

Green Energy in Europe and SocioEconomic Impact

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Abstract

The pandemic crisis caused by the COVID-19 coronavirus in early 2020 resulted in a series of rapid developments in all areas of political, economic, social and technological life in every country and society, on a global level. The European Commission has announced the Next Generation recovery plan, with a budget of 750 billion euros for the period 2021-2027. The main scope for European Union is to create a greener, more digital and ultimately sustainable Europe, with increased resilience even in future crises. At the same time, energy is seen as vital for the development and prosperity of every country and society, let alone in today's era of interconnection, high technology and globalization. In this study, both secondary research as well as primary qualitative research took place with personal in-depth interviews with experts, such as academics, politicians and entrepreneurs, all of them considered as stakeholders in issues related to the "green" energy. The overall study produces useful conclusions and suggestions that can contribute to a better understanding of green energy and its economic and social impact on society. The new green deal seems to be a first-class opportunity for the radical restructuring of the European economy and the strengthening of institutions through a more dynamic, sustainable, green growth model that is expected to further shield society and the country from a new upcoming crisis which is likely to occur sooner and more ambitiously, according to what is happening in the global environment.

Keywords: green energy, green deal, EU policies, socioeconomic, financial mechanism

1. Introduction

The European Parliament, with regard to the recently announced Green Deal, stated that it aims to bring it at the heart of the European Union's (EU) recovery package, while in a resolution of 15 May 2020, it called for an ambitious recovery plan that is in line with the core of the Green Deal (EC, 2020). In the period of the pandemic, the impact of COVID-19 on public life has become unforeseen which finally resulted in a slowdown of global economic activities. In Europe, the Gross Domestic Product (GDP) declined by 3.8% in the first quarter of 2020 (Eurostat, 2020). At the same time, due to the reduced economic and social activity of citizens, a temporary reduction in energy consumption and CO₂ emissions appeared to be recorded, which may affect the energy mix and the subsequent retargeting of the Member States (European Parliament, 2020). The European Commission's communication on the European Union of the next year (Next Generation) sets out a recovery plan of 750 billion euros for the next period 2021-2027. This plan, together with the next long-term EU budget adopted by Member States and Parliament, aims to create a greener, more digital and ultimately more sustainable Europe as well as to increase resilience to other crises such as climate change. The newly elected European Commission has presented the European Green Deal, a roadmap for Europe that is expected to become a neutral continent from climate-harmful emissions by 2050 (EC, 2020). In this context, energy and how it is produced and used is a crucial factor for success and contribution towards achieving the 2050 climate-based targets set for climate change: a neutral continent with zero emissions of polluting exhaust gases into the atmosphere. The analysis of this transition and the socio-economic impact on the EU Member States, the local regions, the local communities and ultimately the European citizen are interesting and useful.

The main objectives of this study concern about the identification of the basic characteristics that make energy "green" and the mapping of the available financial instruments that can be used for the implementation of green growth in Europe. In addition, we try to identify the main social and economic outcome due to the implementation of the European Green Deal.

The transformation of the economy requires an appropriate management which will eventually help to avoid social and regional disparities between EU Member States. The main EU priorities outlined in the Energy Union strategy are also mentioned in the various funding programmes (cf. Horizon 2020, etc.) for which the EU needs to demonstrate their proper performance, impact and added value. For example, "Horizon 2020" is a financial instrument implementing innovation union, a flagship initiative aimed at ensuring Europe's global competitiveness. Horizon 2020 is seen as an instrument for economic growth and job creation having the political support of Europe's leaders and Members of the European Parliament, who agreed that research is considered as an investment for the future and that is why such a financial instrument has been designed at the heart of the EU's plan for smart, sustainable and inclusive growth and jobs.

The study, identification and recording of the social impact of each proposal for research and innovation is now a prerequisite and an evaluation criterion for all kinds of funded projects to be approved and implemented within the EU framework. In this way, an attempt is made to apply the principles of responsibility and transparency to transactions and actions, as well as to collect the necessary information and provide evidence for the effective and strengthening of the decision-making process. The various projects for approval and subsequent implementation, it is considered wise to include a study evaluating the effects, not only for the satisfaction and application of the principle of responsibility but also for the creation of new collaborative knowledge and its dissemination to other applications, stakeholders and regions in order to strengthen and strengthen them.

