources for what concerns electricity generation in the final uses and the topic of energy

production.” – pag. 3, *The Role of Natural Gas in the EU Decarbonisation Path*, Simone Tagliapietra, Fondazione Eni Enrico Mattei, 2015

¹³⁵ *ibid.*

saving¹³⁶, the EU strengthened all these points and added some indications on how to implement them¹³⁷.

Even if since 1990 there has been a shift from fossil fuels towards renewables, as the following graph shows, in 2006 there was still need for this new green paper in order to make the situation of the EU in these matters clear and because a debate was necessary in order to highlight the obstacles for achieving the targets. Furthermore, the new green paper was drafted in order to project the EU into the new strategy called “Roadmap 2050”, which is aimed to a carbon free energy market, as I described earlier¹³⁸.



Note: Other renewables include biomass, CSP, geothermal and marine.

Source: WEO, 2016

¹³⁶ “An EU based target for GHG emission reductions of 20% relative to emissions in 1990; a 20% share for renewable energy sources in the energy consumed in the EU with specific target for the Member States; 20% savings in energy consumption compared to projections.” – pag. 3, *Green Paper a 2030 framework for climate and energy policies*, European Commission, Brussels, 2013, COM (2013) 169 final

¹³⁷ *ibid.*

¹³⁸ *The Role of Natural Gas in the EU Decarbonisation Path*, Simone Tagliapietra, Fondazione Eni Enrico Mattei, 2015

Hence, the quest of the EU to have a carbon free energy is active and targets like the 20% reduction in the greenhouse gas emissions is discussed in this green paper. It is widely discussed how every target mentioned is to be implemented and the first one that it debates is the one that concerns the reduction of greenhouse gas emissions. Stating that, the targets are implemented by the Emission Trading System (ETS) plus the Effort Sharing Decisions (ESD). The ETS gives an allotment of CO₂ emissions to each state in order to create a carbon market. Thus, an organic carbon price¹³⁹ for industrial installations is set. Yet, today the carbon price in the market so created is pretty low and thus the investments in the long term low carbon are not yet the main item which member states are aiming to. In fact, the low carbon price of today is not enough an incentive to push investors to “invest and increase the risk of carbon lock-in”¹⁴⁰. Because of this, there are some member states that are willing to put taxes for carbon intensive fuels in sectors covered by ETS and this can cause a risk of policy fragmentation that could be a threat to the Single Market and undermine the role of the ETS sectorial policies.

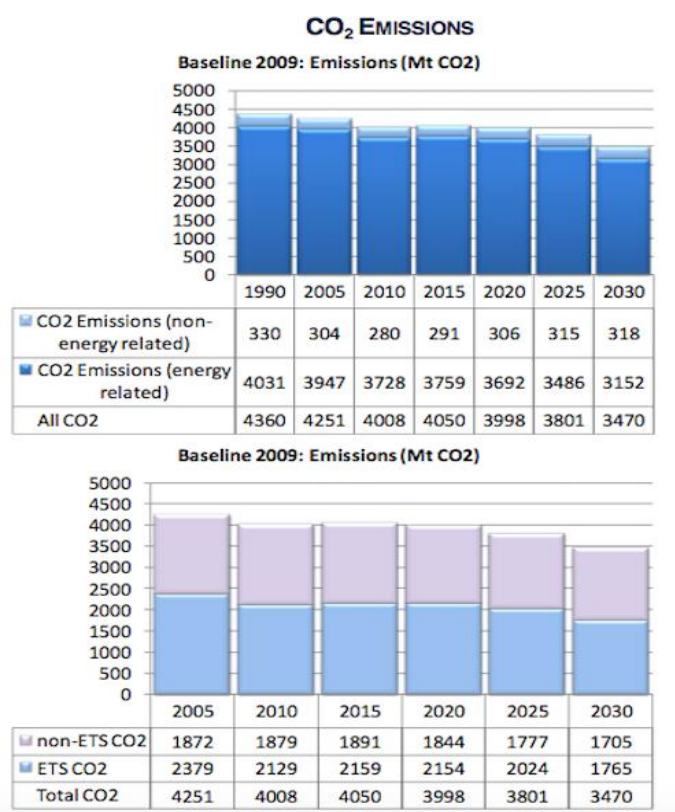
While the ETS is about making the carbon price uniform in order to boost investments in low carbon technologies, the ESD is the tool that fixes national targets for greenhouse gas emissions in areas which the ETS does not cover¹⁴¹. The total target is set to a 10% average emission reduction compared to 2005 data. The dispersion of this average is high, because given the economic differences of the member states, some have a limited growth in emissions and other have to achieve stronger targets. In fact, a report called “EU energy trends to 2030” shows the trend of emissions at 2030. The total CO₂ emissions are expected to fall only by 8% in 2020 and by 20% in 2030. This is a reduction that affects energy related emissions, while the non-related ones are expected to increase a little bit compared to 1990. In any event, the biggest

¹³⁹ “By putting a price on carbon and thereby giving a financial value to each tonne of emissions saved, the EU ETS has placed climate change on the agenda of company boards across Europe. Pricing carbon also promotes investment in clean, low-carbon technologies.” – pag. 2, *The EU Emissions Trade System (EU ETS)*, European Commission, 2016, Publications Office

¹⁴⁰ Pag. 4, *Green Paper a 2030 framework for climate and energy policies*, European Commission, Brussels, 2013, COM (2013) 169 final

¹⁴¹ “Operates in 31 countries (all 28 EU countries plus Iceland, Liechtenstein and Norway)” – *EU Emissions Trading System (EU ETS)*, European Commission, https://ec.europa.eu/clima/policies/ets_en

part of the reduction in energy related emissions are expected to be in areas covered by the ETS¹⁴².



Source: EU energy trends to 2030

The description of implementation goes on for all the 20-20-20 targets, by trying to individuate the problems that have arisen during the years. It is worth mentioning, though, that according to this green paper, the EU is moving forward to achieve the target of 20% renewable energy in the gross end-user consumption. The share of renewables up to 2010 increased compared to the 6.5% of 2005. All in all, there was an annual increase by 1.9% during the period 1995-2000 and by 4.5% during the period 2001-2010¹⁴³. Even if these numbers seem to be promising for achieving the 2020 targets, still some Member States are expected not to achieve the main goal due to economic reasons. Because of this, probably new measures will be needed in order to

¹⁴² “It is necessary to specify that about the graphic, there is a clarification in the paper: “For reasons of comparability over time, ETS emissions are calculated according to the enlarged ETS scope (including aviation and further processes) valid from 2012/13 onwards. Hence 2005 emissions as calculated in the model are higher as current verified ETS emissions.” – *EU energy trends to 2030*, Prof. P. Capros, Dr. L. Mantzos, N. Tasios, A. De Vita, N. Kouvaritakis European Commission, Directorate-General for Energy in collaboration with Climate Action DG and Mobility and Transport DG, 2009-2010

¹⁴³ *Green Paper a 2030 framework for climate and energy policies*, European Commission, Brussels, 2013, COM (2013) 169 final

face the economic crisis and help those member states that are not in a position to achieve the goal by themselves.

Even if there are these problems, thanks to investments in technology, the use of renewables has become less expensive and the market much more competitive, which means that it has become easier for those members states in difficulty to achieve the goals. Furthermore, according to the green paper, there is the challenge of ensuring a long-term use of renewables, in order to be more cost-efficient and limit the support schemes only to those areas that really need it. This, because the aim is to encourage the decrease in greenhouse gas emissions even more in order to have carbon free energy as quickly as possible. Among the discussed targets, there is one that debates about energy saving, stating that even if the 20% goal is not legally binding for the member states, there is a progress on the matter nonetheless¹⁴⁴.

Since 2007 there has been a decrease in primary energy consumption, because of the economic crisis and thanks to the effectiveness of the policies in place¹⁴⁵.

Thanks to the Energy Efficiency Directive (EED)¹⁴⁶ now there is a legal framework that improved the progress made so far and when it is fully implemented, the progress will continue even if the goal of 2020 will not be achieved¹⁴⁷.

Last but not least, the paper also discusses about supply security and affordability. This is an important issue, since this was the one topic that drove the EU to initiate policies about energy. In 2009 and 2010 the EU made rules on the internal energy market, it also made some regulations on security of gas supplies, due to the two gas crises that occurred up to 2009 in Europe. Furthermore, in order to enhance policy energy

¹⁴⁴ *EU energy trends to 2030*, Prof. P. Capros, Dr. L. Mantzos, N. Tasios, A. De Vita, N. Kouvaritakis European Commission, Directorate-General for Energy in collaboration with Climate Action DG and Mobility and Transport DG, 2009-2010

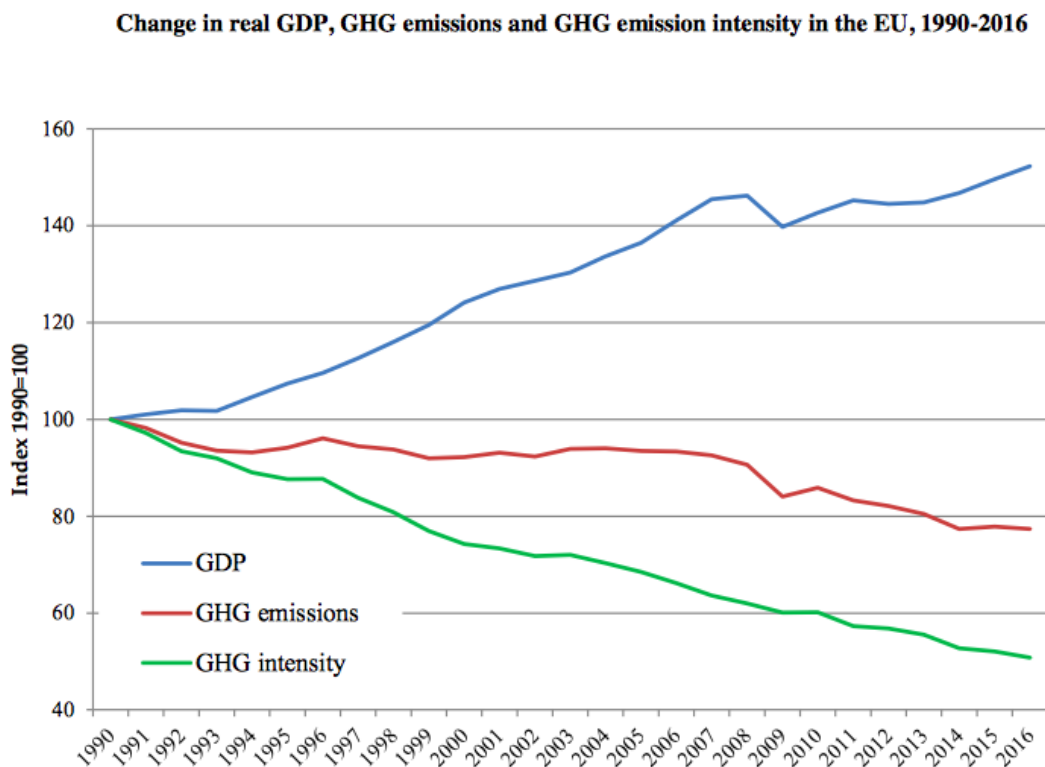
¹⁴⁵ *ibid.*

¹⁴⁶ “The 2012 Energy Efficiency Directive establishes a set of binding measures to help the EU reach its 20% energy efficiency target by 2020. Under the Directive, all EU countries are required to use energy more efficiently at all stages of the energy chain, from production to final consumption.” – *Energy Efficiency Directive*, European Commission, <https://ec.europa.eu/energy/en/topics/energy-efficiency/energy-efficiency-directive>

¹⁴⁷ This emerged to an analysis made by the Commission that the green paper points out stating that: “The implementation of measures in the Transport White Paper, further ecodesign measures, smart metering roll-out and smart grid deployment with the resulting demand response should contribute to closing the gap.” – pag. 3, *Green Paper a 2030 framework for climate and energy policies*, European Commission, Brussels, 2013, COM (2013) 169 final

objectives and thanks to a political agreement between the European Parliament and the Council, the Commission approved a Regulation on “Trans-European Energy Infrastructure Guidelines”¹⁴⁸.

Even if, according to the last report by the Commission, the EU has separated the economic growth from its emissions and even if, as the graph below shows, the GDP grew 53% and the total emission fell 23%, the targets that were supposed to be achieved by 2020 probably will not be achieved.



Source: *Two years after Paris progress towards meeting the EU's climate commitments, 2017*

For this reason, in 2014 the Commission proposed new energy targets aiming to “private investments in infrastructure and low carbon technologies”¹⁴⁹.

¹⁴⁸ “It addresses infrastructure challenges to ensure true interconnection in the internal market, integration of energy from variable renewable sources and enhanced security of supply. For projects identified as projects of common interest (PCIs), the Regulation introduces measures to accelerate permitting procedures, including through a maximum time-limit and streamlining of environmental assessment procedures. The Regulation also provides better incentives to investors through enhanced regulatory provisions, and it sets the conditions for EU financial assistance under the proposed Connecting Europe Facility” – pag. 6, *ibid*.

¹⁴⁹ *Energy Statistics introduced*, Eurostat, online publications, 2017

With this new proposal, the Member States adopted a new communication called “Policy framework for climate and energy in the period from 2020 to 2030” where new targets¹⁵⁰ were set in order to achieve the goals of the “Roadmap 2050”.

While the green paper and the communications in general are the starting point for a debate that focuses on certain issues, the white paper is the one that formally launches the process to take legislative actions and the Strategic Energy Technology Plan is the one that gives the financial tools to achieve it and support the framework.

2.2 The white paper

Knowing the role of a Green Paper and its importance, it is possible now to discuss the White Paper. As I said earlier, it is a formal request for solutions and ideas and it leads to legislative actions in order to make the solutions proposed effective.

The beginning of the practice to issue white papers dates back to 1995, with the first one called “an energy policy for the European Union” which aimed to define the new energy policy of the Community. The new policy in question aimed to make better levels of competitiveness for what concerns energy supply and environmental protection, trying a new approach towards energy efficiency and energy saving and, at the same time, promoting renewables¹⁵¹.

Energy was then linked to the policy of environmental protection. Indeed, it was found out that every environmental problem is due to an energy action, at local and at global level. Hence, the sphere of environmental protection has become fundamental, it being, a “*conditio sine qua non*” for sustainable development¹⁵².

In the light of this, it is possible to understand why environmental policies come along with the energy ones, as I previously discussed in this thesis.

¹⁵⁰ “The key 2030 targets are: 1) to reach at least 40 % cuts in greenhouse gas emissions (compared with the situation in 1990); 2) to reach at least a 27 % share of renewable energy; 3) to reach at least a 27 % improvement in energy efficiency” – *ibid*.

¹⁵¹ *Le politiche energetiche europee e nazionali: quali strategie?*, Romina Giovannoli, università degli studi “G. D’Annunzio”, Chieti-Pescara, 2015-2016

¹⁵² *ibid*.

The latest white paper, drafted in 2009, is focused on the environment and energy and it is called “Adapting to climate change: Towards a European framework for action”. In this paper, a strategy is set out to reduce the Community’s weakness when facing the impact of the climate change¹⁵³. Furthermore, it aims to enhance the resilience of the Community to the impact of climate changes and, in doing so, it pushes the EU to invest in a low-carbon economy through energy efficiency and the circulation of green products¹⁵⁴.

In addition, the paper not only handles energy but, in order to minimize the impact of environmental changes, it also outlines a strategy of EU resilience to the changes, concerning health, agriculture, social policies, forests, biodiversity, water, ecosystem, coastal, marine areas, production systems and physical infrastructures, because these all are sectors on which the climate change is going to have consequences.

In a few words, the EU wanted to be prepared to the changes. For the energy sector, there was a prediction of problems in hydropower production, due to very irregular precipitations and ice melt¹⁵⁵. As a matter of fact, exposure to hydropower is still high. Analyses still in 2015 showed that the EU renewable electricity generation mix was largely composed by hydro¹⁵⁶.

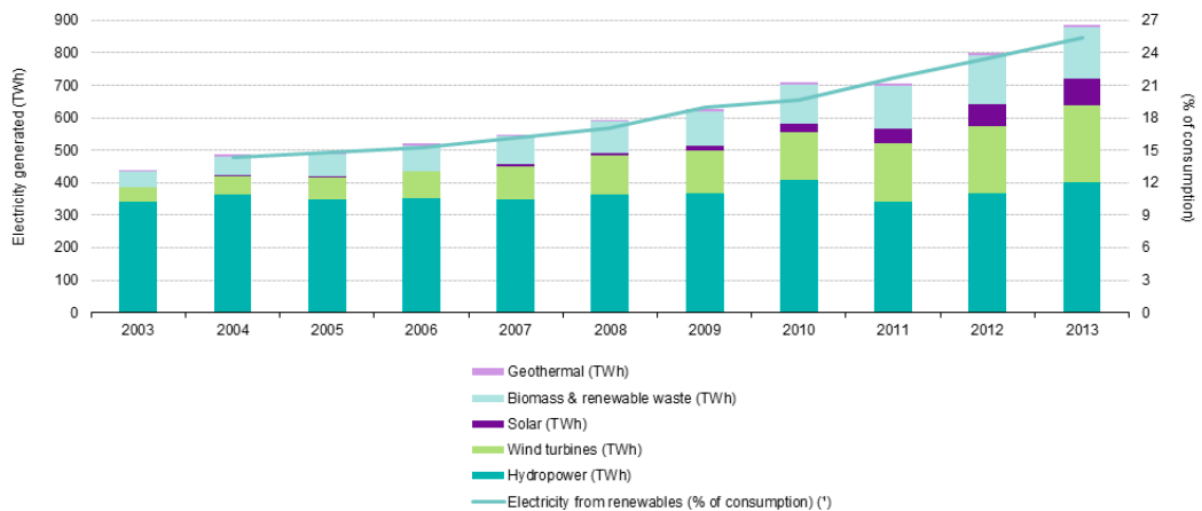
¹⁵³ *Adapting to climate change: Toward a European framework for action*, Commission of the European Community, Brussels, COM (2009), 147 final

¹⁵⁴ *ibid.*

¹⁵⁵ “In the energy sector, climate change will have a direct effect on both the supply and demand of energy. The projected impact of climate change on precipitation and glacier melt indicate that hydropower production could increase by 5% or more in northern Europe and decrease by 25% or more in southern Europe” – pag. 4, *ibid.*

¹⁵⁶ *The Role of natural gas in the EU decarbonisation path*, Simone Tagliapietra, Fondazione Eni Enrico Mattei (FEEM), 2015

Electricity generated by renewable energy sources in the EU (2003-2013)



Source: Eurostat (2015).

Source: *The Role of natural gas in the EU decarbonisation path*, Simone Tagliapietra, 2015

Since hydro resources have been fully exploited in Europe, with scant possibilities for increase, one of the targets at 2030 is the development of renewable energy sources like wind and solar energy¹⁵⁷.

The paper also underlines the importance of a common strategic adaptation in order to decrease the percentage of error, to protect the vulnerability of certain areas¹⁵⁸, to protect the single market and the common policies in areas such as energy networks.

