

RENEWABLE ENERGY - A KEY FACTOR FOR A SUSTAINABLE FUTURE**Marius – Sorin CIUBOTARIU***Ștefan cel Mare University of Suceava, 720229, Romania*
ciubotariumarius@yahoo.com**Abstract**

The aim of the article is to analyze and present from an economic and technological point of view how the entities in the energy sector, from renewable sources, end up producing electricity, energy so vital for all mankind. In order to achieve this objective, I will consider the presentation of the impact that renewable energy has on the national economy, focusing on the jobs it offers, and aspects related to the evolution of energy from renewable sources in the coming years.

Key words: *renewable energy; European directives; current stage and perspectives; the share of jobs.*

JEL Classification: *M41.*

I. INTRODUCTION

Over the years, the promotion of renewable energy sources in the energy production structure has already become a national goal for some industrialized countries and is also seen as a possible alternative solution to oil reserves.

Over the years, there have been several scenarios and hypotheses about energy sources, hypotheses that claim that they are limited and will end at the end of the present century, exhausting them as a matter of time. However, there is no well-defined certainty in this regard (Ciocan, 2017: 3). At the same time, it is estimated that renewable sources will receive more attention in the future, as fossil fuels are no longer a viable option, because their use is considerably reduced. This estimate is reinforced by current forecasts of the need for energy from renewable sources both globally and nationally, with a doubling of the demand for energy from renewable sources by 2050 (see <https://www.europarl.europa.eu/>).

Primary energy sources (such as oil, coal, natural gas, nuclear energy, etc.) are materials that can be transformed into energy products and made available for consumption. Some examples in this direction: crude oil is transformed into diesel, fossil, nuclear and renewable energy are transformed into electricity and other products alike.

Renewable energy means energy derived from a wide range of resources, all with the ability to renew, at the same rate as they are consumed. These energy resources can be used in the generation of electricity needed in all sectors of activity, as well as for the generation of heat energy needed for industrial sectors and home heating (Bulearcă, 2009: 11). Renewable energy is the key to the future in terms of "advancing civilization", and the evolution of human society depends on achieving energy conversion for the benefit of mankind. Few have questioned this hypothesis and most believe that the standard of living of civilization and its quality are proportional to the amount of energy consumed by society (Iancu, 2017).

Given the importance of renewable energy for society as a whole, the development of this energy sector is carried out under state supervision. Among the main objectives of renewable energy is to ensure the necessary conditions to meet long-term energy needs, at affordable prices, adequate for a modern market economy and a civilized standard of living, based on quality and environmental protection.

Energy is vital for everyday life because without energy, people and businesses cannot carry out their activities. "Energy is the dominant factor that determines the well-being of society and the factor that influences the level of development of all segments of a country's activity. It is the driving force in advancing the country and its long-term economic evolution. In order to achieve continuous and sustainable economic development, it is necessary for energy sources to be adequate and safe, at a reasonable price and to ensure the competitiveness of the economy and the country. The energy sector is a basic branch of the national economy, which, to a large extent, determines the success of programs for the development of the national economy, as well as stability in society, with the task of providing energy to all consumers in the country" (Arion, 2004).

According to the EU Directive 2018/2001 on the promotion of the use of energy from renewable sources, "renewable energy means that energy from non-fossil renewable sources, namely wind, solar (solar thermal and solar photovoltaic) and geothermal, environmental energy, tidal energy, waves and other types of ocean energy, hydroelectric power, biomass, landfill gas, wastewater treatment plants and biogas".

Renewable energy sources have a high energy potential and offer the possibility of unlimited use locally and nationally. Their capitalization can be achieved on the basis of three important premises, namely: accessibility, availability and acceptability. However, the biggest challenge in terms of transforming and using renewable energy is the instability and fragility of changes in nature. There are phenomena over which man has no control based on safety (such as control over the flow of energy generated by heat from the center of the earth, over that generated by the sun's rays, wind power, watercourses, etc.) and for this reason investors in this field must take into account the possibility of risks arising from the uncertainty of the manifestation of natural phenomena. At the same time, let us not forget the idea presented above, namely that these renewable sources are practically inexhaustible, this advantage being far superior to any level of risks that may arise during the process of transformation, processing and creation of energy from renewable sources.