2. Method

The aim of this study is to identify the main parameters related to green energy in the EU. In addition, it tries to explore the concept of green energy, as well as to record the social and economic factors that are expected to be affected. An example of one EU member state is given, that of Greece. More specifically, the main aims of the primary research are to study and clarify the following:

- Identifying and describing the key characteristics and pillars that make the energy "green".
- Recording, comparing and summarising the main social and economic factors expected to be affected by green growth in Europe.
- Drawing useful conclusions and formulating proposals on green energy.

In general, each survey provides the possibility of collecting useful data necessary for an analysis that includes a wide range of perceptions and opinions. By that, it may enable the extraction of useful conclusions and the formulation of appropriate proposals. In this particular primary investigation, qualitative research was carried out. The research tool used for field research was an interview guide, with axes of discussion and open-ended questions, which was based on the relevant scientific literature from the fields of energy, environment and EU policies. In a qualitative survey, the sample is generally selected purposefully and is usually small (Merriam, 2009). In this research the sampling was appropriate and the snowball effect was applied: a non-probability sampling technique, with the sample group being able to it seems to grow like a rolling snowball, where one interviewee suggests another, and the interviews continue that way. The primary research concerned in-depth interviews, where experts on energy, green energy and EU policies, coming from the academic, politics and business fields. The design of the research and the main parts of it are briefly described below:

- Type of Research: qualitative research, using the basic protocol of the personal interview (face-to-face), with in-depth discussion.
- Research design: Nine (9) personal interviews.
- Sampling method: Purposeful / snowball.
- Sample description: three (3) politicians, three (3) academics and three (3) professionals/entrepreneurs, all of them related to energy, environment and policy issues.
- Method of recording: Use of appropriate audiovisual media (video/digital audio recording) and/or taking notes.
- Period: Two (2) months [July-August 2021].
- Documentation: Discussion guide, material sorting, survey profile.

3. Results

The results of this survey are presented below, by different category of participants while an overall summary and evaluation of the findings is also given.

3.1 Academia

Based on the research that took place among members of academia, the term “green energy” is finally understood as the energy produced in the cleanest possible form through primarily the exploitation of Renewable Energy Sources (RES). In other words, respondents understand the term “green energy” as the energy derived from clean and renewable resources, such as air, sun, water as well as the exploitation of organic materials like wood residues, agricultural and animal residues, urban residues and geothermal fluid. One responder replied that RES are expected to have a cost to the natural environment which is significantly lower than the existing methods of energy production and therefore does not pose a serious burden on the sustainability of the natural environment. There is also talk of linking green energy with a new model of energy resource management based on the principles of climate neutrality, energy saving and the circular economy. In regards to climate change, an opinion was given about the necessity for progress in de-lignification, combined with the elimination of fossil fuels and the simultaneous development and use of RES in Greece's energy mix. Based on the responses, three main characteristics of green energy stand out: (i) energy production that involves natural processes and they are naturally renewable, ii) energy produced from natural resources as mentioned above and (iii) energy which is based on the reduction of pollutants and is therefore environmentally friendly.

Regarding the evaluation of RES forms and their impact on green energy, there are different opinions. Some of the respondents consider that all forms of RES have strong dynamics, while greater dynamics are considered to exist in the case of wind and solar energy as they are RES with strong potential in Greece. At the same time, environmentally friendly RES such as hydroelectric power and biomass are considered to be promising. Also, geothermal and wave energy are considered to have very significant potential while green hydrogen was named as one of the critical objectives of Europe's energy transition. At the same time, some of the respondents share the view that the assessment of the dynamics of renewables should be done first on the basis of their efficiency compared to conventional forms of energy as well as based on the cost of production of each form of RES.

In regards to energy security in the EU, there was a reference to the European Green Agreement and its objectives. It seems that there is an expectation that green energy can make a major contribution to strengthening the EU's energy security and economy, as it can free it from major energy suppliers outside the EU, which can help improve external relations. At the same time, the importance of energy transition is reflected. On the other hand, reference is made to the harmonisation of Greece with the EU's objectives through the National Plan for the Energy and Climate (NECP). In addition, the country's commitment to proceed with the de-lignification was already declared, which in combination with the development of RES as well as storage, will be able to contribute further to the country's energy security. Concerning the expected impact of green energy on the economy, there is a convergence of views in two cases: (i) an estimation of lower production costs and thus benefits for consumers and the economy as a whole; and (ii) the creation of new positions; the work after attracting an investment as well as development of certain sectors that will take advantage of this transition, e.g. alternative forms of tourism. At the same time, possible impacts are presented such as:

- Production will not be vulnerable to external factors as resources are inexhaustible
- The environment is now the pinnacle in energy production planning, which will enable companies that spend money on environmental actions to invest it in other areas where there is a need.
- Improvement of the country's health system, due to the improvement in the standard of living resulting from the lower burden on the environment.