Thus, after describing the financial instruments¹⁵⁹ in order to be as prepared as possible to climate change and after pointing out some actions that need cooperation between Member States¹⁶⁰, the paper gives some conclusions that project the EU into the strategies of the years to come, stressing out the importance of working together in

¹⁵⁷ *ibid.*

¹⁵⁸ "Some examples of this "mal-adaptation" are sea level rise or flood protection infrastructure that may disturb the natural dynamic nature of coastal and river systems, or cooling or water supply technologies that may increase energy consumption." –pag. 6, *ibid.*

¹⁵⁹ "Estimate adaptation costs for relevant policy areas so that they can be taken into account in future financial decisions; Further examine the potential use of innovative funding measures for adaptation; Explore the potential for insurance and other financial products to complement adaptation measures and to function as risk sharing instruments; Encourage Member States to utilise the EU's ETS revenues for adaptation purposes" – pag. 15, *ibid.*

¹⁶⁰ "Take a decision to establish by 1 September 2009 an Impact and Adaptation Steering Group (IASG) to step up cooperation on adaptation; Encourage the further development of National and Regional Adaptation Strategies with a view to considering mandatory adaptation strategies from 2012" – pag. 16, *ibid.*

order to help national and international adaptation to climate change. But, most of all, it underlines the importance of ensuring the resources and the efforts necessary for a cost-effective adaptation, with coordination of the EU efforts with all stakeholders¹⁶¹.

The United Nations' Sustainable Development Goals (SDG) indicators: coherence between the international community and the European one.

Because the EU is part of the international community, it is clear that for the energy area, the Community has to have coordination with the UN Sustainable Development Goals (SDG). To support the EU actions, these SDG have, among other goals, one that enhances the importance of accessing energy in order to enjoy better life quality.

These indicators have been developed by the Inter-Agency and Expert Group on SDG Indicators (IAEG-SDGs), which makes the implementation of the global indicator framework easier. The global indicator framework was adopted by the General Assembly months after a session of the UN Statistical Commission of 2017 in which an agreement was reached upon the indicators. The “Resolution adopted by the General Assembly on Work of the Statistical Commission pertaining to the 2030 Agenda for Sustainable Development” contains such adoption¹⁶². The list counts 232 indicators in the global indicator framework and fixes some targets and goals.

But, the target on which I will focus on it is number 7, entitled “Ensure access to affordable, reliable, sustainable and modern energy for all”¹⁶³. This target has been

¹⁶¹ “Adaptation will be a long and continuous process. It will operate at all levels and require close coordination with stakeholders. The EU will support international and national adaptation efforts ensuring that there are adequate resources for efficient and cost-effective adaptation action to provide a sustainable and sound economic basis for future generations. The Commission will regularly review progress in implementing the first phase of the framework for action identified in this White Paper with a view to developing a comprehensive adaptation strategy from 2013” –pag. 17, *ibid*.

¹⁶² *SDG Indicators – Global indicator framework for the Sustainable Development Goals and targets of the 2030 Agenda for Sustainable Development*, UN, Department of Economic and Social Affairs, Statistic Division, Sustainable Development Goals, <https://unstats.un.org/sdgs/indicators/indicators-list/>

¹⁶³ *Global indicator framework for the Sustainable Development Goals and targets of the 2030 Agenda for Sustainable Development, Resolution adopted by the General Assembly on Work of the Statistical Commission pertaining to the 2030 Agenda for Sustainable Development (A/RES/71/313)*, E/CN.3/2018/2, https://unstats.un.org/sdgs/indicators/Global%20Indicator%20Framework%20after%20refinement_En.pdf

fixed thanks to the recent improvements that have been made in sustainable energy which permit access to electricity to populations that did not have it. These improvements led to another one for what concerns energy efficiency, that in addition permits the offsetting of carbon dioxide emissions and reduces energy demand, consequently making energy more affordable¹⁶⁴. Improvements in renewables make things go faster for what concerns areas such as transport, heating and cooling, because, even today, some populations do not have access to technologies and clean cooking fuels¹⁶⁵ which are the most important items in order to have good health and a better-quality life.

The targets fixed for this goal about energy are very ambitious, they comprehend that by 2030 there will be a universal possibility to access to affordable and clean energy, that there will be increase in the share of renewables in the energy mix, that there will be improvement in energy efficiency¹⁶⁶. Furthermore, it has been stated that, by 2030, international cooperation will be more effective in order to make the access to clean energy and technology easier, and, most of all, to renewables, to energy efficiency and to cleaner fossil fuel technologies ¹⁶⁷.

Another target is the promotion of investments in infrastructures, in order to face the modern and sustainable energy for those developing countries and especially the least developed one¹⁶⁸.

¹⁶⁴ *The Sustainable Development Goals Report 2018*, UN sustainable development goals site, <https://unstats.un.org/sdgs/report/2018/goal-07/>

¹⁶⁵ The report says that there is a 41% of the world's population that cannot have this kind of access. – *ibid.*

¹⁶⁶ “7.1 By 2030, ensure universal access to affordable, reliable and modern energy services; 7.2 By 2030, increase substantially the share of renewable energy in the global energy mix; 7.3 By 2030, double the global rate of improvement in energy efficiency. 7.1.1 Proportion of population with access to electricity; 7.1.2 Proportion of population with primary reliance on clean fuels and technology; 7.2.1 Renewable energy share in the total final energy consumption; 7.3.1 Energy intensity measured in terms of primary energy and GDP” – *ibid.*

¹⁶⁷ “7.a by 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology; 7.a.1 International financial flows to developing countries in support of clean energy research and development and renewable energy production, including in hybrid systems” – *ibid.*

¹⁶⁸ “7.b By 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries, small island developing States and landlocked developing countries, in accordance with their respective programmes of support; 7.b.1 Investments in energy efficiency as a proportion of GDP and the amount of foreign direct investment in financial transfer for infrastructure and technology to sustainable development services” – *ibid.*

These targets are ambitious and even if goal 7 is getting closer, the achievement is not yet at hand. Because, for example, the share of renewables up to now has not increased as hoped¹⁶⁹ and the graph below shows that traditional use of biomass is still high and that 3 billion people still rely on cooking with stoves that pollute the environment. Thus, as the graph shows consumption, from renewables grew only by 18% in 15 years (2000-2015). In this scenario, electricity accounts for half of this growth, mostly from wind and solar sources, balance being mostly bioenergy for heating and transport. According to this trend, the predicted share of renewables in energy consumption will be only 21% by 2030, which means that the goal fixed in the target will not be achieved¹⁷⁰.

During the period 2000-2016, 1.4 billion more people gained access to clean cooking fuels and technologies, so 59% of the population is in a good situation but even if it is a progress, because it is 10% more compared to 2000, it is not enough, because by 2030 there will be 2.3 billion people who will still be using traditional cooking fuels and technologies¹⁷¹.

This access to clean cooking fuels is important because it impacts on the health of 3 billion people, especially women and children who are the main users.

Amount of individual renewable energy sources in total final energy consumption, 2015
(millions of tons of oil equivalent)



Source: *The Sustainable Development Goals Report 2018*, UN sustainable development goals site, <https://unstats.un.org/sdgs/report/2018/goal-07/>

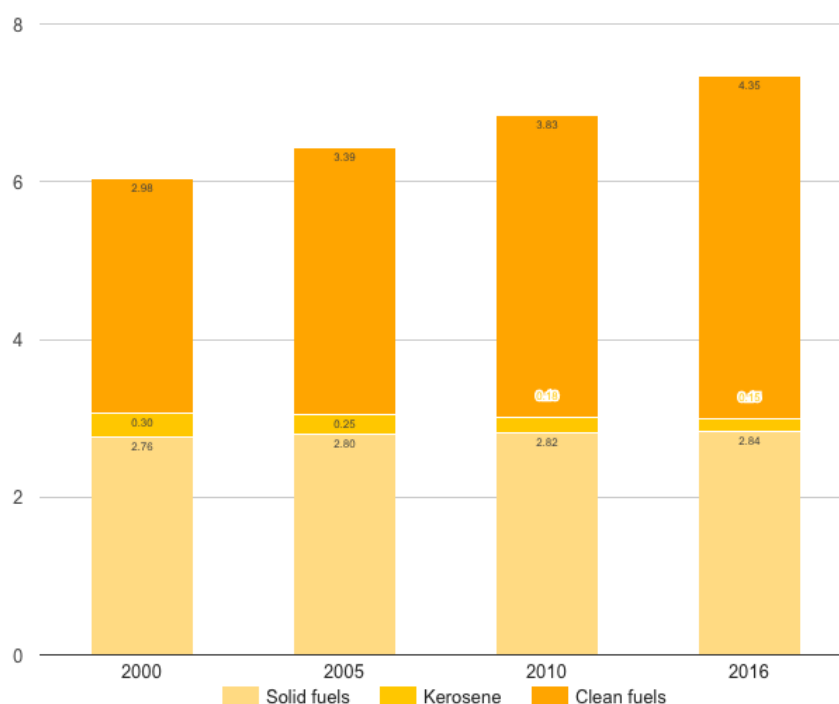
¹⁶⁹ “[...] from 17.3 per cent in 2014 to 17.5 per cent in 2015” – *ibid.*

¹⁷⁰ *ibid.*

¹⁷¹ *ibid.*

In 2016 there was a trend to have high levels of household air pollution due to 2.8 billion people who were using solid fuels with old stoves. If this trend continues, even in 2030 the situation will not change much. The solution is to shift to clean fuels and technologies (gas and electricity) in order to have stove efficiency improvement¹⁷².

Global primary energy intensity, 2000-2015 (megajoules per 2011 US\$ PPP)



Source: *The Sustainable Development Goals Report 2018*, UN sustainable development goals site, <https://unstats.un.org/sdgs/report/2018/goal-07/>

The absence of clean cooking fuels and technology in many parts of the world is causing lots of deaths, although for 14 years (2000-2014) the population that has access to it increased up to 57% compared to the previous 50%. This increase shows us that energy intensity is progressing slowly than electrification¹⁷³. Still, even if between 2012 and 2014, 80 million of people had access to clean cooking fuels and technologies, the progress of 0.46% (annual) is not what was hoped for and required, in order to achieve the 2030 goal of universal access. Still 98 countries have to make

¹⁷² “Addressing issues of affordability, lack of consumer awareness about the benefits of clean cooking, and minimal financing for producers of clean cooking energy technologies are key to accelerating the rate of access to clean cooking.” – *ibid*.

¹⁷³ “About 3 billion people, the majority in Asia and sub-Saharan Africa, are still cooking without the benefit of clean fuels and technologies. Rural areas lagged behind urban areas, with 22 per cent access versus 78 per cent, a gap much larger than in the case of access to electricity.” – *ibid*.

a big effort in order to achieve the universal access fixed by 2030. Furthermore, there is also the problem of population growth that offsets the gains in this field¹⁷⁴.

There are still lots of areas that do not have access to electricity at all. Additionally, there was increase by 10% in the global population during the period 2000-2016, that, as mentioned above, is at least partially offsetting the progress made in this field.¹⁷⁵, These data are the evidence that in energy matters the EU has been following the same ideals as the international community: clean energy and affordable access. It is clear why the EU has pledged in several ways in order to meet the achievements fixed. The global situation is worrying, because it takes into account the developing countries, too, and it is clear that the EU, as a confederation of developed countries, has to make more efforts to achieve sustainable development. Because of this goal, the EU has drafted plans in order to allocate financial resources better.

2. 3 Strategic Energy Technology Plan

Since I have talked about the white paper which is the document that formally initiates the legislative action about certain issues, it is worth mentioning the Strategic Energy Technology Plan. This plan is the one that gives the financial focus to achieve and support the areas that were pointed out in the framework mentioned before.

Since 2007, when it was firstly launched, it has played a fundamental role in areas of research and innovation (R&I) of the energy and environmental policies.

It is focused on the development and on the deployment of low-carbon technologies, looking for new ones and trying to bring down costs through coordination of the national researches and by financing projects¹⁷⁶. Furthermore, besides the cooperation between member states and other actors¹⁷⁷, the plan promotes research and innovation

¹⁷⁴ *ibid.*

¹⁷⁵ “From 2000 to 2016, the electricity access rate increased from 60 per cent to 86 per cent in Southern Asia and from 26 per cent to 43 per cent in sub-Saharan Africa” – *ibid.*

¹⁷⁶ *Strategic Energy Technology Plan*, European Commission, Technology and innovation, <https://ec.europa.eu/energy/en/topics/technology-and-innovation/strategic-energy-technology-plan>

¹⁷⁷ “It promotes cooperation amongst EU countries, companies, research institutions, and the EU itself.” – *ibid.*

in order to support those technologies that impact the most and that contribute to the transformation of the EU's energy system in a low carbon one.

The SET plan is managed by a Steering Committee chaired by the Commission and composed of 32 countries¹⁷⁸. It is supported by bodies that have a fundamental role in achieving the ambition of the plan and those bodies are: the SET-Plan information system (SETIS)¹⁷⁹, the research community represented by the European Energy Research Alliance (EERA)¹⁸⁰ and the industry sector which is represented by the European Technology and Innovation Platforms (ETIPs)¹⁸¹.

The Plan was revisited in 2015 by a Communication called "Towards an Integrated Strategic Energy Technology (SET) Plan: Accelerating the European Energy System Transformation". It defined the new EU strategy for the research and innovation areas and it was built by taking into consideration the Energy Union Strategy¹⁸². The adaptation was structured in a way that could make the transformation of the EU's energy system faster, according to the new focuses. The revised plan pointed out four main points: the need for a stronger partnership between the Commission and the SET-Plan member states and stakeholders¹⁸³, the need for an integrated approach to the energy system as a whole, the need for a new management structure¹⁸⁴ and the need for a more specific focus. This last need led to the drafting of ten key actions¹⁸⁵ and

¹⁷⁸ "28 EU Member States, Iceland, Norway, Switzerland and Turkey" – *ibid*.

¹⁷⁹ "The SET-Plan is supported by the open-access SET-Plan Information System (SETIS) that provides up-to-date information on its activities covering all research and innovation priorities of the Energy Union." – *ibid*.

¹⁸⁰ "The European Energy Research Alliance is the largest energy research community in Europe. Organised in 16 Joint Research Programmes, EERA coordinates energy research to achieve more efficient and cheaper carbon energy technologies" – *Welcome to EERA*, EERA site, <https://eera-ecer.de>

¹⁸¹ "In 2015, the energy policy review under the energy union led to the European industrial initiatives' (EII) merging with existing European technology platforms (ETP) to create nine European technology and innovation platforms (ETIP). They operate similarly to other ETPs, but are bound to SET plan implementation." – *European Technology and Innovation Platforms*, European Parliament think tank, http://www.europarl.europa.eu/thinktank/it/document.html?reference=EPRS_ATA%282017%29603939

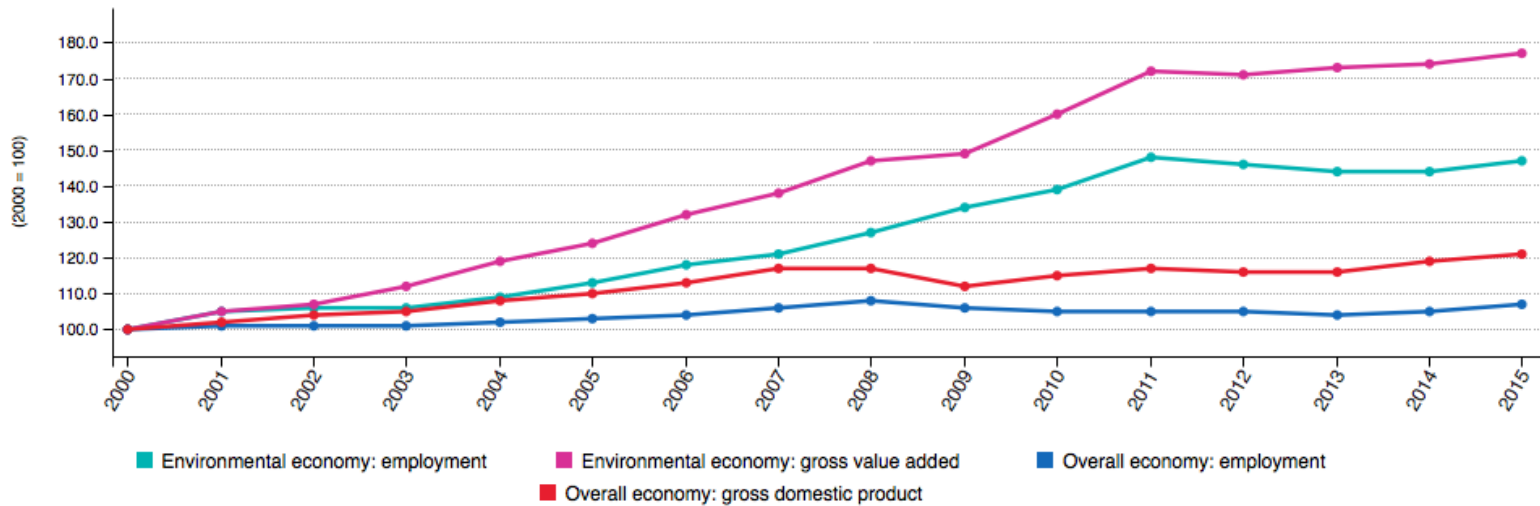
¹⁸² "The Energy Union strategy builds further on the 2030 Framework for Climate and Energy and the European Energy Security Strategy." – *Building the Energy Union*, European Commission, Energy Strategy and Energy Union, <https://ec.europa.eu/energy/en/topics/energy-strategy-and-energy-union/building-energy-union>

¹⁸³ "including research organisations and industry" – *ibid*.

¹⁸⁴ "to increase transparency, accountability and monitoring of progress, as well as a result-oriented approach" – *ibid*.

¹⁸⁵ "1) Develop performant renewable technologies integrated in the energy system; 2) Reduce the cost of key renewable technologies; 3) Create new technologies and services for consumers; 4) Increase the resilience and security of the energy system; 5) Develop energy efficient materials and technologies for buildings; 6) Improve energy efficiency for industry; 7) Become competitive in the global battery sector

their job was to underline the importance of the energy system transformation, the creation of jobs and growth. In fact, by 2015 it was seen that there was an “employment re-structuring effect”¹⁸⁶ with this energy transition. As the graphic below shows, 1.6 million people, within the EU, are working on energy efficiency and renewables and this indicates an increase by 13% compared to 2010¹⁸⁷.



Eurostat estimates for Environmental economy: employment and Environmental economy: gross value added

Environmental economy: employment - in full-time equivalents.

Index compiled for chain-linked volumes data in EUR million (ref year 2010; at 2010 exchange rates) for

Environmental economy: gross value added and Overall economy: gross domestic product

eurostat

Source: Eurostat, *Environmental Economy – Employment and Growth*, 2018

This, among other achievements, is a clear sign that the EU is going into the right direction, into the deployment that has been driving down the cost of renewables¹⁸⁸ and has been improving their performance. It is also because of this if within the EU there has been strong increase in renewables share since 2007¹⁸⁹ and also increase in investments in renewables.

The Publication of the SET-Plan also predicts what the energy scenario in the future could be, by saying that if the trends continue to be like these towards renewables, it

(e-mobility); 8) Strengthen market take-up of renewable fuels; 9) Drive ambition in carbon capture and storage/use deployment; 10) Increase safety in the use of nuclear energy” – *ibid.*

¹⁸⁶ *ibid.*

¹⁸⁷ “more than seven times greater when compared to the 1.7% employment increase for the whole EU economy.” – pag.7, *The Strategic Energy Technology (SET) Plan*, European Commission’s Directorate-General for Research and Innovation, Energy and the Joint Research Centre

¹⁸⁸ *ibid.*

¹⁸⁹ “The EU-wide share of renewable energy use increased from 9.7% in 2007 to 16.4% in 2015 – pag. 7, *ibid.*

means that by the mid 2020's building a wind farm will be less expensive than building a gas plant. The new publication of the SET-Plan also predicts that in 2040 60% of the EU electricity mix will be represented by renewables and even in the transport sector there will be about 25% of cars (globally speaking) that will be electric¹⁹⁰.