II. REFERENCES ON THE USE OF RENEWABLE ENERGY

The use of renewable resources in energy generation has seen an upward trend in recent decades, the determining factor for this evolution being the research and accelerated development of new technologies (research that was possible only through financial support from several countries). It is interesting to note that although there have been initiatives to promote renewable resources since the early 1960s, the emergence of the renewable energy industry has its origins in the early 1970s when the alternative to fossil fuels was considered after the first oil shock.

The main developers of this industry were the Danish investors who noticed the huge potential of Denmark in terms of wind energy. Also during this period, one of the most severe energy crises took place. The world's major industrial engines such as the United States, Western European countries, Canada, Japan, Australia have faced major oil supply problems. This was the initial context that led to the development of the renewables industry.

The first measure to support this industry was adopted by Denmark in 1976. The measure consists of the use of funds from the charging of electricity to support the research and development of green electricity generation technologies.

In the early 1980s, the most widely used method of supporting the development of renewables was to provide investment subsidies, the best examples being the Netherlands, Denmark and Germany where preferential loans for wind turbines were offered as support. Germany is now the country with the most developed energy industry, based on renewable resources in the world.

During the years 1990 - 2000 in most European countries there were a number of methods to promote renewables using regulated tariffs imposed by law for the purchase of electricity from accredited producers. Thus, in the early 2000s the first directive regulating electricity from renewable sources was issued, due to the fact that the exploitation potential of renewable sources was used under optimal capacity and the fact that it was necessary to accelerate the achievement of targets under the Kyoto Protocol. The targets assumed following the protocol were indicative targets, namely: 12% of the gross national consumption that was required to come from renewable energy and total Community electricity consumption, a share that also had to be produced from renewable sources, was 22.1%.

In 2001-2002, most European countries that used auction systems to promote renewable energy decided to approach the renewable energy support system differently, due to the inefficiency of the auction support system. Due to the continuous liberalization of electricity markets at European level, a new system for the promotion of renewable energy has been discussed for the first time: green certificates. At the same time, various green certificate compensation support schemes have been adopted in Europe, based on a mandatory quota; these being first implemented in Italy, England and Sweden (see <http://energie.gov.ro/>).

From 2002 to 2009, Directive no. 2001 / 77EC which was later replaced in 2009 by Directive 2009/77 / EC, and is currently in force Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources, the latter imposing a stronger legislative framework. The latest directive states that the proposed target for which Member States must contribute in the future is 35% of renewable sources in gross final energy consumption in 2035.

III. THE CONTRIBUTION OF RENEWABLE ENERGY TO THE DEVELOPMENT OF THE NATIONAL ECONOMY

In Romania, most investments have been made in wind and hydro energy, and the least in solar energy and biomass (Papatulica & Prisecaru, 2013: 18).

The use of energy from renewable sources has many benefits, including "reducing greenhouse gas emissions, diversifying energy supply and reducing dependence on fossil fuel markets (especially the oil and gas

market) have been known for dozens for years" (see <https://ec.europa.eu/eurostat>). However, its many socio-economic benefits have only become clear in recent decades, due to the more widespread development of renewable energy technologies.

Creating a zero-carbon energy sector would maximize economic and social benefits, create value, reduce energy poverty, facilitate access to energy and allow for growth in several sectors. The development of renewable energy production systems can also have a high potential to stimulate employment around the world by creating new jobs.

The advantage of using renewable energies extends beyond the economy, which is also reflected in the social environment and in the field of nature protection. The most important advantages are:

- New jobs (Rosseti, 2018);
- New opportunities for the business environment;
- Diversified energy supply;
- Development of modern green technologies;
- Reducing energy dependence;
- Less waste;
- Less greenhouse gases

(see https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Renewable_energy_statistics/ro).

"From an economic point of view, compared to the energy obtained from fossil fuels and nuclear energy, the cost of different renewable energy sources seems more onerous, due to production methods, weak market demand and the necessary equipment " (Morar, 2013: 41).

The Romanian economy is in a continuous process of restructuring, in order to use renewable resources efficiently and increase their attractiveness, both for private investors in Romania and for investors abroad, by complying with European environmental standards.