There is a convergence of views on the view that the sector most likely to be affected is that of work and training related to the necessary skills of human resources. The following are also mentioned:

- Current account balance.
- Public debt.
- In the field of international development cooperation, aid to the least developed countries will create synergies on science and technology and thus create a more robust framework for development aid action.
- Investments that will result from the development of RES.
- Cyclical economy.

Concerning the social impact, respondents mentioned that it is important to reduce energy poverty as it is considered to be related to the general well-being of society. In addition, the general protection of the environment is mentioned. A particular interest was also about the reduction of pollutants and carbon dioxide as there is a correlation between

the mental health of citizens and pollution: higher levels of pollution are correlated with mental health problems in the society. In general, it was found that Green Energy can contribute positively to society, reduce energy consumption costs as well as contribute to the social well-being.

3.2 Politicians

In the research that was conducted with politicians, the term “green energy” was understood as a form of energy which results from both natural processes and RES, such as air, sun and water. Some of the respondents referred to solar and wind energy with the need to adopt new technologies that will contribute to lower production costs. A typical example of an entirely green community is the island of Astypalaia in Greece, where it has been developed as an energy-autonomous island, operating exclusively with RES during last years. As key features of green energy are mentioned the lack of interventions in the natural resources (extraction, pumping, combustion) and at the same time the absence of release and creation of hazardous and nature-toxic gases and substances (carbon dioxide, toxic waste and hydrocarbons). It was also stated that green energy does not burden the environment and does not pose a problem to ecosystems.

As an evaluation of the dynamics of individual forms of RES regarding their impact on green energy, the significant impact of the use of domestic wind, solar and hydropower is mentioned. These forms of energy in the first quarter of 2021 were responsible for almost half of Greece's power generation, which according to some respondents it demonstrates the fact that RES could form the basis of the country's energy system. Examples of RES that may have a significant impact on the country's energy mix include geothermal energy, biomass, while biogas and wave energy/tide are cited as a smaller potential effect. In regards to green energy and energy security within the EU, reference was made to the European Green Agreement and its main objective to make the EU climate neutral by 2050 as well as the individual benefits of this objective such as economic stimulus, sustainable industry, reduction of pollutants. At the same time, there was an appreciation of the interviewees that the promotion of RES contribute a climate neutral by 2050 as well as the benefits of economic stimulus, sustainable industry, reduction of pollutants. Furthermore, there was an appreciation of the interviewees that the promotion of RES creates fertile ground for improving energy security and thus energy efficiency for EU Member States by reducing their dependence on traditional energy suppliers such as Russia. It was also estimated that the promotion of green energy within the EU would contribute to a better response to climate change as EU actors cease funding for fossil fuel-related projects and move towards environmentally friendly strategies.

Focusing on the economic impact of green energy, based on the opinion of the respondents, the promotion of RES seems to favor the economy of each country as investments in the production and storage of clean energy are constantly increasing. Moreover, it was mentioned that domestic energy production through RES could lead to less dependence on imported fuels, which in turn may contribute to easing the state budget and stimulate the country's economies. The sectors that are seen as mostly affected are industry, construction, transport and telecommunications. The areas that may take place changes based on the already existing elements of the country's planning for the green transition, are among others the following:

- De-lignization and the simultaneous reinforcement of RES.
- Dependence of EU Member States on energy exporters.
- Finding new methods of storing electricity.
- Energy security in Greece.
- Promoting electromobile transport and tackling energy poverty.
- References are also made to the low operating costs of RES, inexhaustible energy sources and private consumption.

Among the expected social consequences of green energy was seen society's awareness of the phenomenon of climate change. As ways of influencing green energy on societies, investments were mentioned by using the resources of the Recovery Fund which in turn would have a direct impact on society, improving the quality of life but also stimulating the economy through lower-cost energy management. In addition, it was stated that these investments would result in the creation of new jobs and RES will stimulate activity in local communities, acting decentralisedly in relation to the existing energy system. Finally, it is estimated that a society that consumes green energy will be less vulnerable to fluctuations in the price of traditional energy sources in times of crisis. There is a convergence of respondents with regard to working life, since it seems to be influenced first and directly by green energy, with further sectors including transport, more economical energy supply, stimulation of local communities

and decentralization of the energy system. On the other hand, it is believed that the green transition will affect all sectors of society horizontally and therefore there is no order of importance.