Furthermore, because of the Paris agreement target to maintain global warming under 2°C, investments in the energy sector will be doubled.

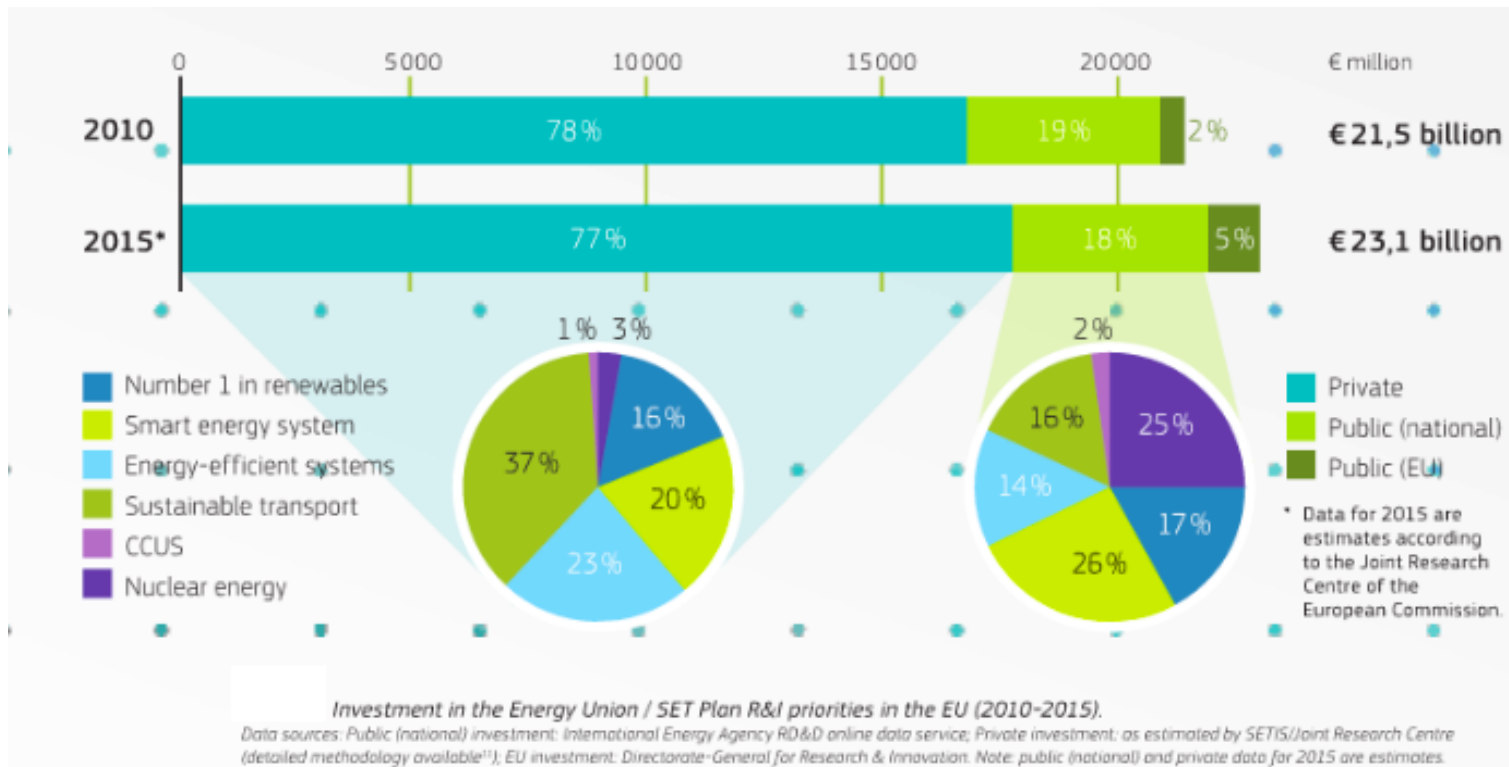
Because of this prevision, finance will adapt to the future of green energy and, therefore, the SET-Plan is the one that will promote specific spending (e.g. on specific technologies that will be useful in future developments) and mobilise private and public sources for investments. Investing in the right technologies is important because it will permit to achieve the goal of decreasing the greenhouse gas emission by at least 80% at 2050¹⁹¹.

The plan was first implemented in 2007, and in 2015 it achieved the amount of 23 billion euros of investments in research and innovation (R&I), with about 77% of this sum coming from the private sector, about 18% from the national public sector¹⁹² and 5% from the EU.

¹⁹⁰ *ibid.*

¹⁹¹ *ibid.*

¹⁹² “from member states’ public funding” – pag.10, *ibid.*



Source: *The Strategic Energy Technology (SET) Plan*, European Commission's Directorate-General for Research and Innovation, Energy and the Joint Research Centre, 2017

As it can be seen in the graph above, the private sector is the one that invests the most in R&I. These kinds of investments recorded growth by 8% during the period from 2010 to 2015. Even more in the sustainable transport sector.

Thus, it is also thanks to the SET-Plan if investments have increased. Indeed, it boosted investments in clean energy by aligning the member states' contributions and by pointing out relevant opportunities of Common interest¹⁹³.

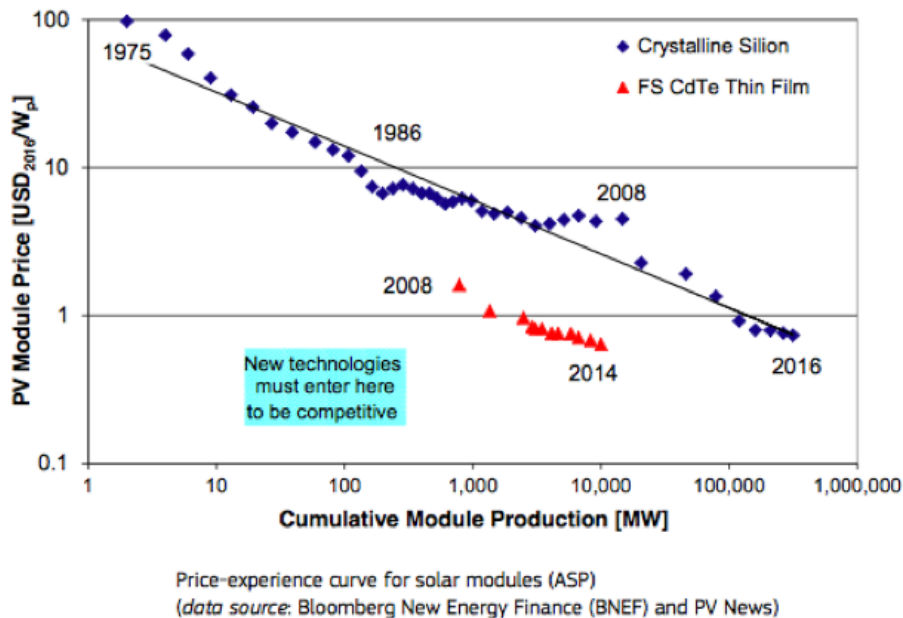
But most of all, because the energy sector is rapidly changing route, the SET-Plan is the one that is speeding up the process most, also with the collaboration of the Commission and research organisations. The Common interest in the EU is to achieve the climate and energy targets (as previously discussed) and to make the industry sector more competitive; the SET-Plan is the one that helps in making important R&I advancements towards these goals and in particular towards low carbon energy¹⁹⁴.

Because the main intent of the EU is to become leader in renewables, the SET-Plan has fixed some ambitious targets in order to make technologies for renewables even

¹⁹³ *ibid.*

¹⁹⁴ *ibid.*

more updated. For example, for what concerns photovoltaic energy, the EU is leader in Photovoltaic (PV) energy research and technology development. Thanks to deployment on a large scale, the PV prices, between 2009 and 2015, decreased by 80%¹⁹⁵.



Source: *PV Status Report 2016*, Arnulf Jäger-Waldau, JRC Science for Policy Report, 2016

Because of these promising data, the SET-Plan has fixed a contribution in order to help this decrease to continue and to “relaunch PV cell and module manufacturing in the EU”¹⁹⁶.

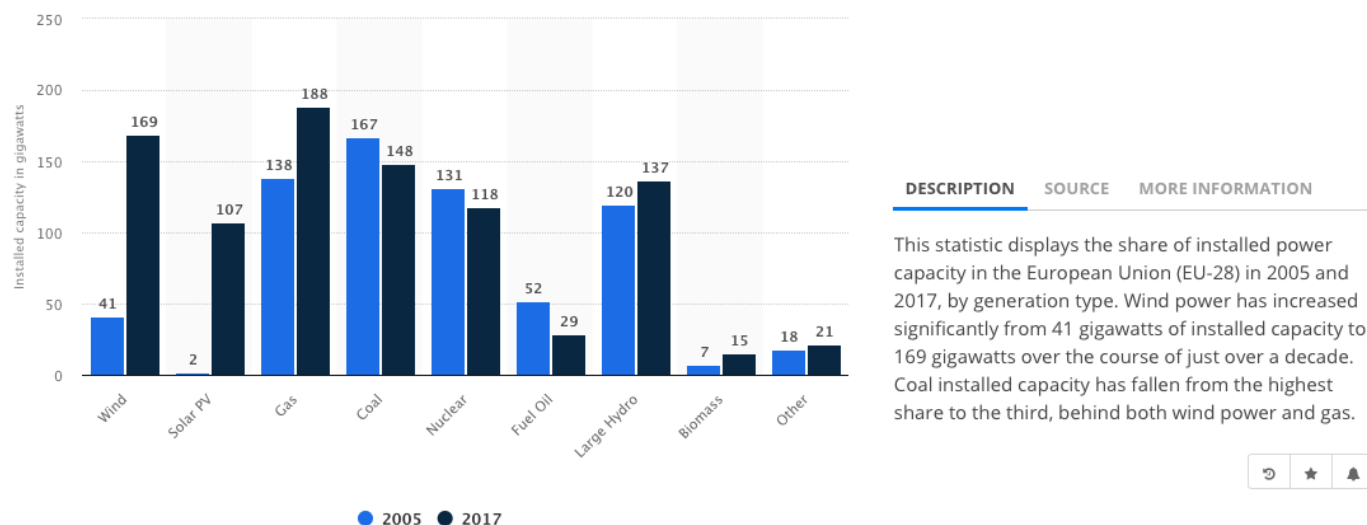
For what concerns wind power, it covered 10.4% of electricity demand within the Community in 2016 and has now become the second largest technology by capacity in the EU. Wind installed capacity can be onshore or offshore. Almost 88% of world offshore wind installed capacity is in the EU and this makes the Community leader in this kind of energy. In line with this trend, the SET-Plan is focused on developing technologies which will increase energy capture by wind power plants, in order to optimize operations and decrease costs¹⁹⁷.

¹⁹⁵ *ibid.*

¹⁹⁶ *ibid.*

¹⁹⁷ *ibid.*

Installed power capacity in the European Union (EU-28) in 2005 and 2017, by generation type (in gigawatts)



Data visualized by + a b l e a u

© Statista 2018

Source: Statista, <https://www.statista.com/statistics/807675/installed-power-capacity-european-union-eu-28/>, 2018

Furthermore, there are also the ocean energy technologies, which use tidal waves and the force of the sea waves in order to produce energy. It is predicted that these kinds of technologies by 2050 will bring electricity to 230 million people¹⁹⁸ and, in doing so, they will replace coal power plants¹⁹⁹. In order to make this prediction happen, the SET-Plan shows the deployment of ocean energy in the market in order to initiate this kind of business and to decrease costs. Even in this case, the main funds come from the private sector²⁰⁰.

Ocean's tides and waves are still at an embryo stage and are not the only resources in this pioneering way of approaching renewables. There is another renewable source, which has reached remarkable results and can be considered as mature and reliable: the geothermal energy. This kind of energy is not only considered reliable but also flexible, with low costs and high capacity, which makes it a possible good choice for the energy mix within the Community. The data collected until 2015 show that this

¹⁹⁸ *ibid.*

¹⁹⁹ "...or replacing average coal power plants, i.e. as much as a third of Europe's coal fleet" –pag. 31, *ibid.*

²⁰⁰ *ibid.*

energy accounts for 3.1% of the total primary renewable energy production in Europe²⁰¹. Notwithstanding the great potential of this type of energy, the geothermal resource is exploited up to a limited degree²⁰².

The increasing use of the geothermal energy depends on whether the SET-Plan targets will be achieved or not. With this, I mean that power production of this kind of energy depends on the construction of enhanced geothermal systems (EGS) with which, if successfully developed and set up, the EU will have a total capacity of 80 GW by 2050²⁰³. This is one of the main targets of the SET-Plan about geothermal energy. This type of energy, though, is not the only area targeted to achieve ambitious goals²⁰⁴.

Another area that the SET-Plan has targeted to achieve is progress in research and investments for what concerns the consumer. The consumer is the focus of the “Clean Energy for all Europe”²⁰⁵ legislation package²⁰⁶. The SET Plan aims at speeding up the penetration of smart energy services and applications, led by the Interoperable Information and Communication Technologies (ICT) because of the transformation that the energy is going through²⁰⁷. The SET-Plan is aiming to put the ICT sector in charge of controlling electricity and in general energy consumption by 2030²⁰⁸, due to

²⁰¹ “The installed capacity in the EU is divided into: 16 GW in ground source heat pumps; around 3.8 GW in direct use; and 1 GW in geothermal power plants” –pag 34, *ibid*.

²⁰² *ibid*.

²⁰³ “Over 200 projects are planned and capacity is estimated to grow by up to 6.5 GW by the end of this decade, with the main markets being France, the Netherlands, German and Hungary. It is also estimated that more than 3GW of geothermal energy are potentially available in abandoned coal of other mines and could be used in applications such as district heating in Europe” –pag 34, *ibid*.

²⁰⁴ *ibid*.

²⁰⁵ “[...] the European Commission presented a new package of measures with the goal of providing the stable legislative framework needed to facilitate the clean energy transition – and thereby taking a significant step towards the creation of the Energy Union. Aimed at enabling the EU to deliver on its Paris Agreement commitments, the 'Clean Energy for All Europeans' proposals are intended to help the EU energy sector become more stable, more competitive, and more sustainable, and fit for the 21st century. With a view to stimulating investment in the clean energy transition, the package has three main goals: Putting energy efficiency first; Achieving global leadership in renewable energies; Providing a fair deal for consumers” – *Clean Energy for All Europeans*, European Commission, Energy topics, Energy Strategy and Energy Union, <https://ec.europa.eu/energy/en/topics/energy-strategy-and-energy-union/clean-energy-all-europeans>

²⁰⁶ *The Strategic Energy Technology (SET) Plan*, European Commission’s Directors-General for Research and Innovation, Energy and the Joint Research Centre

²⁰⁷ “[...] our energy system is undergoing an important transformation, both with the deployment of smart meters and controls, and with the emergence of smart appliances and their inclusion in home networks.” – pag. 38, *ibid*.

²⁰⁸ “The aim is for at least 80% of electricity consumption and at least 80% of energy consumption to be controllable through ICT in 80% of European home by 2030” – pag. 38, *ibid*.

this transformation. Cooperation with the industry and research institutes is needed to perform the R&I that will deliver these targets.

The goal of a smart house²⁰⁹ is an important ambitious target, but not the only one fixed by the plan, because there is also the smart city. Indeed, it has been seen that cities are responsible for a big part of the global greenhouse gas emissions²¹⁰, as the graph below shows²¹¹.

The idea of the smart cities is in line with the main goal of the EU: decarbonisation.²¹² In fact, Horizon 2020²¹³ has given pilot projects to these smart cities and these projects should be able to bring in more investments²¹⁴.

²⁰⁹ “Smart homes depend on robust and advanced energy- related sensors and controllers that can be easily integrated into energy management systems using widespread, upgradable software and application programming interfaces (e.g. plug-and-play, self-configuring, maintenance- free and easy to reuse).” – pag. 39, *ibid*.

²¹⁰ “Cities and their surrounding areas consume around 80% of the world’s energy production and account for roughly the same proportion of global GHG emissions, stemming increasingly from the energy services required for lighting, heating and cooling.” – pag. 41, *ibid*.

²¹¹ *ibid*.

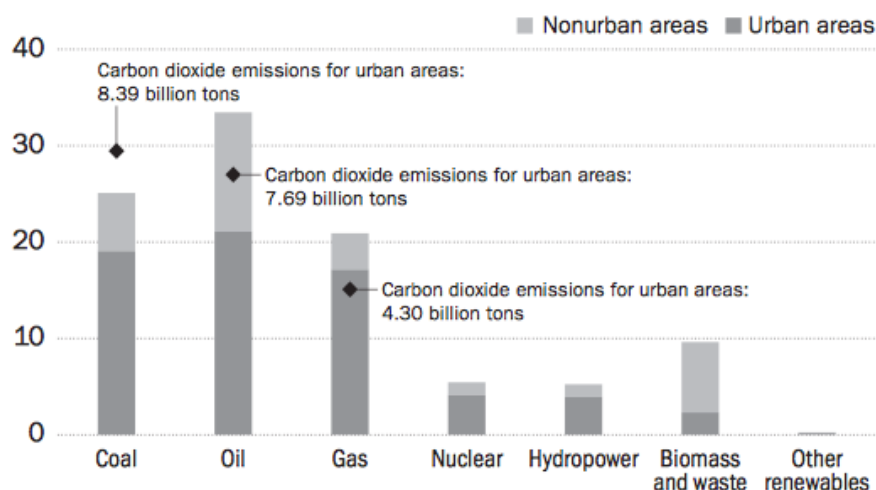
²¹² “[...] the decarbonisation of the city energy system as a whole and more specifically through promoting positive energy blocks and districts” – pag. 41, *ibid*.

²¹³ “Horizon 2020 is the biggest EU Research and Innovation programme ever with nearly €80 billion of funding available over 7 years (2014 to 2020) – in addition to the private investment that this money will attract. It promises more breakthroughs, discoveries and world-firsts by taking great ideas from the lab to the market. Horizon 2020 is the financial instrument implementing the Innovation Union, a Europe 2020 flagship initiative aimed at securing Europe's global competitiveness.” – *What is Horizon 2020*, European Commission, Funding, Tenders, <https://ec.europa.eu/programmes/horizon2020/en/what-horizon-2020>

²¹⁴ “[Horizon 2020], which has provided smart cities and communities’ lighthouse projects with approximately €500 million in funding for 2014-2020; some of these projects will unlock up to 20 times more in investments” – pag. 41, *The Strategic Energy Technology (SET) Plan*, European Commission’s Directors-General for Research and Innovation, Energy and the Joint Research Centre

Emissions from Urban and Nonurban Sources

Energy demand as % of total energy demand, and related carbon dioxide emissions 2005



Source: *Cities and Climate change: an urgent agenda, the world bank, 2010*

Then, as a last point, the SET-Plan not only concerns the renewables and a greener way of energy production, but also technologies as Carbon Capture, Utilisation and Storage (CCUS)²¹⁵ and nuclear. Towards these types of energy, the SET-Plan wants to implement higher safety standards.

For what concerns CCUS, because this is one of the technologies that matter in order to achieve decarbonisation of thermal power generation, the SET-Plan is trying its best in order to focus investments to make CCUS cost-effective and to demonstrate the safety of CO₂ storage. In this case, the SET-Plan is addressing the importance that new technologies be correctly applied thanks to good policies. It is current opinion that the correct storage of carbon can contribute to the Paris Agreement targets²¹⁶.