Generating energy from renewable sources is more expensive than conventional approaches, but nevertheless, energy transformed from renewable sources avoids pollution, thus protecting the environment. Compromise analysis is much more difficult than is often assumed, because the value of energy is extremely dependent on the time and location at which it is produced, which is not very controllable with some renewable sources, such as wind or solar energy.

In terms of employment, renewable energy provides a significant and growing number of jobs each year, both globally and nationally. According to the International Renewable Energy Agency (IRENA) (see Figure 1), the renewable energy sector employed 9.8 million people in 2016 worldwide as a result of increased investment. This record, in turn, was the result of rapid cost reductions, technological improvements and government policies in support of renewable resources.

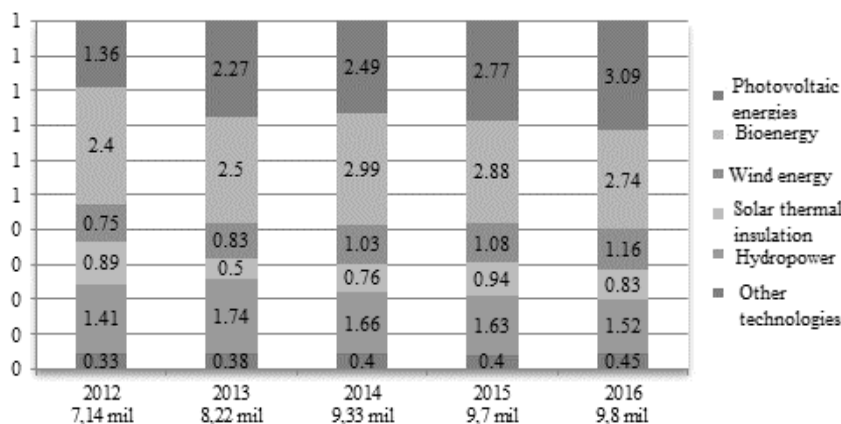


Figure 1 - Share of jobs by renewable energy sectors at international level

Source: International Renewable Energy Agency (<https://www.irena.org/benefits/Job-Creation>)

Photovoltaic energy was in 2016 the largest employer offering 3.09 million jobs out of a total of 9.8 million, followed by bioenergy which provided 2.74 million jobs, hydropower (1.52 mil.), wind energy (1.16 mil.), thermal insulation (0.83 mil.) and other technologies (0.45 mil.). Jobs could increase from 9.8 million to 24 million by 2030.

The results show that energy from renewable sources will lead to a decarbonization of the energy sector. This will lead to an increase in global Gross Domestic Product (GDP) in 2050 by about + 0.8%. Therefore, the acceleration of renewable energy would generate almost \$ 20 billion and more economic activity between 2019

and 2050. Improving human well-being, however, would far outweigh GDP gains. Welfare growth increased by 4% compared to a 0.8% increase in GDP (see <https://www.irena.org/benefits/Macroeconomic-Benefits>).

Experts from the European Commission appreciate that: "... in Central and Eastern Europe, the energy sector is the key to economic restructuring ..." (INS, 2018: 19), so we believe that investments and strategic decisions in this area would bring a plus of value to the economy, but also to society as a whole.

Regarding the cost of renewable energy in Romania, it does not consist only of the price of energy actually consumed. In addition to the actual cost of energy of 0.18 RON / kWh, consumers also pay other taxes such as: distribution (0.142 RON / kWh), introduction of energy into the network 0.001 RON / kWh, extraction of energy from the network 0.015 RON / kWh, system services 0.013 RON / kWh, excises 0.004 RON / kWh, green certificates 0.0456 RON / kWh, contribution for cogeneration 0.012 RON / kWh and value added tax (VAT). All these taxes form the real energy cost of 0.491 RON / kWh (see: <https://energieverde.natura2000.ro/2018/02/13/care-este-costul-real-al-energiei-electrice-pe-care-o-consumam/>).

We consider essential, in this field, the involvement of the state in order to subsidize investments and provide fiscal facilities, thus guaranteeing a growth of the economy, a reality possible through this significant contribution brought by the renewable energy sector. Also, a particularly important aspect related to the existing decisions and possibilities at the level of each company, is that related to the duration of the amortization period of the means used in the processes of transformation of energy from renewable sources.

