

AN ANALYSIS OF ENERGY RESOURCES IN ROMANIA

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Abstract

Energy sector plays an essential role in the national economy and energy security policy. There is a shift from traditional energy pillars, such as coal-fired power plants. That were the main producer of electricity, to an energy sector where hydropower and other renewable energy sources offer the highest part of electricity. Romania cannot cope with a single source of energy to meet its own energy and environmental objectives, and to guarantee sufficient security of supply. Thus much at least is clear that, the energy mix is necessary. The energy strategy project 2016-2020 by 2030 is currently under development. This perspective on the development of electricity production in Romania is based on of the assessment of the macroeconomic, industrial and employment impact on energy scenarios. This paper present a study about the need for an energy mix in Romania.

Keywords: energy mix; energy; power plants; renewable sources; development.

INTRODUCTION

The number of studies on the development of electricity consumption and the use of various technologies based on primary energy sources has become quite high and implicitly the choice of an optimal decision is difficult to take.

The energy strategy project 2016-2020 by 2030 is currently under development. This perspective on the development of electricity production in Romania was elaborated based on the assessment of the macroeconomic, industrial and employment impact on energy scenarios. All these analyses generated main topics of intervention: maintaining a balanced and diversified energy mix; natural gas infrastructure and supply; role of biomass in households heating; high-efficiency cogeneration and modernization of SACET (combined heat and power producers for central heating); increase in energy efficiency in buildings and countering energy poverty.

Romania has the EU's third-lowest dependence on energy imports (below 17%) is expect to exceed 50% in 10 years. The energy mix is one of the most diversified in the EU.

Over the next few years, first-generation energy sources have ended and renewable sources of energy [2-6] will play an increasing role. Between 2020 and 2030, an increased

development of solar energy sources is expected. It estimated that from 2030, European electricity [1] demand is going to reach about 48% of renewable energy, 33% of fossil fuels and about 19% of nuclear energy.

Taken account about the climate protection objectives, existing power plants will now have to meet significantly greater flexibility requirements due to the strong expansion of renewable energies [7] in operation.

The expansion of renewable energies and their realistic use can be made to achieve the EU's climate protection objectives by 2020 and 2030 [8, 9].

Romania have to take these measures, like members of the European Union.

1. Analyses of the energy sector in Romania for three years

We collected data about the energy sector from the national energy system of Romania for three years and make a statistics and graphics about the energy sector in Romania [10] what it's the evolution of this sector.

We make an analysis of the installed generating capacities for three years 2015 (Fig.1), 2016 (Fig.2) and 2017 (Fig.3) and we can observe the difference [10], the growing of renewable energy in every year.

Installed generating capacity 2015 MW

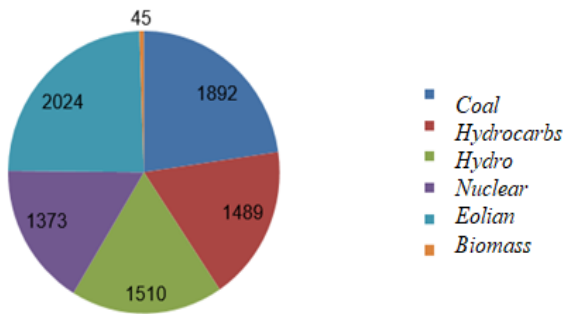


Fig. 1. Installed generating capacities for Romania in 2015 [10]

In the graphics, (see Figures 1, 2 and 3) we can see the use of energy mix. In Romania the energy from coal is the principal but the renewable energy like eolian and biomass start to have an important part from total energy. In the next years 2016, 2017 we can see the difference about the growing of renewable energy.

Installed generating capacity 2016 MW

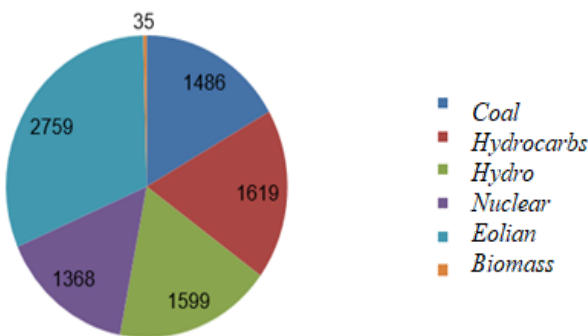


Fig. 2. Installed generating capacities for Romania in 2016

Installed generating capacity 2017 MW

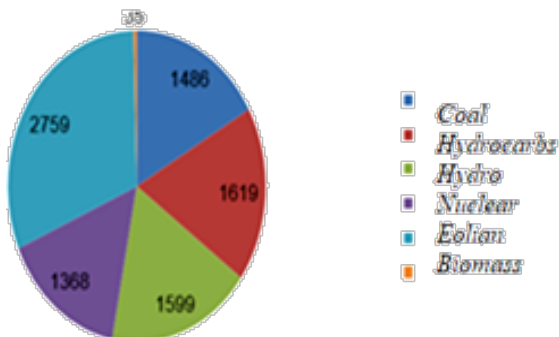


Fig. 3. Installed generating capacities for Romania in 2017

Eolian power is clearly the engine for the expansion of renewable energies. Expanding the use of offshore wind energy [15] has been massively advanced.