²¹⁵ “Carbon Capture and Storage (CCS) technologies aim to capture as much as 85% of CO₂ emissions from power plants and heavy industry before transporting it by pipeline or ship and storing it at least 700 metres below the earth’s surface.” [...] “Carbon capture and utilisation (CCU) stands for, in addition to carbon capture storage, the utilisation of CO₂. The CO₂, as source of carbon, has the potential to be used in the manufacture of fuels, carbonates, polymers and chemicals. Being on development-to-demonstration phases, CCU represents a new economy for CO₂, as used as raw material – *Carbon Capture Utilisation and Storage*, Strategic Energy Technologies Information System (SETIS), <https://setis.ec.europa.eu/technologies/carbon-capture-utilisation-and-storage>

²¹⁶ *The Strategic Energy Technology (SET) Plan*, European Commission’s Directors-General for Research and Innovation, Energy and the Joint Research Centre

Therefore, the SET-Plan's contribute is to boost investments towards new ways of energy production, with also stronger alignment between public and private. The European Policies that concern research and investments are taking the SET-Plan as a reference in order to have a better focus²¹⁷.

In conclusion, the SET-Plan is going to enter the phase of implementing the projects and asking for stronger commitment from the actors that I mentioned earlier. Cooperation is the key on which the Plan is counting, because it is the one thing that can mobilise the investments needed to put in action the projects drafted. As mentioned, the actor that cooperates the most is the private sector "which accounts for as much as 77% of all clean energy R&I investments"²¹⁸ but because of the risk that the research and investments sector entails the Commission is also trying to involve the public sector²¹⁹.

The SET-Plan was drafted not only to put a focus on the R&I investments but also in order to create a new way of collaboration between public and private sectors²²⁰. It is thanks to this coordination that the SET-Plan has achieved innovations into a cleaner and sustainable energy system and the Member States can have a clear path to follow in order to boost the energy transition into the "next generation of low-carbon energy technologies"²²¹.

²¹⁷ *ibid.*

²¹⁸ pag 83, *ibid.*

²¹⁹ *ibid.*

²²⁰ "[...] ten years of partnership between countries, industry, research organisations and the European Commission" – pag. 84, *ibid.*

²²¹ pag 85, *ibid.*

2.4 What does the future hold? The decarbonisation goal, renewables and trends to 2050

Decarbonisation is one of the main pillars in the EU's growth agenda, thanks also to the Europe 2020 strategy and the Resource Efficient Europe Flagship Initiative.

The energy Roadmap²²², a document that was adopted by the Commission in order to achieve the decarbonisation goal, makes the projection that the target of reducing greenhouse gas emissions will be achieved by 2050²²³.

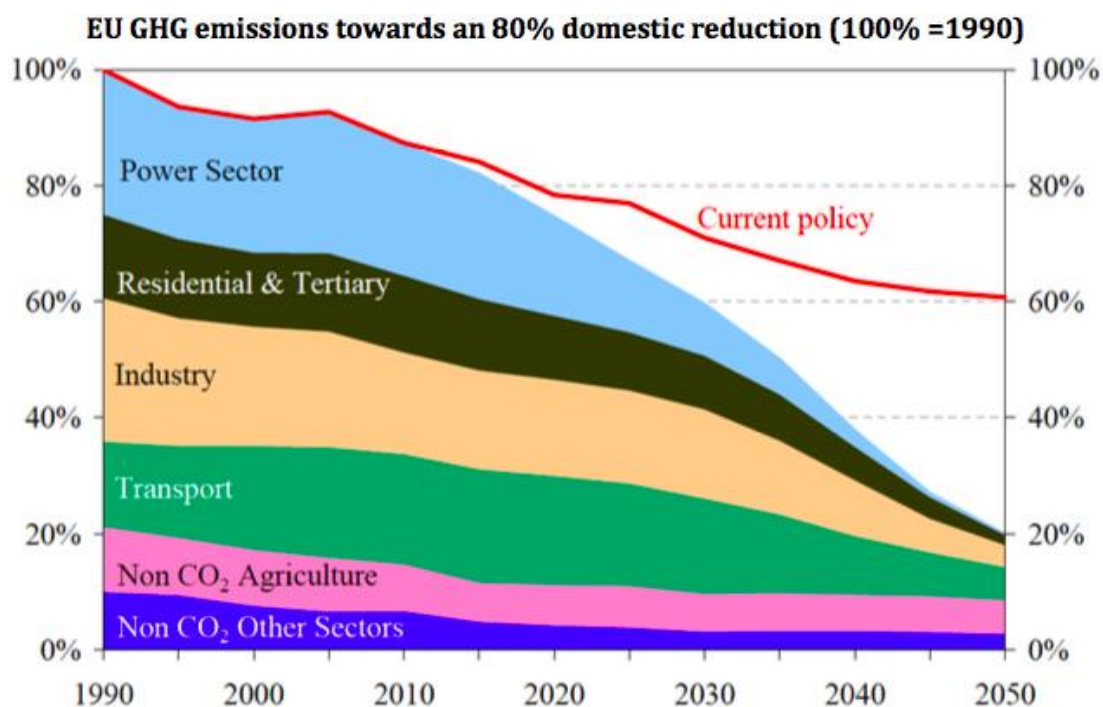
Emissions are already experiencing a major decrease compared to 1990 when the issue of greenhouse gas emissions was at first addressed, as the graph below shows. Furthermore, according to the "Energy Roadmap 2050", natural gas will have a better performance compared to other fossil fuels.

This because for the prices that the fossil fuels will have, which, in the Reference Scenario published in 2016, will be dependent by the stringency of the policies in action, by the production costs, productive capacities, limits in production rates and recovery factors of the resources²²⁴.

²²² *The role of natural gas in EU decarbonisation path*, Manfred Hafner Associate Researcher, FEEM, Simone Tagliapietra, Senior Researcher, 2015

²²³ *Energy Roadmap 2050 impact assessment and scenario analysis*, European Commission, Brussels, 2011

²²⁴ *EU Reference Scenario 2016 Energy, transport and GHG emissions trends to 2050*, European Commission, Directorate-general for Energy, Directorate—General for Climate Action and Directorate-General for Mobility and Transport, 2016



Source: *The role of natural gas in EU decarbonisation path, 2015*

The Scenario also shows that the GHG emissions decrease in many sectors thanks to the maturity reached by the decarbonisation technologies and the consequent big reduction in the carbon intensity in power generation²²⁵. Because of this, the PROMETHEUS project, which helps the position of enterprises in the energy market^{226 227}, has projected the price for gas, with its import price that today has decreased because of the world oil prices and of the development of shale gas in the USA²²⁸.

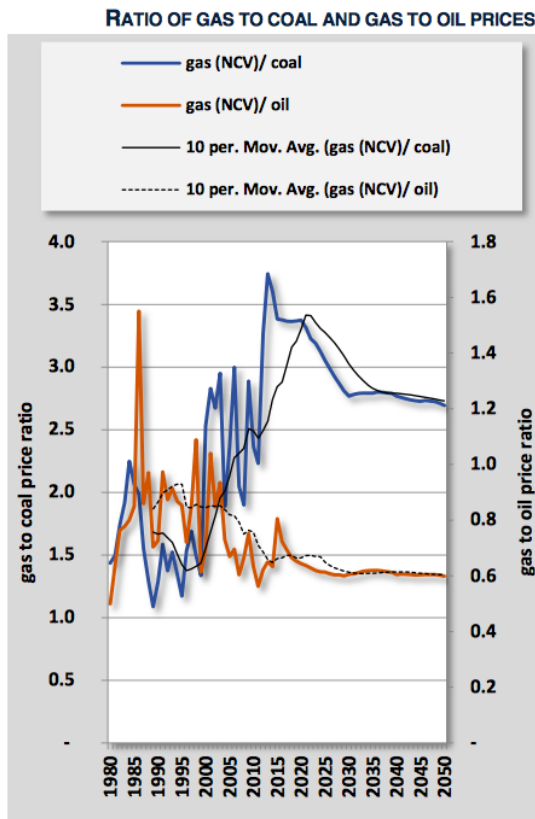
²²⁵ibid.

²²⁶ “The PROMETHEUS project has got the objective of helping enterprises (especially SMEs - Small and Medium Enterprises) to strengthen their position in the market of energy services. It will give instruments and support to all European SMEs that are providing or wish to provide their customers, both private citizens and other SMEs, with energy services (installation of small scale RES, energy audits, energy certification of buildings, production and supply of RES and Energy Efficient products, etc.)” – *Providing users with Organised and Monitored Energy services by Transparent and High-value EU Smes*, European Commission, Intelligent Energy Europe, <https://ec.europa.eu/energy/intelligent/projects/en/projects/prometheus>

²²⁷ “The purpose of this model within the Reference Scenario process is to provide fossil fuel price trajectories used for the EU modelling as EU import price assumptions. The world energy prices projections are used as inputs to PRIMES and GEM-E3.” – pag. 3, *EU Reference Scenario 2016 Energy, transport and GHG emissions trends to 2050*, European Commission, Directorate-general for Energy, Directorate—General for Climate Action and Directorate-General for Mobility and Transport, 2016

²²⁸ “During 2013-15, the average gas import price to the EU has declined by 27% in constant Euro terms (and 39% in constant US Dollars) following the evolution of world oil prices (41% and 50% respectively) and the easing of conditions in global LNG market mainly due to the shale gas developments in North America.” – pag. 39, ibid.

Furthermore, the Scenario highlights that gas price vs oil price, after peaking in 2015, will slide down steadily and get to a gas to oil ratio of about 0.60 starting from 2030, a level that will mark final decoupling in the prices of the two commodities²²⁹.



Source: *EU Reference Scenario 2016 Energy, transport and GHG emissions trends to 2050*, 2016

The EU is one of the major energy importing zones in the world, considering that as much as 53% of the energy that is consumed there is imported. For this reason, it is clear why gas imports will have a high peak during the period 2020 - 2030 while oil will be more stable in the decarbonisation scenario²³⁰.

Decarbonisation is an ambitious goal that was planned since the drafting of the 2030 Climate and Energy Framework, which mentions that in order to have a carbon free energy system, investments in low-carbon technologies are necessary, especially if we consider that for the Energy Roadmap a goal of 80% to 95% GHG emission reduction²³¹ has been fixed.

²²⁹ *ibid.*

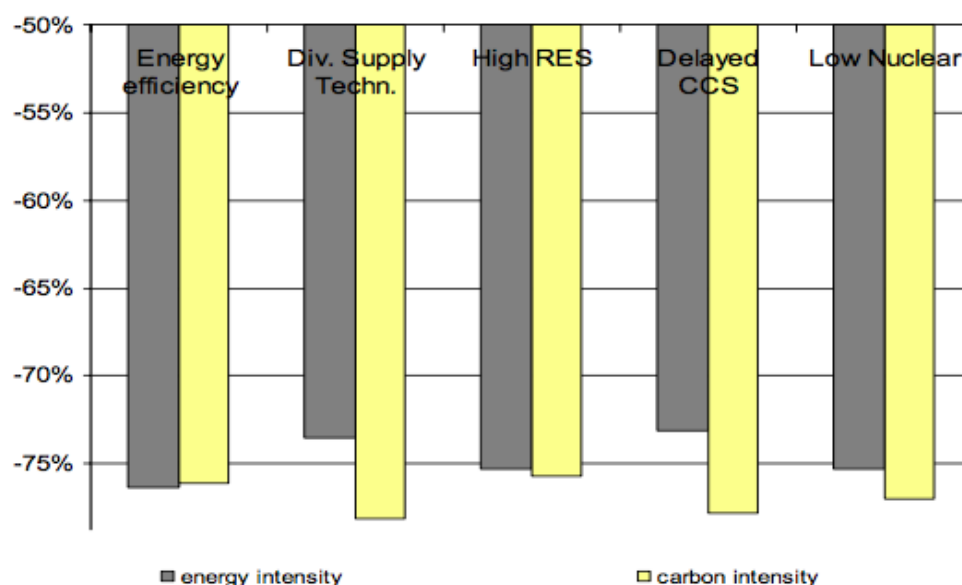
²³⁰ *Energy Policies of IEA Countries, European Union, 2014 review executive summary*, International Energy Agency

²³¹ *ibid.*

The decarbonisation path has five scenarios pictured. In one it predicts that there will be a high energy efficiency, in order to achieve the goal of 20% of energy saving²³². Another scenario is one with differentiation, driven by carbon prices and carbon values. In this scenario, the stress is on policy measures that boost emission reduction. The third scenario is predicting a high Renewable Energy System (RES) share and penetration in power generation²³³. The last two scenarios are projecting delay in Carbon Capture and Sequestration (CCS) and low nuclear energy, due to the perception of the public²³⁴.

These scenarios demonstrate that they bring an improvement in energy intensity²³⁵ and if fuel switching continues, then carbon intensity will fall²³⁶.

Decarbonisation scenarios: Improvements in carbon and energy intensities (reductions from 1990)



Source: *Energy Roadmap 2050 impact assessment and scenario analysis, 2011*

²³² *Energy Roadmap 2050 impact assessment and scenario analysis*, European Commission, Brussels, 2011

²³³ “[...] around 90% share and close to 100% related to final consumption” – pag. 109, *ibid.*

²³⁴ *ibid.*

²³⁵ “[...] energy intensity which sinks 67%-71% compared with 2005 and 73%-76% compared with the higher 1990 level in terms of energy intensity” – pag. 115, *ibid.*

²³⁶ “[...] carbon intensity would improve substantially falling 76%-78% from 1990 (73%-75% from 2005)” – pag. 115, *ibid.*

It is hoped that the share of renewables will increase and in fact the Commission predicts 27% of overall energy consumption from renewables by 2030²³⁷.

Of course, renewables have the problem that when the resource is absent (the night comes, the wind does not blow etc.), back-up plans of energy storage²³⁸ or of energy production are needed. Yet, the larger the share of renewables will be, the less dependent from other countries the EU will be. Indeed, according to the EU Reference Scenario, by 2050 the mix in primary energy with renewables will be dominant. In fact, thanks to the latest technologies and innovations and thanks to the commitment of the EU as one, countries like Italy have been making great progress towards achieving the hoped share of renewables and a carbon free energy system.

²³⁷ *The Role of Natural Gas in the EU Decarbonisation Path, Nota di Lavoro*, Manfred Hafner Associate Researcher, FEEM, Simone Tagliapietra, 2015

²³⁸ “[...] more flexibility will be required in the system, in order to reduce this intermittency and ensure the overall stability of the system. Flexible resources include dispatchable back-up power plants, demand-side management and response, energy storage facilities and interconnections with adjacent markets. The main tool to reduce the intermittency of wind and PV electricity generation is to aggregate their outputs over a wider geographical area” – *The Role of Natural Gas in the EU Decarbonisation Path, Nota di Lavoro*, Manfred Hafner Associate Researcher, FEEM, Simone Tagliapietra, 2015

CHAPTER III

3.1 Italy's National Energy Strategy

In 2009 Europe was struck by an economic crisis that led to a decrease in energy demand²³⁹ and, as a consequence, a diminution of investments in the supply and demand side²⁴⁰.

Italy also registered decrease in energy consumption during the period 2008-2013²⁴¹. In spite of the crisis, according to the IEA report, since 2009 Italy has made strong improvements towards the implementation of its energy policies, in line with the EU²⁴².

The EU 20/20/20 and the package, which are legally binding, along with the Roadmap 2050, provides for goals such as decrease in the GHG emissions, a decarbonisation scenario, increase in the share of renewables, competitiveness and economic growth for what concerns energy transition and reduction of energy consumption by end users²⁴³.

Italian policy is fully consistent with the EU 20/20/20 policy and with the Roadmap 2050 and its starting point was to make environmental sustainability stronger, to improve the efficiency and security of the energy systems and to decrease the GHG emissions²⁴⁴. The first results are positive, because there was reduction in gross energy final consumption in 2014, while energy efficiency continued to grow and there

²³⁹ *Energy Policies of IEA Countries, executive summary*, International Energy Agency, 2014

²⁴⁰ *The Impact of the Financial and Economic Crisis on Global Energy Investment, IEA background paper for the G8 Energy Ministers' Meeting 24-25 May 2009*, Ministero dello Sviluppo Economico, Energy Ministers Meeting, International Energy Agency, 2009

²⁴¹ *Energy Efficiency trends and policies in Italy*, ENEA, Giulia Iorio, Alessandro Federici, 2015

²⁴² *Energy Policies of IEA Countries, Italy, review*, IEA, 2016

²⁴³ *Italy's National Energy Strategy 2017*, Ministero dello sviluppo Economico, Ministero dell'Ambiente e della Tutela del Territorio e del Mare

²⁴⁴ *ibid.*

was the achievement of 17% share in renewables in the total energy consumption²⁴⁵. Italy's turning point was reached when it adopted the National Energy Strategy (NES – “Strategia Energetica Nazionale”) in 2017.

This strategy was drafted within the juridical scenario of the EU's “Clean Energy Package” that I mentioned before and it marked an important step for the Italian government, because it sent the important message of achieving EU energy goals to all stakeholders, who were consulted during the drafting, along with institutions²⁴⁶.

The drafting process of the strategy involved private and public stakeholders in a public consultation process. In the end, it was established that Italy needed to speed up the process of “making the Italian energy system increasingly environmentally sustainable”²⁴⁷, while still considering the possible effects on prices, supply security and energy transition²⁴⁸ from fossil fuels to renewables.

The priorities of the strategy are: research and innovation, decarbonisation, renewables, energy efficiency and energy markets²⁴⁹. In each of these areas, long and short-term goals were developed²⁵⁰.

In particular, it is to be remarked that energy policies are co-ordinated at national level through public institutions²⁵¹ and this is why the strategy involves bodies as Parliament and Regional governments but also other stakeholders, like companies, citizens, etc.²⁵² Keeping in mind that the main goal of the European Union is decarbonisation, in line with the Paris Agreement and in line with the aim of improving energy efficiency, an item that would contribute to the mitigation of environmental impacts on climate²⁵³,

²⁴⁵ “[...] the GDP energy intensity dropped by 4.3% as compared to 2012” –pag 12, *ibid*.

²⁴⁶ “The National Energy Strategy 2017 arose from a wide participative process, which involved all the public and private stakeholders of the sector, during both its preliminary stage and the proper public consultation. What emerged was a broad consensus on the need (in accordance with European long-term targets) for accelerating the process to make the Italian energy system increasingly environmentally sustainable, paying the utmost attention to repercussions on prices and supply security, and to the environmental impacts of new technologies and of the energy transition itself.” – pag. 13, *Energy Policies of IEA Countries, Italy, review*, IEA, 2016

²⁴⁷ *ibid*.

²⁴⁸ *ibid*.

²⁴⁹ *ibid*.

²⁵⁰ *Energy Policies of IEA Countries, Italy, review*, IEA, 2016

²⁵¹ *ibid*.