Taking into account the aspects mentioned above, regarding the industrial constructions, the situation in Romania is a less optimistic one, as the investors do not benefit from subsidies for investments in equipment producing renewable energy. Given the fact that in most European countries subsidies are granted in the amount of 50% of the value of investments made (regardless of the maximum value of the investment), assuming that investments made in Romania will benefit from similar subsidies, the recovery period will be halved (Iovescu, Buglea, Bălan, Kisapáti, & Lukovics, 2017). Also, another element that can affect the depreciation period is the increase in the price of conventional energy. In Romania, in the last 4 years the average growth rate of the price of classical energy was 11% (Adrisan, 2019).

In the case of civil engineering, it is important to mention that investors can benefit from subsidies for investments in equipment producing renewable energy that can be received through the Green House Program (8,000 lei for investments in heat pumps, respectively 6,000 lei for investments in solar panels).

It is found that in the case of industrial constructions, investments recover faster than in the case of civil ones, due to the fact that legal entities recover the value added tax from the state (and individuals are obliged to bear it). If a differentiated VAT rate were applied in Romania for equipment producing renewable energy purchased by individuals, the return on investment would be considerably reduced.

IV. EVOLUTION FORECASTS IN THE RENEWABLE ENERGY SECTOR

Renewable energies gradually have the largest share in existing demands on energy consumption. Their share in meeting global energy demand is expected to grow by a fifth over the next three years, reaching 12.4% in 2023.

In the period 2019-2023, it will continue to be the largest source of increasing renewable energy consumption, although its share of total renewable energy decreases from 50% in 2017 to 46%. Bioenergy in any form will represent 30% of the increase in renewable energy consumption, as a result of the need for energy in the heat supply system and in the field of transport.

Renewable energy will have the fastest growth in the electricity sector, supplying almost 30% of energy demand in 2023, from 24% in 2017. During this period, renewable energy sources are expected to exceed 70% of global electricity growth, followed by a global increase in wind, hydropower and bioenergy. Hydropower remains the largest renewable source, reaching 16% of global electricity demand by 2023, followed by wind (6%), PV (4%) and bioenergy (3%).

While growing slower than the energy sector, the heat sector - which includes supplying buildings with heat - will account for one of the largest global shares of renewable energy in meeting energy demand in 2023. (see <https://www.irena.org>). Renewable heat consumption is expected to increase by 20% to reach 12% of the heating sector's demand by 2023. However, a modest increase in the share of renewable heat is expected, as a robust increase in total heat demand is expected due to economic growth and population. Technological developments lead to lower costs for wind and photovoltaic equipment, opening new perspectives for the consumer, but also the implementation of policies to establish a special regulatory framework for energy development areas will make, by 2030, the share of renewable technologies to increase easily without the need for a financial support scheme (assimilated to state aid). On the other hand, the share of renewable technologies in the energy system will be higher if there are energy storage technologies.

To meet the medium and long-term climate and other sustainability objectives, the development of renewable energy in the heat, electricity and transport sectors needs to be accelerated. If progress continues at the

current projected pace, the share of renewable energy in final energy consumption will be around 18% by 2040 - well below the IEA sustainable development scenario benchmark of 28%.

V. CONCLUSION

The renewable energy market (E-RES) is supported in Romania by direct interventionism on the supply side. The state does not finance this market. All costs are transferred to the consumer, as suppliers are obliged to buy a share of the energy produced. These suppliers will transfer the cost to distributors and eventually to consumers. The European Union has a clear policy towards supporting the production of energy from renewable sources, to the detriment of those from conventional sources. But this support must be given judiciously, so that the promotion of renewable sources is based on the internal rate of return on energy sources.

For Romania, capitalizing on the potential of renewable energy sources aims to increase security of energy supply, by diversifying sources and reducing the share of imports of conventional energy resources, with the aim of sustainable development of the energy sector and environmental protection. However, in the case of Romania, as in other European countries, the centralized electricity system and the difficult connection to the system make inefficient, for the time being, the investments in green energy for one's own household (in a decentralized system).

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