The same we can say and about the expansion of hydropower capacity relies heavily on the modernization of existing facilities. These facilities, equipped with increased efficiency and additional capacity, significantly increase electricity production.

Expansion of solar energy [13] will largely be guided by enlargement of photovoltaic parks by 2020, before the share of solar thermal power plants plays a larger role from 2020. Solar energy is the form of energy generation that has the greatest discrepancy between production capacity electricity and electricity generation.

The graphics show the evolution of energy from renewable sources, which during this period had an increasing evolution [16] regarding the results of the electricity market monitoring.

From renewable sources, hydroelectric power plants is the first place of energy production, followed by wind power plants, biomass and solar over 2015-2017.

Coal was the most important source for electricity production in 2015-2017 and after the energy from nuclear sector.

From studies and statistics carried out over the period 2007 - 2020 on the development of electricity production in Europe [11], it is noticed that the most sustainable solution is the highest use of the energy mix.

Environment and the economy are equally dependent on avoiding unwanted developments due to short, unilateral decisions. Abrupt abandonment of certain primary energy sources or energy technologies would be economically damaging and environmentally hazardous.

2. Developed of electricity generation until 2030 in Romania

The electricity generation capacity and electricity generation will be developed as follows until 2030 (see Figures 4, 5, 6) [1, 6, 11, 12].

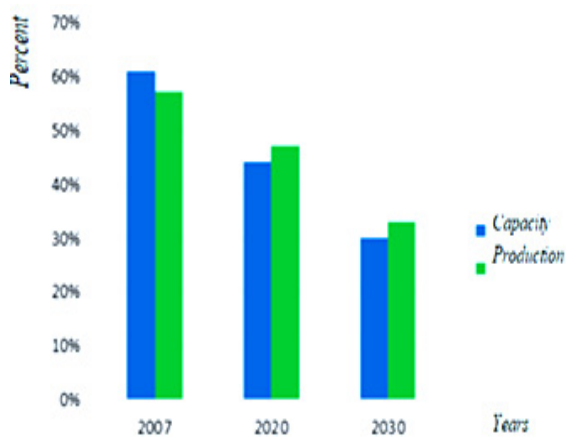


Fig. 4 Energy from coal

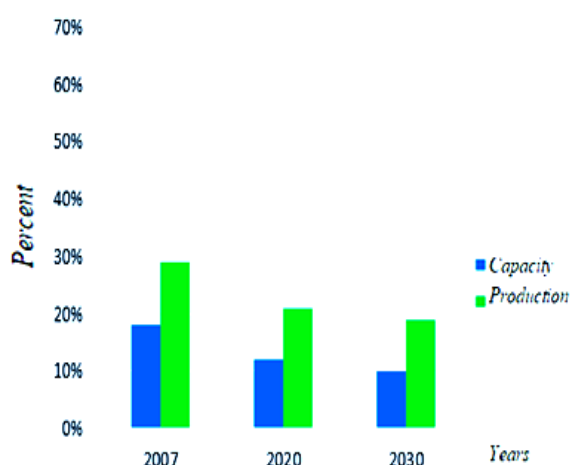


Fig. 5 Nuclear energy

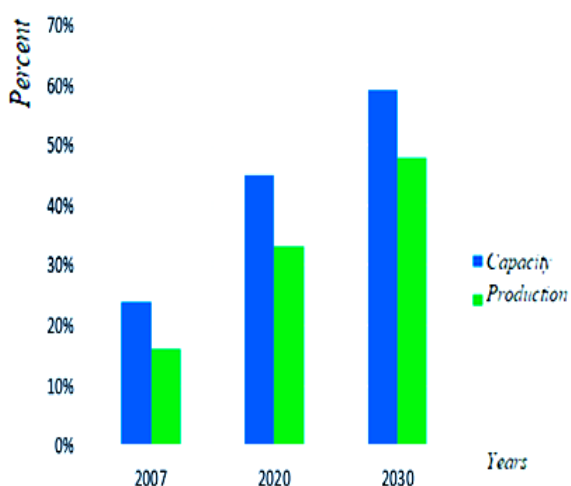


Fig. 6 Energy from renewable sources

Analysis shows that the route provided by energy suppliers for the low-carbon electricity production in 2050 seems realistic, but more technology is needed.

The framework conditions for energy policy in the European Member States as well as the legal framework prescribed by the EU will have a significant influence on the development of the electricity mix. The energy policy framework [3, 16, 17] in the EU needs to be consistently conceived. The objectives of energy policy must therefore be agreed between the EU and its Member States. Member States compete for different energy concepts and technologies. In addition, the growing structures, geographic location and geopolitical interests of the EU Member States will be taken into account.

Prediction about energy sector in Romania for the next years with an increase in renewable energy sources (eolian, solar, biomass) and a decrease of the polluting energy sources (coal, nuclear).