3.3 Entrepreneurs

In the business sector, the term “green energy” was understood as a type of energy produced with little or no carbon footprint on the environment. A typical example of green energy investments refers to wind farms with wind turbines, as well as photovoltaics, which are gradually replacing the traditional ways of energy production so far. Among the key features of green energy, respondents included the reduced production of carbon dioxide and the reduction of environmental pollution with waste.

In regards to the effect of RES on green energy, it was considered that solar and wind energy contribute more to energy production. Concerning green energy and energy security for the EU, a pan-European network was proposed since it could include an advanced battery system that would store unused energy produced and would provide proper channeling of energy according to the needs of each country at a given time. In regards to the economic impact of green energy on the economy, it was mentioned that new jobs would be created due to the production of required equipment for green energy applications which would increase the industrial production as a whole. In addition, renewables could replace fossil fuels once it would be possible to recoup the investment costs of renewables and thus the reduction of the dependence of the country concerned on fossil fuels. Finally, the sectors that could be affected are oil, shipping companies, real estate and construction of RES.

The social impact of green energy was also mentioned, with reference to the improved standard of living, especially within large cities, as well as the increased sense of responsibility and awareness of the environment among citizens. Also, the general awareness of society towards the overconsumption of energy is expressed, whether it is related to electricity consumption or transportation.

4. Discussion

Based on the previous analysis, a summary of the views is given herein, following the same grouping of responders. In addition, several policy proposals and actions are given for the EU Member States:

a) Academia, the following proposals are given:

- Emphasis on research and development of technology related to RES. This means further funding for universities and businesses for research, pilot applications of new technologies that will minimize the cost to the consumer and technological progress to reduce the cost of energy production from RES.
- Greater incentive to businesses to use green energy.
- Emphasis on education and the practical awareness of young citizens throughout school education, so that respect for the sustainability of the environment becomes part of the education of citizens.

b) Politicians, the following actions are mentioned:

- Wider coordination of Member States to strengthen research on the operation and storage of RES.
- Greater coordination in the context of the European Green Deal to better address problems in specific EU countries regarding their energy consumption mix.
- Adoption of legislation on carbon dioxide emissions by industry, but also the introduction of measures to reduce carbon dioxide emissions from vehicles.
- Implementation of taxation for polluting industries, charges for their emissions and proposals to promote investment in low-emission technologies.
- There is a proposal to reduce pollutants from vehicles through a gradual ban on the sale/use of cars with an internal combustion engine (petrol/diesel) and also support for the exchange/purchase of new electric vehicles through subsidized programmes.
- Subsidization of the utilization of RES and their adaptation to the respective area where they are installed (eg, in areas with a lot of wind, wind, in the high locations the solar thermal, etc.).
- Studies for investments in other forms of green energy, such as geothermal energy.

c) Entrepreneurs, the following proposal is indicated:

- Development and establishment of a green energy policy for the next 20 years with the aim of producing zero emissions within the major European urban centres.

In conclusion, a) academia focuses on research about the development and application of new technologies that can help any further development and consolidation of RES, b) politicians emphasize on the ways in which the political world can promote not only further research on green energy with additional funding, but also to establish legislation to contribute in practice to the protection of the environment, the acceleration of the addition of RES to the energy mix of each country and the reduction of pollutants from industries and vehicles and c) Entrepreneurs seem to be in convergence with that of the political space, from which it is proposed to establish a green energy policy in order to contribute to the reduction of pollutants within the large urban centers. Therefore, each field gives its own approach to the development and consolidation of green energy, with proposals that are, ultimately, complementary.

The demand for energy is constantly increasing, while at the same time society is trying to contribute more to the protection of the environment. Using clean energy sources as fuel, it seems that it is ultimately possible to achieve both objectives in the medium and long term. Over the last few decades, more attention has been paid to the environmental impact of the activity of various sectors of the economy, industry, transport and human activity. The ultimate shock is the reduction of dependence on oil and fossil fuels such as lignite and the transition towards a low- or ultimately zero-carbon economy. The energy sector is constantly influenced by business and technological trends, with new technologies and revolutionary innovation being able to drastically change today's world. During the 21st century, innovation in the energy sector is becoming increasingly important. Considering that CO₂ emissions contribute significantly to global warming and account for around 80% of all greenhouse gas emissions in the EU (Eurostat, 2020), innovation in clean energy is becoming a priority. Climate change, greenhouse gas emissions and reduced availability of non-renewable natural resources are driving the search for clean fuels and innovation. However, it should be underlined that a cleaner and more resilient future energy system with net zero emissions will require a wide range of technologies and some of them are still at an early stage of development.