²⁵² *Italy's National Energy Strategy 2017*, Ministero dello sviluppo Economico, Ministero dell'Ambiente e della Tutela del Territorio e del Mare

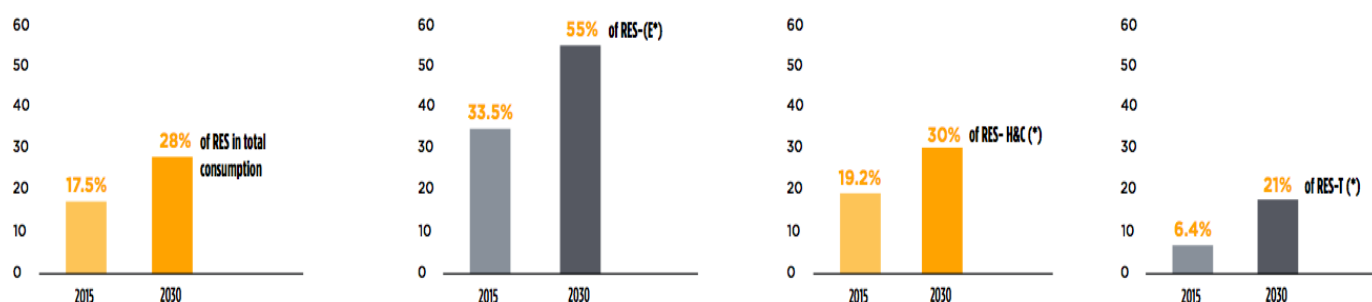
²⁵³ “[...] and encouraging energy conservation to mitigate environmental and climate impacts; promoting environmentally conscious lifestyles, from sustainable mobility to wise energy usage; and confirming Italy's environmental leadership role.” – pag. 3, *ibid*.

Italy, with the NES, has moved forward in the field of environmental sustainability and in decreasing greenhouse gas emissions while improving energy efficiency and security.

The main goal is that the national energy system should become “more competitive, more sustainable and more secure”²⁵⁴. In order to do this, energy prices should get to the same levels as the European ones²⁵⁵. Furthermore, it was pointed out that in order to make the national energy system more competitive, the gap between the costs of natural gas in Italy and in other European countries should be reduced ²⁵⁶.

The growth that the NES is aiming at is a sustainable one, which means that there are measures to achieve a low carbon economy that would be beneficial to cope with the climate change, too. Furthermore, with the combination of renewables and energy efficiency there will be a stronger contribution to the environmental protection, to the reduction of prices (because the costs for the construction of wind and solar power plants are decreasing, thus making renewables more competitive, and because energy efficiency means demand reduction) and to energy security²⁵⁷. The graph below shows the targets for the low-emission Renewable Energy Sources (RES), which are in line with the target of decommissioning the “coal-fired thermal power plants by 2025”²⁵⁸.

RES targets



(*) RES-E: RES in electricity; RES-H&C: RES in heating & cooling; RES-T: RES in transport.

Source: Italy's National Energy Strategy 2017

²⁵⁴ *ibid.*

²⁵⁵ *ibid.*

²⁵⁶ “This gap amounted to about € 2/MWh in 2016” – pag. 5, *ibid.*

²⁵⁷ *ibid.*

²⁵⁸ pag 12, *ibid.*

In fact, Italy reached a share in renewables of 17% in 2014. With this good starting point, the NES fixed a more ambitious target: to reach 28% share renewables in total energy consumption, by 2030, that is in line with the EU path. Thanks to improvements in energy saving in Italy “the GDP energy intensity dropped by 4.3% as compared to 2012”²⁵⁹.

Renewables are on the way to an impressive growth, but they are not the only item in the strategy. In fact, it also envisages improvement of energy security along with that of the energy system. It aims at improving the “flexibility of gas networks and power grids”²⁶⁰, in order to increase the number of renewables in electricity²⁶¹, to manage the variability of natural gas flows and demand²⁶² and to improve the cost effectiveness of the energy expenditure²⁶³. Important is also the increase in research and development activity, which is one of the targets proposed, in order to endow renewables of more and more advanced technology²⁶⁴.

With the decarbonisation goal of the EU, renewables are important, as energy efficiency is, and, in fact, the energy efficiency projects²⁶⁵ are the ones that will contribute to boost sustainability and push down consumer prices.

Italy’s performance in energy efficiency compared to other Member States

Italy’s National Agency for New Technologies, Energy and Sustainable Economic Development (ENEA – Agenzia nazionale per le nuove tecnologie, l’energia e lo

²⁵⁹ pag 12, *ibid.*

²⁶⁰ *ibid.*

²⁶¹ “[...] and new players, by strengthening and fostering the evolution of networks, grids, and markets towards smart, flexible, and resilient configurations.” – pag. 8, *ibid.*

²⁶² “[...] and demand peaks, and diversifying supply sources, in the complex geopolitical context of the countries from which we import gas and of increasing integration of European markets.” – pag. 8, *ibid.*

²⁶³ “improve the cost-effectiveness of the energy expenditure thanks to technological innovation.” – pag. 8, *ibid.*

²⁶⁴ “Doubling investments in research and development of clean-energy technologies: from € 222 million in 2013 to € 444 million in 2021.” – pag 7, *ibid.*

²⁶⁵ Their targets are: “curbing yearly energy consumption from 2021 to 2030 (10 Mton) and changing sectoral energy mixes to promote the achievement of non-ETS2 CO₂ emission reduction targets, by focusing on the residential and transport sectors” – pag. 7, *ibid.*

sviluppo economico sostenibile) is the one that monitors the progress made so far towards energy efficiency. In its latest report published in 2017, it states that the results obtained so far are encouraging and that they are placing Italy as “best practice” in the EU scales²⁶⁶.

Since 2008 Italy has drafted policies that focus on energy efficiency and with the recent NES, energy efficiency has become a national priority. With the national strategy, Italy wants to advance the low-energy consumption initiatives with the “best cost/benefit ratio”²⁶⁷ possible, in order to achieve the goal of 30% energy saving by 2030. In order to achieve the goal of 9 Mtoe of reduction in energy consumption in the period 2021 - 2030, while maintaining a constantly growing economy of 1% GDP per year, the NES has outlined some actions which should boost the growth of energy efficiency in Italy²⁶⁸.

For example, in the residential sector, the NES has planned to review Italy’s tax deduction scheme in order to strengthen investments on energy efficiency ²⁶⁹, to introduce an energy efficiency fund and encourage the development of “minimum performance standards”²⁷⁰.

In the transport sector, the policy to expand urban electric mobility and the refilling network for electric vehicles. In addition to this, the NES proposes to set up a tool that gives incentives to new vehicles proportional to the reductions of emissions and to the improvement of energy efficiency²⁷¹. Yet, so far not so many real initiatives that aim at expanding this sector (apart from the EU directives) have been enacted. It should be kept in mind that the transport sector accounts for 32% of the total final energy consumption in Italy ²⁷².

It should be remembered that the European goal is now to achieve reduction of energy demand by 27% by 2020 and by 30% by 2030. This means that Member States will

²⁶⁶ *Analisi e Risultati delle policy di efficienza energetica del nostro paese*, Agenzia Nazionale Efficienza Energetica (ENEA), Roma, 2017

²⁶⁷ *ibid.*

²⁶⁸ *ibid.*

²⁶⁹ “so-called “Ecobonus” – pag. 18, *ibid.*

²⁷⁰ *ibid.*

²⁷¹ *Analisi e Risultati delle policy di efficienza energetica del nostro paese*, Agenzia Nazionale Efficienza Energetica (ENEA), Roma, 2017

²⁷² *Energy Policies of IEA Countries, Italy, review*, IEA, 2016

have to increase energy saving by 1.5% per year on average²⁷³. Furthermore, there is a directive (the so-called Energy Efficiency Directive) that imposes an annual decrease of 1,5% in the final energy consumption in the period 2021-2030 as compared to a reference period (2016 – 2018)²⁷⁴.

Nonetheless, EU energy efficiency on average has not increased. On the contrary, it has decreased by 23% compared to 2000 and by 12% compared to 2010²⁷⁵. This is why in its latest climate package, “Clean Energy for all Europeans”, the EU has placed energy efficiency as a priority, pointing out the importance of a governance model that focuses on energy efficiency called “putting energy efficiency first”, in the understanding that such model can promote growth of economy, sustainability and employment²⁷⁶. In the list of European countries with biggest energy intensity Italy still holds the sixth place because of its poor energy efficiency.

Over the recent years, Italy passed measures to improve energy efficiency: regulatory measures and economic instruments like tax incentives²⁷⁷. These should allow Italy to decrease primary energy consumption by 24% by 2020²⁷⁸ and to even exceed the EU energy efficiency goals.

In order to boost improvements in efficiency, the Government in 2016 tried to define the role of the public administration and the white certificate scheme²⁷⁹. The latter has been established on energy saving obligations that push electricity and gas distributors to reach the “annual targets of primary energy savings”²⁸⁰. This scheme, at its core,

²⁷³ *Rapporto annuale Efficienza energetica Analisi e Risultati delle policy di Efficienza Energetica del nostro paese*, Agenzia Nazionale Efficienza Energetica (ENEA), 2017

²⁷⁴ *ibid.*

²⁷⁵ *Rapporto SDGs 2018 Informazioni Statistiche per l'agenda 2030 in Italia, Prime analisi*, Istituto Nazionale di Statistica (Istat), Roma, 2018

²⁷⁶ *ibid.*

²⁷⁷ “and an innovated trading mechanism, the WCs scheme. These measures are not cumulative and have contributed to energy savings above the intermediate target set by the NEEAP.” – pag. 72, *Energy Policies of IEA Countries, Italy, review*, IEA, 2016

²⁷⁸ *Energy Policies of IEA Countries, Italy, review*, IEA, 2016

²⁷⁹ “The tradable WC system, which began to operate in 2005, is one of the first market mechanisms for energy efficiency in Europe. It is a trading incentive scheme that requires electricity and natural gas distribution system operators (DSOs) with more than 50 000 customers (“obliged parties”) to achieve yearly energy saving targets. They can do this either by implementing energy efficiency solutions themselves, or by buying certified savings from other (non-obliged) DSOs, energy service companies (ESCOs) and other entities that have an appointed energy manager or an ISO 50001-certified energy management system in place.” – pag 57, *Energy Policies of IEA Countries, Italy, review*, IEA, 2016

²⁸⁰ *ibid.*

has a criterion that the only savings that are considered are the ones that are reached “above the market average or above legislative requirements”²⁸¹.

The area that is among the lowest in the EU is the household energy efficiency and it is not improving. The technical standards and regulations for energy saving measures in buildings are issued by both national and regional governments, thus creating sometimes different standards and regulations²⁸² in the various regions of the country. The real problem is that some regions have implemented “a clear reference system for the registration of the energy performance certificates”²⁸³ while other regions have not done it yet²⁸⁴. Because of this, only a national monitoring system could harmonize the situation, it could strengthen the “implementations of the standards”²⁸⁵ and it could be moving forward to achieve energy saving at acceptable levels.

Even if the energy efficiency area seems to have the financial support necessary for achieving the fixed targets, there is an area that seems to enjoy a stronger financial support: renewables, a field which is more profitable and more directly connected with the EU GHG emissions targets. In the next section, we will be surfing Italy’s performance with renewables, in which the country’s achievements have played a different tune.

Italy’s performance with renewables compared to other Member States

In 2015 the energy production in Italy was 35.5 Mtoe, which was composed by renewables for 68.4%, broken down into: waste and biofuels 32.2%, geothermal 15.4%, hydro 10.6%, solar 6.6% and wind 3.6%²⁸⁶.

²⁸¹ *ibid.*

²⁸² “[...] a national level that establishes the national minimum energy performance requirements and a regional or local level that may be more stringent.” – *ibid.*

²⁸³ *ibid.*

²⁸⁴ “by the end of 2012, 11 Regions and autonomous Provinces out of 20 had enacted local transposition of the EU Energy Performance of Buildings Directive (EPBD).” – *ibid.*

²⁸⁵ *ibid.*

²⁸⁶ *ibid.*

It is to be pointed out that for what concerns the decarbonisation goal, Italy is leading the way among European countries, while fixing a further 21% emissions reduction by 2020 compared to the emissions level of 2005²⁸⁷.

In conclusion, the Italian policy is to maximize energy production from renewables, to increase sustainable mobility and reduce emissions in those sectors that are not covered by the ET scheme²⁸⁸.

Thanks to the EU directive of 2009, there is a clear path to follow for reaching the 20% renewable energy target. Under the terms of the directive, each Member State is to set an individually binding renewable energy target, which will contribute to the achievement of the overall EU goal. Member States are to achieve their individual targets in the heat, transport and electricity sectors and, apart from a sub-target of a minimum of 10% in the transport sector that applies to all member states, there is flexibility for each country to choose how to achieve their individual target.²⁸⁹ Italy fixed a target of 17% of renewables in energy final consumption by 2020²⁹⁰, which the country already reached in 2014.

As a matter of fact, at national level, the growth of renewables in primary energy generation increased from 6% - 8% in the early 2000's to nearly 20% in 2016, while the energy end use from renewables increased from 7.9% to 17.6% in 2016²⁹¹, i.e. 0.6% more than the national target for 2020²⁹².

Thus, Italy is leading the way for what concerns renewables, in line with the decarbonisation goal.

These data put Italy above the average of the EU and they also show that the country has reduced its dependence on imported energy sources²⁹³. In fact, the percentage of energy imports decreased from 87% to 78% in the period 2000-2016, while in the EU on average it increased from 47% to 54%²⁹⁴.

²⁸⁷ *ibid.*

²⁸⁸ *L'Italia e gli Obiettivi di Sviluppo Sostenibile, rapporto ASVIS 2017*, Roma, 2017

²⁸⁹ *Energy Policies of IEA Countries, Italy, review*, IEA, 2016

²⁹⁰ *ibid.*

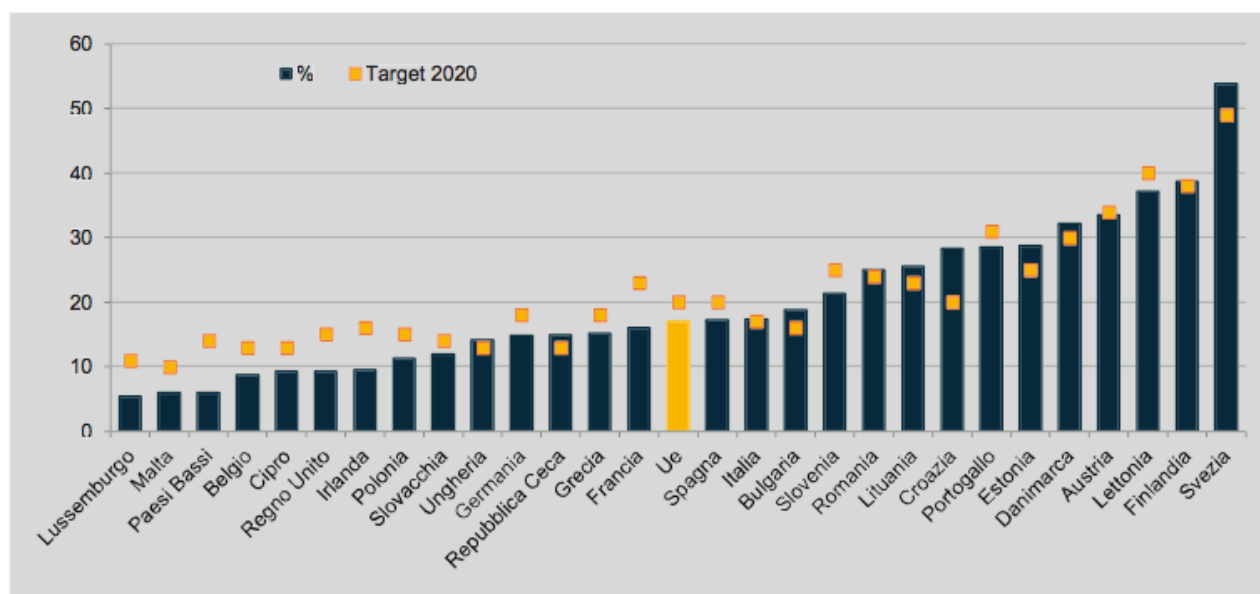
²⁹¹ *Energia pulita: dalla Sen a una strategia Energetica, Climatica e Ambientale*, ASviS, <http://asvis.it/goal7/home/401-2264/energia-pulita-dalla-sen-a-una-strategia-energetica-climatica-e-ambientale>

²⁹² *Energy Policies of IEA Countries, Italy, review*, IEA, 2016

²⁹³ *Rapporto SDGs 2018 Informazioni Statistiche per l'agenda 2030 in Italia, Prime analisi*, Istituto Nazionale di Statistica (Istat), Roma, 2018

²⁹⁴ *ibid.*

Consumi di energia coperti da fonti rinnovabili, per paese - Anno 2016 (percentuale del consumo finale lordo di energia)



Fonte: <http://ec.europa.eu/eurostat>

Source: *Rapporto SDGs 2018, Istat*

As far as the role of the renewables in energy consumption is concerned, Italy is performing better than countries like the UK, Belgium, France, Germany and the Netherlands (see graph above) ²⁹⁵. Nonetheless, this is remarkable, because Italy started this program later than other countries. Since 2014 the country has been leading the way into the decarbonisation goal, thanks to his high share of renewables.

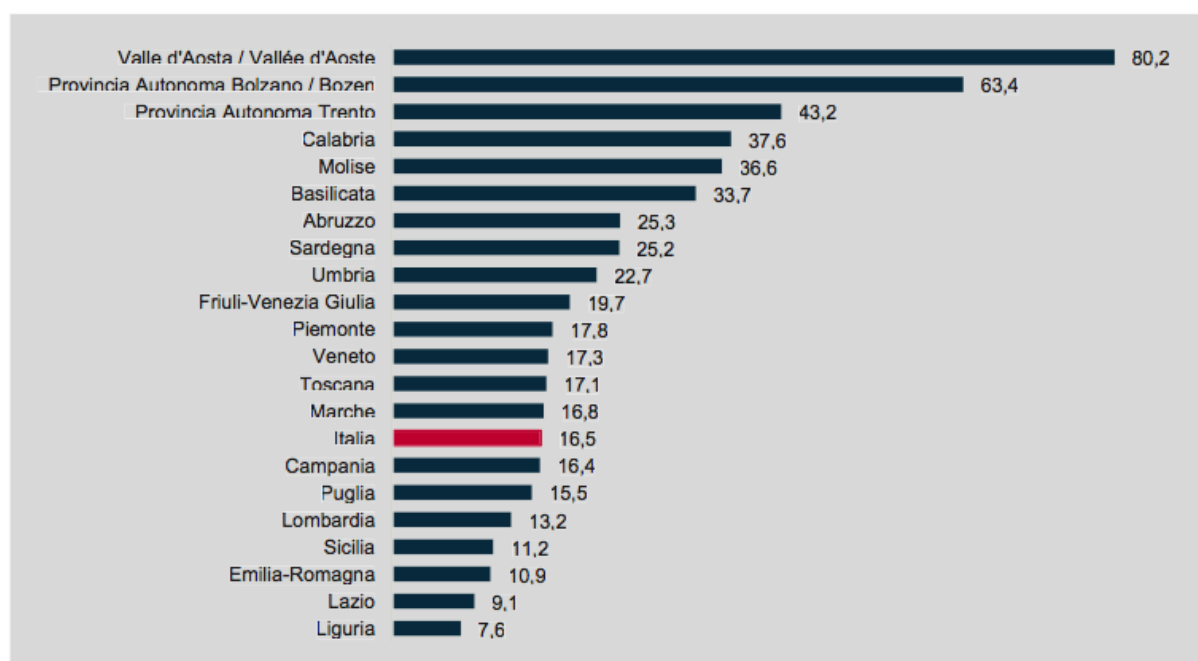
With the decree called “Burden Sharing”, every Italian region and province received an obligation to give its contribution in order to achieve the final national goal for what concerns renewables²⁹⁶. Regions are not totally free, as they still have to ask for State approval to their plans and strategies, but this bureaucratic burden did not prevent Regions from acting. In 2015 a large share of Italy’s Regions had achieved the intermediate goals fixed for 2016 and some of them had reached the 2020 targets in advance, as the graph below shows²⁹⁷.