Use of new, non-polluting sources of energy that are not yet used because of the high costs (geothermal, tidal energy, waves, water temperature differences) [18].

In this figure (Fig.7) we can see the installed capacity renewable energy in Romania from 2010 until 2017.

We can see that in Romania the energy from geothermal already appear and we can see that the use of renewable energy is growing.

Earth's heat is called geothermal energy and can be harnessed to produce electricity. Many technologies have been developed to take advantage of geothermal energy. This heat can be drawn from several sources: hot water or steam reservoirs deep in the earth that are accessed by drilling; geothermal reservoirs located near the earth's surface; and the shallow ground near the Earth's surface that maintains a relatively constant temperature of 50⁰-60⁰F.

This key renewable source covers a significant share of electricity demand in countries like Iceland, El Salvador, New Zealand, Kenya, and Philippines and more than 90% of heating demand in Iceland. The main advantages are that it is not depending on weather conditions and has very high capacity factors; for these reasons, geothermal power plants are capable of supplying baseload electricity, as well as providing ancillary services for short and long-term flexibility in some cases.

Other applications apply the heat produced from geothermal directly to various uses in buildings, roads, agriculture, and industrial plants.

Oceans cover more than 70% of the Earth's surface. As the world's largest solar collectors, oceans generate thermal energy from the sun. They also produce mechanical energy from the tides and waves. Even though the sun affects all ocean activity, the gravitational pull of the moon primarily drives the tides, and the wind powers the ocean waves. The main types of ocean energy that are being explored for: 1) Ocean thermal energy conversion; 2) Tidal power and 3) Wave power [20].

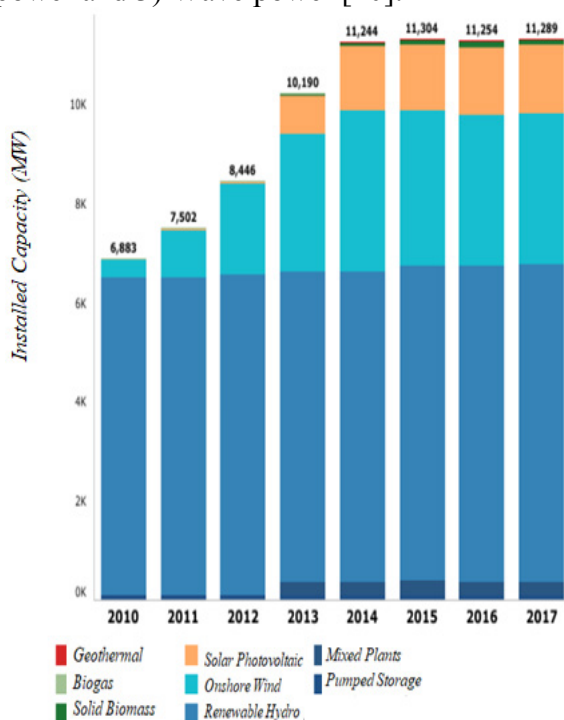


Fig. 7. Installed capacity renewable energy in Romania [17]

Elizabeth Rusch wrote in Smithsonian magazine: *Unlike wind and solar power, wave energy is always available. Even when the ocean seems calm, swells are moving water up and down sufficiently to generate electricity. And an apparatus to generate kilowatts of power from a wave can be much smaller than what's needed to harness kilowatts from wind or sunshine because water is dense and the energy it imparts is concentrated. All that energy is also, of course, destructive, and for decades the challenge has been to build a device that can withstand monster waves and gale-force winds, not to mention corrosive*

saltwater, seaweed, floating debris and curious marine mammals. And the device must also be efficient and require little maintenance [19].

The most powerful waves occur on western coasts, because of strong west-to-east global winds, so Great Britain, Portugal and the West Coast of the United States are among the sites where wave energy is being developed.

In Romania, on Black Sea coast based on some scenarios which consider average, energetic and extreme wave conditions, like a further step, the influence of a generic wave farm on the nearshore climate was assessed. Simulations were made about wave farm. A general perspective on the wave field evolution is provided by increasing the absorbing property of the farm, from zero to a total absorption.

CONCLUSION

Renewable energies represent much of our energy in the future. They allow future development and represent alternative solutions to our energy and environmental problems. There are more renewable energies that exist, but only few are used by people because they have a high cost. They have advantages that are unique to them: they are inexhaustible, respecting the environment compared to fossil fuels such as coal or oil.

By 2050, fossil fuels remain an important part of energy for Romania, even if the energy agreement focuses on achieving a CO₂ reduction target from 80 to 95% by 2050, which is expected to use renewable energies in - a 16% share of energy production by 2023.

The use of the energy mix is a way of saving energy and implicitly of sustainable economic development, providing clean and renewable energy helps ensure quality of life.

Energy efficiency is a key factor in improving economic, environmental and industrial performance. The overall challenge in this area responding to the needs of a growing population while providing concrete solutions to help mitigate the effects of climate change. Reducing carbon emissions and increasing energy from sources such as renewable energies will help ensure the security and sustainability of energy sources for future generations.

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