Energy and the expected improvement in the areas of saving and its more rational use are expected to contribute greatly to the successful green transition, through individual actions related to the renovation of building facilities, use of appropriate materials, use of insulation materials and bioclimatic design in the architecture of buildings. In the transport sector, the electronic, the use and replacement of old-technology and internal combustion vehicles by green-based cars now seems to be a one-way street and to bring about major changes in motoring and international transport. The commercial use of advanced biofuels on a larger scale, the entry of fuel cells as a storage medium in almost all categories are developments that will drastically affect markets and design towards a sustainable and green economy in the EU. The requirements and obligations at state, business, social and individual level exist and will continue to be (re)shaped continuously, based on the developments in technology and the synchronization with the rate of their acceptance by the final consumer.

Based on the primary research carried out in the context of this study, its results on the socio-economic impacts of green energy can be summarized as follows:

Economic impact

- Expectations for lower production costs than in the case of fossil fuels.
- Improvement of country's energy security, since production will no longer be vulnerable to external factors because resources become inexhaustible (see renewables).
- Creation of new jobs after attracting investment in the industrial, construction, transport and telecommunications sectors.
- Improvement of the environment and the ecosystem, with consequent improvement of the country's health system, due to the better standard of living.
- A number of sectors that will take advantage of this transition, e.g. alternative forms of tourism, are flourishing.

Social impact

- The importance of a just energy transition and the fact of the major importance of mitigating energy inequalities in the transition to green energy so that there is no threat to the EU's energy security.
- Improvement of the quality of life of citizens due to the use of the resources of the Recovery Fund and the beneficial actions for the wider community.
- Cities are expected to become more sustainable in the future.

- Improvement of the mental health of citizens, due to the reduction of pollutants and carbon dioxide in the atmosphere.
- Sensitization of society towards the phenomenon of climate change as well as the overconsumption of energy that is deemed necessary to be reduced with the appropriate actions and way of living.

A key priority for the EU is also to provide financial assistance for the development of low-index/carbon footprint technologies, as well as a business model that will help to achieve climate change adaptation targets. Innovation offers the EU a strategic opportunity, as it is expected to increase its competitiveness in relation to the rest of the world and give it the necessary competitive advantage, capable of diversifying and improving its position on international markets. The low-carbon economy is expected to reduce the EU's dependence on fossil fuels and imports and thus contribute to the availability and security of supply and thus to its energy security. In this way, it will be possible to reorient the creation of added value within the EU. In the meantime, Europe's industry will be able to exploit from the path of the EU's green transition and thereby become a leading provider of advanced technology, especially with regard to Asian countries. At the same time, the EU has expressed its desire to become a leading provider of low-carbon technologies and green solutions, at a global level. The EU supports green technologies at all stages, from research and innovation to their market placement and commercial use.

The expected improvement in the issues of energy, environmental protection and, by extension, adaptation to the new conditions of climate change is in itself extremely demanding and unprecedented given the extent and quantitative targets set by 2050 so that the EU is neutral in burdening the environment with air pollutants. Such a green transition requires strong political will and actions that will ultimately affect the final consumer and EU citizen. The changes and consequences concern almost every sector of economic and social life: production units and movement of goods and products, transport, energy and living consumption, food and the environment, accommodation and health, well-being and mental state of citizens. Sustainable finance aims to support economic growth, while at the same time reducing pressures on the environment, tackling emissions of air pollutants, tackling pollution and minimising waste, as well as improving efficiency in the use of natural resources. The funded projects must take into account both climate mitigation and climate resilience. With its stance and actions, the EU is at the forefront of the fight against climate change, having adopted and implemented bold policies and measures, becoming a point of reference for setting standards and reference to the international arena.

Limitations on this research may be related to the fact that the announced Green Deal is in its early stages of implementation and it remains to be seen the level of its consistency. This is another area of future research that could take place, so that comparisons can be made between the initial and interim evaluations of the progress of the Green Deal. In addition, the primary research that took place as a qualitative research, can be further enriched with more participants as well as a new primary research to take place, which can be a quantitative research; in order to measure specific areas of interest and applications, with the possibility of prioritizing them and thus make suggestions for further improvement to the implementation of the Green Deal.

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