²⁹⁵ *ibid.*

²⁹⁶ *ibid.*

²⁹⁷ *ibid.*

Consumi di energia da fonti rinnovabili (escluso settore trasporti), per regione - Anno 2015 (percentuale del consumo totale finale di energia)



Fonte: GSE- Gestore Servizi Energetici - Elaborazione e monitoraggio statistico degli obiettivi di consumo di fonti rinnovabili (SIMERI) (PSN:GSE-00002)

Source: *Rapporto SDGs 2018 Informazioni Statistiche per l'agenda 2030 in Italia, 2018*

These data confirm that Italy's contribution to renewables in Europe has increased remarkably over time (from 13.8% in 2005 to 33.1% in 2016)²⁹⁸ and it is still growing. Hydro power is the largest contributor, but other sources have grown remarkably, such as wind and especially photovoltaic solar (PV). In fact, in Italy there are 3.5 GW of photovoltaic installed capacity and according to TERNA²⁹⁹, only in 2016 PV provided 7.8% of the total electricity consumption³⁰⁰. In fact, since 2005 PV increased from about 0.03 Mtoe to 2.4 Mtoe in 2015.

Keeping these data in mind, it has to be remembered that the National Energy Strategy has fixed two types of goals for renewables. The first one is the same as the 20/20/20

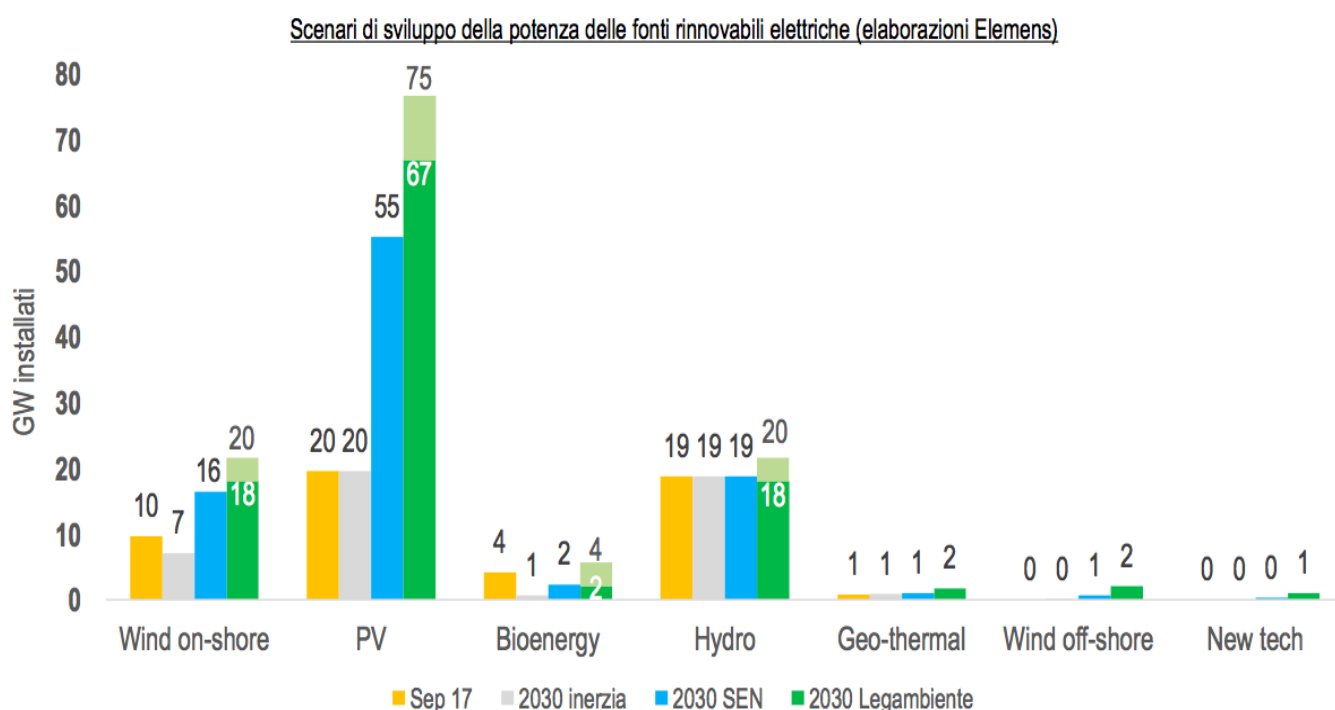
²⁹⁸ *ibid.*

²⁹⁹ "Terna is the majority owner of the Italian high voltage and very high voltage electricity National Transmission Grid. We operate in a natural monopoly and our public service mission is to secure the transmission and dispatching of electricity throughout the country. 90% of our activities are conducted in the regulated market. Our role is crucial in the operation of the entire system. We work to guarantee the supply of electricity to all, companies and private individuals alike." – *Introducing Terna*, <https://www.terna.it/en-gb/chi-siamo/ternainbreve.aspx>

³⁰⁰ "16.89 TWh or 8.3 % of the total generated during the first eight months of 2016. The highest monthly cover- age was in August, when PV electricity provided 11.6 % of the Italian energy supply" – pag. 27, *PV Status Report 2016*, JRC Science for policy report, Arnulf Jäger-Waldau, Luxembourg, 2016

strategy and the second one is to have 28% of renewables in energy consumption by 2030 and 57% by 2050.

If Italy wants to achieve these goals settled by NES, wind power installed capacity will have to be doubled and PV needs to be tripled. Legambiente³⁰¹ and Elemens³⁰² have developed a projection in order to achieve the targets for what concerns renewables, as shown in the graph below.



Source: *Roadmap di decarbonizzazione al 2030 e oltre, 2017*

The importance of renewables is crucial in order to keep going on the decarbonisation path that Italy wants to follow. Italy has a high share of PV generation³⁰³.

³⁰¹ “Legambiente is a non-profit association born in 1980. The mission of the association is to make the environmental culture the centre of a new kind of development and diffused well-being. Important values for the association are the improvement of environmental quality, the fight against all forms of pollution, a wise use of natural resources, the construction of a more balanced relationship between human beings and the nature” – *Who we are*, Legambiente, <https://international.legambiente.it/who-we-are>

³⁰² “Elemens is a consultation boutique specialised in the energy sector and it links a deep business and regulation knowledge based on a constant dialogue with the entire sector and on the dialogue with institution and big players in order to give to its clients strong, clear and original results.” – *Chi siamo*, Elemens, <http://www.lmns.it/#about>

³⁰³ “[...] provided 8.8% of electricity produced in 2014. In addition, wind generation accounted for 5.4% of electricity production in the same year” – pag. 93, *Energy Policies of IEA Countries, Italy, review*, IEA, 2016

PV capacities are uniformly spread across the country and the transmission grid does not have many problems to absorb it³⁰⁴. PV is the electricity generation technology that could reach the biggest share of energy supply in a decarbonised scenario, because it is made up of small modules that can be easily installed and easily de-installed and moved to another place. Furthermore, PV panels are the tool on which distributed generation is based.³⁰⁵

Thanks to this flexibility, there are companies that are actively employing this technology. One of the most important groups based in Italy, ENEL, is assembling new PV power stations with a bifacial technology (a new technology that will allow to produce 10-15% more energy with less panels) in order to have the highest possible efficiency³⁰⁶ and a cleaner energy system.

3.2 ENEL

Enel is “a multinational energy company and one of the world’s leading integrated electricity and gas operators”³⁰⁷. It operates in about 40 countries in all continents³⁰⁸.

The strategy of Enel is fully consistent with the EU and Italian energy policies and adopted four points of the UN Sustainable Development Goals (SDGs).

In particular they adopted the goals number 4, 7, 8 and 13 of the UN SDGs. In this framework, the Enel Group is making lots of efforts in order to let the highest number of customers achieve clean and affordable energy, due to its adoption of UN Sustainable Development Goal number 7.

³⁰⁴ “Challenges on the distribution grid involve overvoltage situations and 75% of all substations in Italy have reverse power flows during at least 1% of the year. This is a remarkably high share, considering that the power grid was not initially conceived with power flowing in this direction in mind. Curtailment levels are low, 1.5% of all wind generation and no PV generation had to be curtailed in 2013. This illustrates that the grid has been able to absorb current deployment levels. – *Energy Policies of IEA Countries, Italy, review*, IEA, 2016

³⁰⁵ *PV Status Report 2016*, JRC Science for Policy Report, Arnulf Jäger-Waldau, 2016

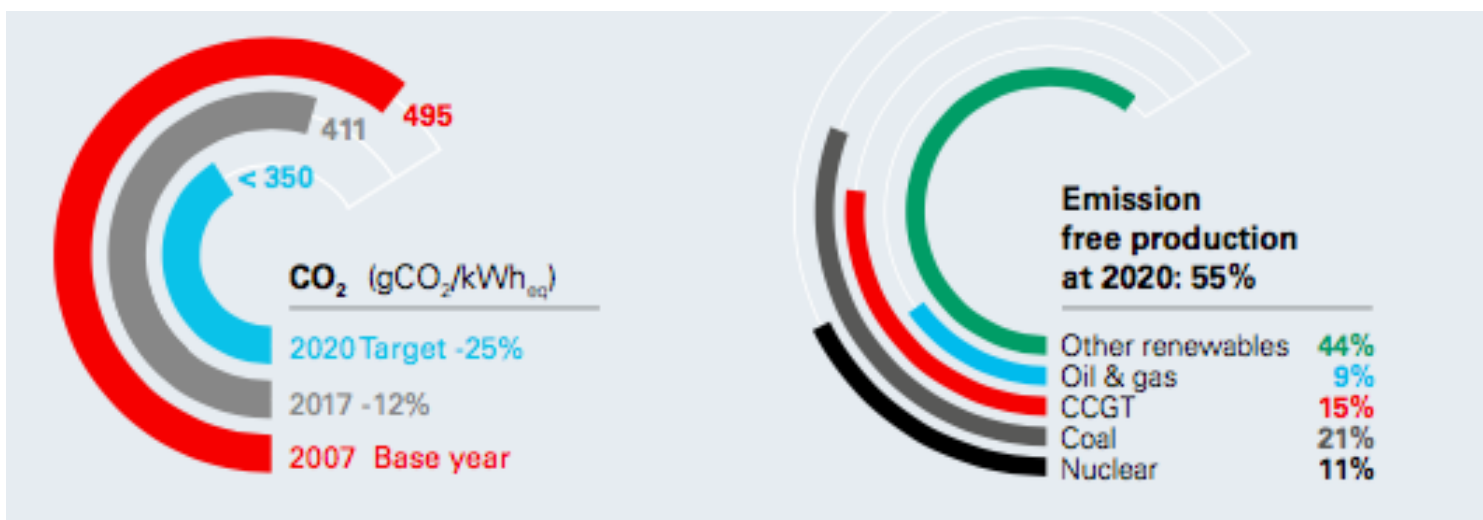
³⁰⁶ *3SUN 2.0: avviata la produzione di pannelli fotovoltaici bifacciali di ultima generazione*, ENEL green power, 2018 <https://www.enelgreenpower.com/it/media/news/d/2018/03/3-sun-2-0-avviata-la-produzione-di-pannelli-fotovoltaici-bifacciali-di-ultima-generazione>

³⁰⁷ *Who we are*, ENEL, <https://www.enel.com/aboutus/who-we-are>

³⁰⁸ *Sustainability report 2017*, ENEL

Thus, innovation³⁰⁹ and sustainability³¹⁰ are concepts at the core of the Group's policies. A number of their power stations are hydro, wind, geothermal and solar power plants, without forgetting other renewables that account for a very small percentage. This makes it possible that “almost half of the electricity generated by Enel be produced with zero carbon dioxide emissions”³¹¹.

Thanks to the goals that it fixed for itself and its internal governance, Enel is projected into the total decarbonisation of its plants by 2050. In order to accomplish that, the development of renewables is a priority for them. In every country in which it is present, the company tries to evaluate the renewable potential and develops it,³¹² in order to achieve that target of the reduction of CO₂ emitted from its plants in 2020 compared to the levels of 2007³¹³.



Source: Seeding Energies Sustainability Report 2017

The development of renewables and the decrease of its costs, especially in wind and PV solar, led to a boost of renewables uses which is the key to decarbonised systems.

³⁰⁹ “Innovation must be cultural, rather than technological, and that means being open to ideas that come from both inside and outside the company” – *Who we are*, ENEL, <https://www.enel.com/aboutus/who-we-are>

³¹⁰ “sustainability is therefore the locomotive of innovation and an integral part of our business in contributing to improving the world.” – *ibid.*

³¹¹ *Who we are*, ENEL, <https://www.enel.com/aboutus/who-we-are>

³¹² “Evaluating development opportunities in new countries with the aim of installing 7.8 GW of additional renewable capacity and reducing thermal capacity by 7.3 GW by 2020.” – pag. 132, *Seeding Energies Sustainability Report 2017*, ENEL

³¹³ *ibid.*

In order to achieve cleaner energy, the group also identifies Efficiency in its power plants as one of the keys to reach this goal, which is an intermediate step towards a decarbonized economy system.

This is in line with the goals of the Roadmap 2050 and on this particular argument, I asked Mr. Antonio Scala, Director of Renewables South America, if Enel is going closer to the decarbonisation goal.

Mr Scala answered that Enel, above all over the last years, has put at the centre of its attention the environmental issue and in particular the item of decarbonisation. Therefore, apart from the European targets, which in any event still are a reference point, Enel, as a company, has adopted its own targets. It follows that practically in all the countries in which Enel is operating, the company first rationalizes the existing thermal power technologies, then it proceeds to progressive phase out of thermal power plants (especially coal) and replacement with renewables technologies. Of course, the pace varies from country to country, according to the different market conditions and to the age of the plants. In any event, this is the common line of the Enel strategy, which is enacted in a strong and clear way. In other words, this strategy is carried out through modifications of some plants and decommissioning of others in the portfolio. It is a process that will require time, but Mr. Scala thinks that it will end much before 2050, even though there is no pre-defined date.

Thus, I asked him whether the emerging countries in which Enel operates will have any impact on its portfolio taking into account the Roadmap 2050 targets. He said that it depends on what it is meant by emerging, because Enel has a strong presence in Italy and in Spain but also in other parts of the world like the Americas, in which there are countries which are not considered as emerging countries. Let us think of the US, which has never been an emerging country, or Chile, which today is not considered as emerging. Regardless of the difference between emerging countries and Italy, in his opinion it is important to highlight the presence and impact of those non-EU countries on the portfolio. Take Chile as an example, or Brazil, whose classification as “emerging” is under question. Surely there is a big growth potential in countries that are not, technically speaking, emerging, but anyway countries with a very important growth rate, as is the case of Brazil, Chile and Mexico, in which there is a strong focus on developing renewables. Therefore, decarbonisation is not to be meant as closing CO₂ emitting plants in order to build new ones with renewables technologies.

Indeed, those American countries have a big concentration of renewables thanks to their high demand for energy, consequent to their dynamic economic growth. In these countries, there is abundance of renewable resources, i.e. lots of wind and sun, which allows for the construction of power plants whose kWh is produced at a low cost. Another important feature of these countries is the space that they have, which allows to construct big power plants. Thus, with a few projects, it is possible to install many megawatts and gigawatts of renewable capacity, that would cost much more if installed in Italy or in Europe, where space is scant. In the Americas, for example, installing 800 MW in one single site is possible, whereas in Europe we would probably need to install 1 MW on 800 different sites, in order to get the same result. If the former is complicated, the latter is certainly much more complicate. In one word, the absence of big spaces is one of the complexities that Italy and Europe in general have as of today.

Surely, this item brings many other questions, because constructing a power plant means administrative and authorization issues and logistical questions. This does not mean that Enel is abandoning the EU growth in this area, because there is growth of renewable capacity both in Spain and in Italy, and Enel is anyway interested in developing new plants everywhere. Of course, plant construction in Europe has different dynamics compared to the ones in the rest of the world (where many of the Enel investments are focused). This is because outside of Europe there is growing demand, there are natural resources and there is the space to host a big plant. All of the above result in low cost of the MWh produced with these plants. Construction costs are not as low as one might expect, because many of the factors employed in this process come from Europe or from the US, e.g. specific products, installers, specialized companies, etc. Therefore, it is not a question of low cost of the local labor but more a question of wind and solar resources and of the availability of spaces on which to construct plants. It is not even a question of the country's bureaucracy (which is also very complex in all these countries, like in Brazil) but only of spaces and resources. These are the main differences between EU and non-EU countries, regardless of them being called emerging or not.

Thus, in light of this and knowing the perspectives about the targets of the new EU energy path, I asked Mr. Scala if the EU heading towards private investments as the

key of development of new technologies and smart cities is the correct idea. Mr. Scala said that it is. Indeed, the present trend is towards private investments in order to develop renewable sources and smart cities. Also by taking into account the development stage of the technologies that we have. Whilst in an embryo phase it is difficult to imagine that the development may be left to private investments only, when we get to maturity, as in the case of renewables today, the driver certainly is private investment, both because of the technological revolution and of cost reduction, which are the key elements for widespread diffusion.

Remaining in the field of renewables, here the context is one in which at first there was technological development and a strong push originated by the European policies of incentives. This happened more or less in all countries (each of them with its own peculiarities) that started massive development of renewables. Now we are in a context in which the big growth of renewables in the world is no longer bound to incentives, but exclusively or mainly to the economic competitiveness that these technologies have reached. Another aspect having influence is the desire for a more environmental friendly context, but I stress again that the main ground is the drop-in costs of these technologies.

Therefore, the Enel investment plans are in line with the renewables path of the EU and as a matter of fact, in the report for the stakeholders it is specifically shown that the major part of the Enel investments in the near term will be on wind and PV.

I asked why only in these technologies and not also in hydro power. Furthermore, Enel operates in some non-EU countries and it would be interesting to know which is the one(s) that will have a major growth with this kind of renewables. On this, Mr. Scala said that Yes, Enel's growth is based (the most of it) on renewables, in particular on wind and solar. The Hydro that is mentioned in the report that I read is connected to old projects, mostly repowering of old hydro power plants. This is linked to a series of causes, first and foremost to the competitiveness of the generation from new renewables that are progressively acquiring larger diffusion at a lower cost and better efficiency. This also thanks to China, especially for what concerns PV panels. The situation is different for what concerns wind turbines, whose main producers are not necessarily from Asia.

Hydro power is a mature technology and a consolidated one. Therefore, today's power plants are not very different from the old ones and they are on average costly because of their complexity. A photovoltaic plant or a wind one is more flexible, because they only need analysis of the abundance of the resource and a site on which to install them. Hydro power needs a much more complicated study, design and construction. Constructing a hydro power plant takes years, whereas a PV or wind plant needs about 12 months. It is a question of how easy or complicate the engineering is. Furthermore, in areas like the EU in practice all hydro resources have already been exploited and there is very little left.

Places like South America, instead, have lots of hydro resources that are not utilized. Notwithstanding this, today very few new hydro power stations are being constructed. Mr. Scala explained that the scarcity of big hydro projects in the world depends on the one hand on costs and on the other hand on the environmental impact that this kind of power plants has. Indeed, in order to construct a hydro power plant, there is the necessity of building a big artificial basin, which means that the territory undergoes deep alterations and sometimes populations have to move. And this is something that Enel does not want to do.

Mr. Scala also pointed out that hydro is not an Enel driver anymore, i.e. that Enel is very careful about new power plants in terms of the environmental impact that they may have and a big hydro plant usually has a big impact on the environment. Therefore, Enel is not going to invest much on big hydro. Also, construction times play a role. The long times needed to build a hydro power plant are not in line with today's market. Today the market changes so quickly that by the time the power plant is ready, conditions may be totally different and the plant may not be needed anymore. Big hydro infrastructures were built more or less everywhere, during the first years of electrification of countries and these infrastructures were considered strategic.

The renewables infrastructures are quicker, easier and more cost-effective.

Thus, the scarcity of hydro investments does not depend on the scarcity of the water resource. In the EU and in Italy all the hydro resources have been used, but even when there are these resources, the idea of planning big hydro projects is put aside for the

reasons mentioned earlier: costs, environmental impact, competitiveness in the market of the new renewables technologies.

Solar and wind power plants are known for their flexibility and low cost. The latter also depends on the countries in which they are installed. In some countries solar is cheaper, in others it is the other way around. In Chile, for example, even if both solar and wind are very competitive, the solar technology is more performing than the wind, but in other countries, like Argentina for example, there is the opposite situation. Today the real difference is made by the abundance of resources, i.e. insolation and hours of wind. Both technologies are equally valuable from the Enel point of view. Solar, for some reasons, has even less impact on the environment compared to wind, which requires vaster territories.

For what concerns the decrease of hydro resources in the EU territory and Italy due to diminished hydrology, Mr. Scala said that because of the many phases of hydro, it is difficult to say whether there is an actual decrease of the resource or whether we are just in a phase of a cycle. Even in those countries like Chile that live on hydro and which over the last years witnessed hydrology halved vs what was in the sixties, it is not possible to say whether it is a cyclical phase or something permanent. The hydro infrastructures are destined to exist virtually forever and as a matter of fact many of them are 100 years old, still operating thanks to proper maintenance. Civil works can last forever if they are taken care of properly and the electro mechanic parts just need small interventions. Even from this point of view there is no need to construct bigger hydro power plants.

Furthermore, in its push towards green power, Enel goes beyond the EU and Italian policies which are monitored by the Division called “European Affairs”. This Division, among other tasks, monitors the legislative evolution at EU level and represents the Group itself on the field in relevant matters.

On this subject, I interviewed Mr. Daniele Maria Agostini, Director of the Enel Low Carbon and European Energy Policies Dept. of the European Affairs Division, about the EU goals and the leadership role of the Group.

The first question that I asked concerns the 20/20/20 strategy, its targets which are legally binding and the energy roadmap 2050, whose targets are not. Given this situation, it would be interesting to know how a multinational company such as Enel is organized and whether the targets, even the non-binding ones outlined by the roadmap 2050, are followed in those non-EU countries in which Enel operates.

In his reply, Mr. Agostini said that the roadmap targets, defined in general terms of decarbonisation within European scenarios, are indicative but nonetheless very important, because they highlight the direction that the energy sector is following. The main target is decarbonisation, already set at a level of 85%-95% several years ago, soon to be revisited. Indeed, a new document is going to be issued by the UN IPCC (Intergovernmental Panel on Climate Change), in which it will be urged to be quicker and do more. There will be a new impulse for everybody to do more.

As widely known, after Paris the impulse to face climate changes has not come only from Governments, but above all from all stakeholders, including firms. In this framework, Enel also is going far beyond what is being required by Governments, both because the company is convinced that decarbonisation is necessary and upon pressure by stakeholders. It follows that in Enel they think that the decarbonisation targets at 2050 are going to be increased in the short term and Enel is getting ready to face and lead this change, a change which is partially dictated by decarbonisation policies (and from this point of view targets are playing an important role), but above all by a multitude of global issues, like for example the urge to improve the quality of the air in cities, which means electric cars, and the issue of supply security, i.e. not being dependent on some areas of the world which are torn by conflicts (e.g. the Middle East). In this respect renewables and energy efficiency are the main tools to reduce this dependency. Last, but not least, there is a question of fast evolving technological progress, which has made big power generating plants obsolete or can quickly make them obsolete. Therefore, Enel is focusing on moving ahead in a world which is technologically much more fluid and dynamic.

This trend is going very fast in Europe, because in Europe there is strong pressure in this direction which is dictated by the urge to face climate changes, to secure air quality and supply security. Being Enel leader in Europe, all the competences acquired in this

continent are transposed to the activities performed in other continents in which the Group is present, i.e. North and South America, but also now Asia and Africa, although Africa in its portfolio has a particular position. The Enel presence in Africa includes Morocco, South Africa and a few more countries.

My second question concerned the 20/20/20 targets. Bearing in mind that these targets are legally binding, because transposed into Directives, whilst the targets at 2050 are not, I asked about the way electric utilities are living this situation and whether they are in line with the 2050 targets anyway or are waiting for them to become legally binding before acting.

Mr. Agostini said that also in the 20/20/20 strategy there are targets “which are not legally binding, for example those connected with energy efficiency”, whilst others are. In renewables, there are legally binding targets, as well as in CO₂ reduction, which affect not only Member States, but also utilities and energy intensive consumers through the cap and trade scheme. All targets in the 2050 documents are indicative. In fact, a new European package has just been passed that, in view of the 2050 targets, fixes goals at 2030 for CO₂, renewables and energy efficiency. Thus, also the non-legally binding targets of the 2050 strategy are quickly being changed into legally binding ones to be achieved by 2030.

Enel takes these targets very seriously and the European Affairs Division is on the front line in an internal project called “Energy Transition Roadmap”, in which it has been taken for granted that there will be this 85%-95% reduction by 2050 and Enel figures out which kind of trajectories all the sectors in the economy have to follow in order to achieve that goal. Of course, some sectors have more aggressive trajectories than others, such as renewable sources, where penetration is being so fast that Enel is expecting it to accelerate even more, with more challenging results to be achieved in the short-medium term. Other sectors are lagging behind: the building industry, for instance. Transportation was lagging behind, but today is catching up thanks to electric cars that are contributing to the achievement of the decarbonisation target and above all to the improvement of air quality.

Thus, in every country in which Enel operates, more than 30 indeed, Enel figures out a roadmap of how the country will change and how the Group thinks it should change

and a dialogue is set up with the local Governments, in order to understand these trajectories with them and, consequently, the Group adapts its industrial and strategic plan in accordance with these trajectories. Therefore, the answer to the point in question, is yes, even the non-legally binding targets at 2050 for Enel are important references, because they think that these paths, these roadmaps, will be shaped not only by compulsory governmental policies, but also by the pressure of stakeholders, in this moment the financial community and environmental associations, but also customers.

Furthermore, The Group is taking into account both the legally binding targets and the non-legally binding ones, in Europe and in other countries, too, such as those of South America which are becoming more aggressive for what concerns renewables. This because of the Paris treaty, which stimulates the international community in order to take the climate change problem seriously. China, for example, has become very aggressive in the renewables sector.

The third question concerned the electricity price forecast which is stated in the Energy Roadmap 2050. Prices that should go up until 2030 and then gradually decrease up to 2050. Enel's view in this respect and their expected position in the market to come is slightly different from the Roadmap 2050.

Mr. Agostini said that is true that Roadmap 2050 expects increase in electricity market prices, but it also gave important considerations about the correlation between price trends and the structure of the electricity market itself. At the moment, the electricity market, especially in Europe, is predominantly structured on the spot market and this reflects the marginal cost. The new low-carbon assets of renewables have a price structure completely different. Indeed, in this technology the marginal cost is very low, while the fixed cost is very high. Thus, the present electric market structure is not suited for a strong penetration of renewables and for this reason Enel is pushing for changing this structure through advocacy actions and it is also pushing for a structure based more on long-term contracts, in which since the beginning the parties agree on a price for this technology that would last for 10, 15 or 20 years. This will drastically change the price behavior and, in his opinion, these predictions of increased prices are linked to the present nature of the electricity market and might not happen. These projections could happen only if policy makers would be unable to change the

regulatory structure of the markets. Then, in conclusion, with the actual system it is possible that we would witness the price increase envisaged in the document, but Enel is confident that it will soon be understood that the system needs to be changed. Additionally, there is an issue on energy efficiency, whose investment structure is similar to the one of renewables, i.e. high investments at the beginning (as in renewables) then benefits for the next 20 years. This structure does not get along with a kind of remuneration that envisages a remuneration based on the spot market and electricity prices that can go up and down.

There are then two kinds of uncertainty: the regulatory one, that has just been depicted, and the commodity price trend one. There are different and diverging visions on gas and coal prices trends. Thus, depending on the price trends of these technologies (especially gas, that should be the technology that will set the marginal cost on the spot market) prices for electricity will be affected accordingly. Some see gas market prices stable, others are convinced that prices will go up and this is a strong uncertainty. In this respect, it is difficult to predict prices. Nonetheless, Enel is acting in order to have a portfolio that will be resilient to price changes. This is very important, because accessibility to and price of electricity is a subject that is gaining momentum more and more.

The fourth question concerned the Enel relationships with local communities when investing in renewables. In the document “investor presentation 2018-2020”, a document that shows Enel’s performance and investments, it is stated that the Group is strongly investing in renewables and this is in line with intention of the EU and the international community. The interesting point is that Enel is investing more in PV and wind than in hydro power. I asked why.

Mr. Agostini pointed out that big hydro power plants are facing various problems, especially those projects that envisage big basins. These problems involve acceptance by local communities, who are more and more rejecting the idea of hosting big plants on their territories. Thus, even if Enel is making lots of efforts in order to develop a shared view and walk along common paths with local communities, the result is controversial and implementation times can be very long. Thus, as far as hydro power is concerned, Enel is investing more on small run-of-the-river power stations, which do not have big acceptance issues and imply smaller investment sums, smaller capex.

Therefore, it is more an acceptance issue than a resource availability one. Of course, the question of water availability has its importance due to climate changes, but at the moment this investment trend is dictated more by acceptance issues than by other items. The approach that Enel holds when constructing a power plant is called Creating Shared Values (CVS) and it consists in assuring the acceptance by the local communities of the construction sites and the power plants. With big hydro plants this is often very difficult also due to the necessity to displace people from one area to another.

The fifth question concerned the Enel position as a European and world citizen when operating in non-EU countries and whether there are any particular constraints from being a big multinational utility with headquarters in the EU.

Mr. Agostini clarified that while operating in non-EU countries, there are no constraints coming from its being a European company. Enel is a large multinational company with assets in more than 30 countries and operations in 40 countries, it has access to international financing and for this it is subject to the scrutiny of international, global, advanced stakeholders and to their pressure. Because of the size and global presence of the company, there are expectancies as to its behavior, especially if the Group intends to maintain its present leadership role. Leadership implies the ability to behave in an ethical way. Then it is more a matter of the Enel global nature and its will to be a leader in the energy sector than real constraints that can come from the EU or other sources.

The sixth question concerned the Enel interactions with local governments as a stakeholder of the countries in which they operate.

As a matter of fact, the consultation of companies such as Enel in Governmental legislative and policy processes is a standard procedure in Europe and Italy. As I said earlier, when the Italian National Energy Strategy was drafted, stakeholders and private entities were consulted. Even the EU Commission does this regularly. It would be interesting to know whether this practice exists also in the other countries where Enel operates.

Indeed, Mr. Agostini confirmed that Enel is consulted in all the countries in which it is a large local operator, as in Argentina, Chile and Colombia. Furthermore, thanks to

the internal roadmaps mentioned above, Enel can set up a dialogue with local Governments about their national energy strategies. For example, in Chile Enel is currently discussing the “coal phase out” in the framework of a decarbonisation scenario. The Paris agreement has certainly contributed to consolidate this practice by Governments of setting up consultation roundtables with stakeholders. Enel, being a large utility and a sectorial leader, especially in fields as smart grids, renewables, electric mobility and other, is regularly consulted thanks to its being a big industrial operator and a large investor in the countries in which it operates, in order to review development perspectives jointly.

CONCLUSIONS

The importance of energy and environmental policies in today's world has been increasingly clear. Public opinions and governments, with the strong contribution and backing of international organisations, are more and more aware of the necessity of a strong international team play in order to fight against climate change and improve life quality of the world citizens, of both the people who live in developed areas, especially in big cities, and of those living in developing countries. In these last countries, there is an additional effort, i.e. bringing clean and affordable energy to those who do not yet have access to it, as stated by the UN in number 7 goal of its Sustainable Development Goals (SDG). Within this framework, the EU has been committed to a more environmentally friendly energy system.

Thanks to the EU history of environmental and energy policies, made of plans and interventions that start as early as in the 70's, today the EU enjoys a leadership position in this field. Although the first drivers were economic ones, the main one being the concern about completing the integration of the European market, the policies enacted over these years certainly have improved the quality of life of the European citizens. Indeed, since when the Community realized the correlation between correct energy use and production with protection of the environment, several measures have been taken and roadmaps have been drafted. Although the battle has not yet been won and the way is not over, for sure the life quality of citizens living in Europe has tremendously improved.

The analysis of the energy strategies, that have been issued at multinational and national levels so far, outlines the successful application of policies concerning both the development of a European energy market and care about the environment, whereby joining two targets that at first glance may look irreconcilable.

The goals in the field of energy, i.e. security of supply, low prices and decrease in polluting emissions, together with the recent progresses of technology, enabled the EU to enact strategies and guidelines that have already started releasing positive results. The EU issued a system of trading concerning GHG (especially CO₂) emissions. CO₂ is not a pollutant in itself, but the main culprit of the so-called Greenhouse Effect, and by trying to reduce these emissions the EU has been in the front line to fulfill the targets of the Kyoto protocol and then of the Paris agreement, all today in the framework of the UN Sustainable Development Goals.

This thesis focuses on the history and the development of the EU approach on the matter. Since the beginning, the main goal was the common market, then this concept was extended to energy and today the EU is the only multinational area in the world where a common energy market exists, with a strong plan for decreasing CO₂ emissions, increase energy efficiency and enhance the penetration of renewables. By boosting renewables, thanks to today's lower costs of the PV and wind technologies, the EU is also trying to lower electricity prices and reduce the dependency on imports of commodities from other countries outside the Union.

Today, the EU is a major innovator on renewables, the key to clean energy, and on energy and environmental matters in general.

Not only nowadays the EU has a leadership position for what concerns the energy market, but it is also advanced in the legislative field, thanks to its policies transposed into Directives. Even those policies that have not yet been transposed into Directives are a guideline to States and private companies.

The EU plans to achieve 20% energy production from renewable energy sources across Europe, in order to reduce the share of thermal power plants in electricity generation and thereby decrease greenhouse gas emissions. In this respect, the EU target is to get to a 20% reduction compared to the levels of 1990. Not an easy target indeed. Some countries, though, have come close in reaching the 2020 targets in renewables share and Italy is one of those.

Already in 2014, the country reached the share of renewables required by its national strategy plan, even though at the start it was lagging behind the rest of Europe.

In Italy, there are excellences worth mentioning and as an example of them I took a company which is very active in both energy and the environment, a company that this year, too, Fortune magazine inserted into the list of the 50 companies that can change the world, list in which in 2018 it holds position number 28. This company is Enel. It was born in Italy as a State-owned monopoly, “Ente Nazionale per l’Energia Elettrica”, then became a joint-stock company and, thanks to the EU who pushed to open up the electricity markets in Europe, it was forced to drop its monopolistic position in Italy by selling part of its assets and business. This gave it a push towards international expansion and today Enel is a big successful multinational company, with assets in more than 30 countries and operations in 10 more. The achievements of the Group are many and impressive.

I believe that the interviews with the top managers that I made firmly support my conviction of the high standing of the company. This standing is worldwide renown and one of the evidences is that Enel is among the stakeholders regularly consulted by the EU and by governments, both in Europe and outside, during the drafting of energy policies.

Furthermore, the Group has an ethic standing, too, that makes it an ambassador of sustainability. Enel publicly adopted 4 goals of the UN Sustainability Goals, precisely numbers 4, 7, 8 and 13. The credibility of Enel in its actions is shown by the ethic funds that regularly invest in its stocks.

The Group is a world leader in electricity generation from renewables, it is committed to develop innovative technologies like smart grids, smart meters and electric cars and has a plan for complete decarbonisation of its power plants worldwide. As mentioned earlier, the standing of the group is unquestionable, with deep commitment in sustainability and in preserving the world from climate change. The old State-owned monopoly is now a real public company, with its capital scattered among a multitude of shareholders, in which the Italian State is still the reference shareholder with about 30% of the capital and who still chooses the majority of the Board of Director members, including Chairman and Managing Director. With its results and reputation, it has proven that it is possible to conjugate profit and ethics, innovation and sustainability.

In conclusion, the path that we have followed in this thesis starts from the EU, the framework, the organization that aims at excellence in its deeds, that facilitates the emergency of other excellences, States and Companies, then we drill down into Italy, one of the EU most representative countries and arrive at focusing on one specific company with headquarters in this country.

All of these items tend towards a single point: the junction of economic achievements and success with good standards of life quality in harmony with the environment, the latter being the essence of the legacy that we are to leave to the future generations.

SUMMARY

Within the European Community a common energy policy began to be discussed during the earliest years of the seventies. Earlier on, energy policies were designed and enacted only at national level, because cooperation between member states was not easy to achieve, due to the fact that each state saw autonomy about energy matters as a strategic issue not to be shared with any other country. In the eighties, energy policy was boosted and the need for closer coordination between member states was pointed out, in order to focus on the question of energy supply, too.

The main item that drove the member states towards a common energy and environmental policy, though, was not concern for the environment, but economic reasons connected to the accomplishment of the internal market. In a moment of general awakening on environmental issues it was assumed that different environmental standards could hinder the free circulation of goods, e.g. cars that could circulate in a country, but not in another, due to different environmental standards. Indeed, after realising that environmentally friendly policies could bring some strength into the common market and boost national economies, environmental protection became more important.

Realising the importance of environmental protection, within the Community it was understood that policies at a national state level in this field were not effective and so the idea of a common policy strategy about energy and the environment gained momentum.

With the 2007-2009 action plan, the Commission adopted a European strategy called “20/20/20”, which is still today’s European energy policy strategy, from which some directives were issued, that made it legally binding among member states. In fact, up to 2009, the year when the 20/20/20 strategy was issued, Member States did not have any obligation to follow the strategy lines of the Community.

The legally binding goals of this strategy to be attained by 2020 are: 20% reduction of greenhouse gas emissions, 20% energy production have to come from renewable

energy sources and 20% reduction of energy use by enhancing energy efficiency . These goals aim at multiple results: first and foremost, improving the air quality within the Union, then contributing to mitigate the climate changes by reducing CO₂ emissions from industrial plants. As a by-product of these policies there are also economic benefits and the enhancement of supply security. By improving energy efficiency and by producing energy from renewables, dependency on imports from countries outside the Union will be reduced and the savings coming from both targets will be beneficial to the economies of Member States. In other terms, the strategy joins sustainable growth and climate friendly policies.

In order to achieve the targets, the Commission found it necessary to update the Emission Trading System (ETS), in order to achieve an eco-friendly economy. The ETS was considered an important tool to incentivize the investments needed. Furthermore, the ETS structure stimulates trading, because companies have to stick to a certain allowed level of CO₂ emissions, which is allocated by the national governments after the approval of the national plans by the Commission. Thanks to this system, a market of carbon allowances was developed because the companies that had not reached the level allowed could sell the remaining part to other companies that already reached and overcame the permitted level. This trade system helped even more in the cutting of GHG emissions³¹⁴.

The 20/20/20 strategy is not only about cutting emissions but also about promoting the usage of renewables. The required share of this kind of energy (in all its forms, i.e. mainly wind, solar and small hydro) has been fixed at 20% by 2020.

The main objectives that the EU wants to pursue then include: an integrated EU energy market and a decrease in energy import. In fact, the reduction of energy use through energy efficiency and the increment of renewables is the right path to decrease energy import from other states³¹⁵. As far as energy efficiency is concerned, the target is fixed at a 20% of saving by 2020.

³¹⁴ 20 20 by 2020 *Europe's climate change opportunity*, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, Brussels, 2008

³¹⁵“This reduces the exposure of the EU economy to rising and volatile energy prices, inflation, geopolitical risks and risks related to inadequate supply chains that are not keeping up with global demand growth” – pag. 3, *ibid*.

It is thanks to this strategy that the Lisbon Treaty, which entered into force in 2009, includes a section that deals with energy issues. The energy question was included in a clearer way, through the specific article 194 of the TFEU³¹⁶ that speaks about the internal market and includes the energy market, the energy supply of the Union and the promotion of energy efficiency, with a look at renewables³¹⁷.

Apart from this, the Treaty also establishes new rights for the EU Countries (like article 50 for those who want to exit the Union) and improves the area of policy making by giving new competencies to the EU, such as the “*passerelle clauses*”³¹⁸, the principle of subsidiarity and the common security and defence policies³¹⁹.

Furthermore, some parts of the Treaty specifically focus on energy supply and take into consideration energy security, which was previously reserved only to the single states. Even though collaboration among member states has been improved and institutions have been changed within the organisation, there are topics still dealt with at national level, such as the energy mix of each country and the conditions for exploiting local energy resources. On the other side, decisions of fiscal nature are voted by the council by following the rule of unanimous consent, after getting the advice of

³¹⁶ 1. In the context of the establishment and functioning of the internal market and with regard for the need to preserve and improve the environment, Union policy on energy shall aim, in a spirit of solidarity between Member States, to: (a) ensure the functioning of the energy market; (b) ensure security of energy supply in the Union; (c) promote energy efficiency and energy saving and the development of new and renewable forms of energy; and (d) promote the interconnection of energy networks. 2. Without prejudice to the application of other provisions of the Treaties, the European Parliament and the Council, acting in accordance with the ordinary legislative procedure, shall establish the measures necessary to achieve the objectives in paragraph 1. Such measures shall be adopted after consultation of the Economic and Social Committee and the Committee of the Regions. Such measures shall not affect a Member State's right to determine the conditions for exploiting its energy resources, its choice between different energy sources and the general structure of its energy supply, without prejudice to Article 192(2)(c). 3. By way of derogation from paragraph 2, the Council, acting in accordance with a special legislative procedure, shall unanimously and after consulting the European Parliament, establish the measures referred to therein when they are primarily of a fiscal nature.” – *Consolidated Version of the Treaty on the Functioning of the European Union*, Part three, Union policies and internal actions, Title XXI, Energy, <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A12012E194>

³¹⁷ “The article 12 first refers to the “functioning of the internal market” sticking to its roots, but then enumerates several innovations: (a) ensure the functioning of the energy market; (b) ensure security of energy supply in the Union; (c) promote energy efficiency and energy saving and the development of new and renewable forms of energy; (d) promote the interconnection of energy networks.” – pag 6, *EU Energy policy: From the ECSC to the energy roadmap 2050*, Susanne Langsdorf, Green European Foundation, 2011

³¹⁸ “Several so-called ‘passerelle clauses’ allow a change from unanimous decision-making to qualified majority voting and from the consultation procedure to co-decision (Article 31(3) TEU, Articles 81, 153, 192, 312 and 333 TFEU, plus some passerelle-type procedures concerning judicial cooperation in criminal matters)” – *The treaty of Lisbon*, Fact Sheets on the European Union, European Parliament, <http://www.europarl.europa.eu/factsheets/en/sheet/5/the-treaty-of-lisbon>

³¹⁹ “[...] the Lisbon Treaty introduces a mutual defence clause which provides that all Member States are obliged to provide help to a Member State under attack.” – *ibid.*

parliament. This is the first approach as a Community to the issues in question and it is thanks to this that the Commission has had the possibility to state a list of proposals that were implemented into directives concerning emission trading.

The actions described so far have made it possible to design the strategy that nowadays is used and known as “Energy 2020”, which is a document from the Commission to the Parliament that was published in November 2010 when the Community realized that the 20/20/20 targets will not be achieved by 2020.

Therefore, the new document focuses on priorities still in line with the old targets of the 20/20/20 strategy: “achieving an energy efficient Europe; building a truly pan-European integrated energy market; empowering consumers and achieving the highest level of security; extending Europe’s leadership in energy technology and innovation; strengthening the external dimension of the EU energy market”³²⁰.

With all these new targets and the approaching of the deadline (2020), in 2012 the EU issued a strategy called “Energy Roadmap 2050”, whose purpose, apart from indicating the way after “Energy 2020”, is the enhancement of investments in energy infrastructures. Furthermore, it has goals like reducing the greenhouse gas emissions³²¹ and decarbonisation (a reduction by 80%-95% in 2050 compared to the emission level of 1990) by still ensuring energy security and competitiveness³²².

In any event, the Roadmap has some controversial points, because the document does not abandon fossil fuels completely because it relies on the technology of CCS, which many see as unviable from an economic standpoint and potentially dangerous in case of accidents in the storage, a storage which is to be kept for an indefinitely long period. Furthermore, it still relies on nuclear, which many consider dangerous and non-economic³²³.

³²⁰ *Energy 2020 A strategy for competitive, sustainable and secure energy*, European Commission, Brussels, 2010, COM (2010) 639 final

³²¹ “to 80-95% below 1990 levels.” – pag.7, *EU Energy policy: From the ECSC to the energy roadmap 2050*, Susanne Langsdorf, Green European Foundation, 2011

³²² *ibid.*

³²³ “The Commission’s on-going reliance on fossil fuels and nuclear energy provoked harsh criticism from environmental groups and Green Parties. They excoriated not only the focus on outdated technologies, but also the scenarios on which these assumptions were built. They object to the Commission’s estimates of future price and security development of nuclear energy and carbon capture and storage (CCS) as overly positive whereas underestimating the potential of renewable energies.” – pag. 8 *ibid.*

“Roadmap 2050” has decarbonisation as its main goal, hinted at as an absolute necessity, because if mankind keeps on using fossil fuels, the environment will be seriously damaged, if not destroyed. Yet, there is still the question of how to get to this goal and what to use as a back-up to renewables, which are the key to environmentally friendly policy.

The importance of protecting the environment has been increasing during the years (the first time that the environment was brought up was in 1972, after a United Nation conference that was held in that year³²⁴) due to the understanding of the strict correlation between energy and the environment. In the beginning, as mentioned earlier, the economic motive was the one that drove the Community to make the first steps towards a common energy policy. The environment as such came at a later stage. Only in 1972 the Environmental issues were openly spoken about at the Paris Summit and, in the same year, the first Environmental Action Program (EAP) was launched. Six more followed up to 2016.

Thanks to the success of the EAP6, its concepts and ideas were extended into a new action program called “A good life within our planet”, which outlines the environmental policies up to 2020. The document envisages the new realities of the twenty-first century and the necessity of sustainable energy sources³²⁵.

With this scenario in mind, the Community then drafted the EAP7, which reinforces such goals as: urban sustainability, maximisation of EU policy effectiveness, financial resources to invest in environmental policies, improvement of natural capital, improvement of benefits of the EU legislation about the environment and continuation of the transition to a greener economy. Nowadays, the present European environmental policy is based on the EAP7 which was implemented in the framework of the Agenda 2020.

Remembering that it was an economic goal that drove the first approaches to the energy issues and to the environmental protection, it was pointed out that not only the preservation of the environment and the common strategy about energy would be

³²⁴ *Environmental action programmes in the European union - evolution and specific*, Vasile Popeangă, Professor PhD. University “Constantin Brâncuși” of Târgu-Jiu Faculty of Economics and Business Administration, 2013

³²⁵ *ibid.*

improving the life of the EU citizens, but also that there could be improvement for the economy at large by carrying out sustainable economy. It is today common opinion that there are incorrect relationships between economic growth and environment degradation. This relationship is due to the lack of consideration of the environment as an economic resource, which was fully the case until the sixties. Environmental resources were seen as public goods or goods that one could take for free. They did not enjoy any rights of property. For reasons like this, the market in general fails towards the environment, because it is unable to put a price on the environmental resources in order to distribute them in an efficient way³²⁶ and such policies as increase in investments and tax facilities could be harmful for the environment.

Thus, Giorgio Panella, in his book “Economia e Politiche dell’ambiente”, proposed to include the environment into the economic decisions in order to introduce a link of sustainability into them. Because of the incapability of putting prices onto resources, the reallocation of them can help the drafting of policies which support the correct understanding of the cost and benefit analysis that is key for an environmental friendly economy. With a cost-benefit analysis that includes the environmental effects, it is possible to measure in all its aspects if a policy is going to have more benefits than costs³²⁷. Even if this analysis does not calculate the allocation of resources in economic terms, policymakers choose to have the results of this analysis because it is the one way to predict the social welfare and the effects of the policy onto the lives of citizens in addition to the purely economic effects.

A glance at the process to enact a policy within the European Union in order to understand how environmental policies are made, too. It is a complex process, made complex in order to extract the best results. In order to outline the correct policy, the EU policy makers have to come across a number of institutional steps with several political institutions.

The journey of a policy starts with the Commission. Then, after some data collection, goes through the EU Parliament, the Council and, if an issue arises vs the existing treaties in terms of possible infringements, to the European Court of Justice.

³²⁶ *Economia e politiche dell’ambiente*, Giorgio Panella, Carocci editore, 2007

³²⁷ “If the benefits are indeed bigger than the costs, then the project or policy makes society better off as a whole.” – *Pricing Nature: Cost-benefit Analysis and Environmental Policy*, Nick Hanley, Edward B. Barbier, Edward Elgar Publishing Limited, 2009, USA

All in all, the entire political strategy is a joint product of the European Parliament, the Council of the European Union, and the European Commission (whose president usually determines the political priorities of his mandate and starts the process). Usually, it is the commission that starts the process but it can also be started by a EU citizen through a “European citizen’s initiative”, which in order to be eligible for analysis by the Commission, needs to have at least one million signatures³²⁸ of EU citizens who have reached the age to vote, gathered in at least seven EU countries. This journey is aimed at enhancing transparency in the policy of the EU and attain political consensus among the member states.

These passages constitute the decision-making process of a policy within the Community and by knowing that, it is possible to understand the importance of the Green Paper and of the White Paper. These two kinds of documents have specific importance, because the first one is the one that clarifies the situation on a certain matter which needs to be disciplined by a legislative act and this kind of communication is used specially to create a debate and to initiate a legislative approach on the issue³²⁹. The second one, the White Paper, is the one that usually follows the Green Paper and it contains proposals for the Union in order to take action to resolve issues. When this document follows the green paper, it is because the EU Commission wants to launch a consultation process.

The main goal is precisely launching a debate between the Council, the European Parliament and the stakeholders, aiming at getting political consensus on the matter under discussion. Thanks to the success of the green paper on energy and climate issues, the European Council urged the Commission to take further actions, and so it did. The Commission then drafted the “Energy Climate Package” which is made up of measures that establish the European new energy policy according to what was written in the Green Paper. Adopted in 2008, then two years after the release of the Green

³²⁸ *How decisions are made*, https://ec.europa.eu/info/strategy/decision-making-process/how-decisions-are-made_en

³²⁹ “Green Papers are documents published by the European Commission to stimulate discussion on given topics at European level. They invite the relevant parties (bodies or individuals) to participate in a consultation process and debate on the basis of the proposals they put forward. Green Papers may give rise to legislative developments that are then outlined in White Papers.” – *Glossary of Eur-lex*, https://eur-lex.europa.eu/summary/glossary/green_paper.html

Paper, the Package establishes the well-known paradigm that is still present in the EU policy: sustainability – competitiveness – security.

The package not only established this paradigm but also marked an important advancement known as 20-20-20 energy policy targets, i.e. decreasing greenhouse gas emissions, improving energy efficiency and increasing the role of renewable energies. All of them by at least 20%. The targets established in the package are very important, because during the last decade the share of renewables, within the Community, increased³³⁰. Knowing this increased share, another green paper was issued in which the achievements reached so far were set out and the possible solutions to achieve the goals fixed by 2030 were indicated. This new paper was drafted because the EU realised that the targets of the 20/20/20 strategy could not be achieved by the 2020 deadline, notwithstanding the efforts made. For this reason, in 2014 the Member States adopted the Communication “Policy framework for climate and energy in the period from 2020 to 2030” where new targets³³¹ were set in order to achieve the goals of the “Roadmap 2050”.

While the green paper and the communications in general are the starting point for a debate that focuses on certain issues, the white paper is the one that formally launches the process to take legislative actions (in order to make the solutions proposed effective) and the Strategic Energy Technology Plan is the one that gives the financial focus to support the areas that were pointed out in the framework mentioned.

Because the EU is part of the international community, it is clear that the Community is to coordinate actions with the UN Sustainable Development Goals (SDG). These SDG set up various goals and among them, there is one in particular that stresses the importance of accessing clean and affordable energy for better life quality of all the world inhabitants.

³³⁰ “...the share of renewable energy in the EU energy system grew substantially over the last decade, reaching a share of 15% of EU gross final energy consumption and a share of 25% of EU electricity production.” - pag. 3, *The Role of Natural Gas in the EU Decarbonisation Path*, Simone Tagliapietra, Fondazione Eni Enrico Mattei, 2015

³³¹ “The key 2030 targets are: 1) to reach at least 40 % cuts in greenhouse gas emissions (compared with the situation in 1990); 2) to reach at least a 27 % share of renewable energy; 3) to reach at least a 27 % improvement in energy efficiency” - *Energy Statistics introduced*, Eurostat, online publications, 2017

This is a confirmation that the EU is taking its actions not only to be leader of the sector but also to make a remarkable contribution to the cause with its pledge that the various documents and strategies hold.

Because of this commitment and in order to comply with the goals mentioned in the Roadmap and in the strategies, the EU has drafted plans to better allocate financial resources (SET-Plan), in order to increase the chances to achieve the main goal of decarbonisation which is one of the main pillars in the EU's growth agenda.

According to the EU Reference Scenario, by 2050 the mix in primary energy will have renewables as its main sources. Another aspect to be taken into account is the technological progress that occurred during the last decade. Indeed, the combination of the EU policies and the technological progress has allowed many countries to push ahead in changing and modernizing their energy matrices. Italy in particular, has been making great progress towards achieving the hoped share of renewables and a carbon free energy system.

When in 2008 Europe was struck by the economic crisis which led to decrease in energy demand³³² and, as a consequence, a diminution of investments in the supply and demand side³³³, Italy also registered a decrease in energy consumption during the period 2008-2013³³⁴. Nonetheless, the country made strong improvements towards the implementation of its energy policies, in line with the EU targets³³⁵.

Thanks to its National Energy Strategy (NES), a policy fully consistent with the EU 20/20/20 strategy and with the Roadmap 2050, Italy paved the way to make further steps in order to get to the top positions in this area. Drafted within the juridical scenario of the EU's "Clean Energy Package", the NES made it possible for Italy to be quoted as "best practice" in the EU scales for what concerns the development of renewables³³⁶. In the field of energy efficiency, Italy passed measures to improve it,

³³² *Energy Policies of IEA Countries, executive summary*, International Energy Agency, 2014

³³³ *The Impact of the Financial and Economic Crisis on Global Energy Investment, IEA background paper for the G8 Energy Ministers' Meeting 24-25 May 2009*, Ministero dello Sviluppo Economico, Energy Ministers Meeting, International Energy Agency, 2009

³³⁴ *Energy Efficiency trends and policies in Italy*, ENEA, Giulia Iorio, Alessandro Federici, 2015

³³⁵ *Energy Policies of IEA Countries, Italy, review*, IEA, 2016

³³⁶ *Analisi e Risultati delle policy di efficienza energetica del nostro paese*, Agenzia Nazionale Efficienza Energetica (ENEA), Roma, 2017

i.e. regulatory measures and economic instruments like tax incentives³³⁷ that aimed to allow Italy to decrease primary energy consumption by 24% by 2020³³⁸, i.e. to even exceed the EU energy efficiency goals.

With these measures to boost energy efficiency, it appears that the financial support necessary for achieving the fixed targets has been found. Yet, the sector which is the most profitable seems to be renewables, that has been showing good profitability since 2014.

Indeed, before issuing the National Energy Strategy, Italy reached a good quota share in renewables in 2014 (17% of renewables in final energy consumption), which is in line with the EU goal. Thanks to improvements in energy saving, in Italy “the GDP energy intensity dropped by 4.3% as compared to 2012”³³⁹.

For what concerns decarbonisation, Italy is leading the way among European countries. Indeed, this situation and the promising data collected so far show that Italy’s renewables growth in primary energy generation increased from 6% - 8% in the early 2000’s to nearly 20% in 2016, while the energy end use from renewables increased from 7.9% to 17.6% in 2016³⁴⁰, i.e. 0.6% more than the national target for 2020³⁴¹. These data not only show that Italy is above the average of the EU but they also show that the country has reduced its dependence on imported energy sources³⁴², in line with the EU wider goal about reducing energy dependency on other countries. In fact, the percentage of energy imports in Italy decreased from 87% to 78% in the period 2000-2016, while in the EU on average it increased from 47% to 54%

³³⁷ “and an innovated trading mechanism, the WCs scheme. These measures are not cumulative and have contributed to energy savings above the intermediate target set by the NEEAP.” – pag. 72, *Energy Policies of IEA Countries, Italy, review*, IEA, 2016

³³⁸ *Energy Policies of IEA Countries, Italy, review*, IEA, 2016

³³⁹ Pag 12, *Italy’s National Energy Strategy 2017*, Ministero dello sviluppo Economico, Ministero dell’Ambiente e della Tutela del Territorio e del Mare

³⁴⁰ *Energia pulita: dalla Sen a una strategia Energetica, Climatica e Ambientale*, ASviS, <http://asvis.it/goal7/home/401-2264/energia-pulita-dalla-sen-a-una-strategia-energetica-climatica-e-ambientale>

³⁴¹ *Energy Policies of IEA Countries, Italy, review*, IEA, 2016

³⁴² *Rapporto SDGs 2018 Informazioni Statistiche per l’agenda 2030 in Italia, Prime analisi*, Istituto Nazionale di Statistica (Istat), Roma, 2018

Since 2014 the country has been leading the way into the decarbonisation goal, thanks to his high share of renewables, that have put it in a better position than countries like the UK, Belgium, France, Germany and the Netherlands³⁴³.

These data and position could be achieved thanks to the efforts of the country, to some incentives given for the earliest installations (a scheme that was applied in many other countries, too) and to the action of companies operating in the energy field. One of the most outstanding of these companies is Enel, which is leader in energy generation, distribution and sale in Italy, but above all a leading company in generating energy from renewable sources worldwide.

I had the opportunity to interview two top managers of the company: Mr Antonio Scala, Director for renewables in South America and Mr Daniele Agostini, Director of the Low Carbon and European Energy Policies Dept. of the European Affairs Division. Mr Scala clearly confirmed the strong success of renewables in the world, the intention to increase the share of these technologies in the Enel portfolio and the phase out and decommissioning of the old thermal power plants belonging to the group. The interview with the latter, Mr. Agostini, showed the remarkable standing of Enel as an important stakeholder in all the counties in which it is present. Both the EU Commission and single Governments of EU and non-EU countries regularly consult the company on energy matters, upon drafting national strategies and in order to be updated on technologies and prospects for the future.

The commitment of the Group in leading into the decarbonisation scenario is a clear demonstration of a success company with a moral backbone about the environment and its commitment to a better quality of life.

All reasons why Fortune magazine in 2018, for the fourth time, put the multinational company into the list of the 50 private companies that can change the world.

³⁴³ *ibid.*

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