



# Renewable energy sources potential evaluation in Romania

Authors: I Bucur, P Axinte, C Pleşcan

## 1. INTRODUCTION

Greenhouse gas emissions is considered a serious threat regarding climate change, with potentially disastrous effects on humanity. Renewable energy sources (wind energy, solar energy, energy hydropower, ocean energy, geothermal energy, biomass and biofuels) are alternatives to conventional fuels in the greenhouse gases emissions reduction process.

The use renewable energy sources (RES), together with improved energy efficiency, can contribute to the reduction of energy consumption, the reduction of greenhouse gas emissions and, consequently, to prevent dangerous climate change. The potential of biomass, solar, hydro, wind and geothermal energy is very important, especially in recent years, due to financial support mechanisms such as green certificates, which in many European countries helped this sector to developed progressively.

## 2. METHODS AND PROCEDURES

This article reviews the potential of the renewable energy sources exploitation in regard to the European Union legislation and objectives. Until 2020, the European Union had three targets: 20% cut in greenhouse gas emissions, 20% of EU energy to come from renewables, and a 20% improvement in energy efficiency. The EU took action in different areas and now the targets are met. In the future, EU provides a new action plan called the European Green Deal. The new EU target is to be climate neutral in 2050. [1]

## 3. EU CONTEXT

During 2016, the European Council (EC) presented two packages of proposals for reforming European energy policies, anticipated in 2015 through the Energy Union Framework Strategy. These packages are defining for the European energy sector, and implicitly for the Romanian one, in the period 2020-2030, being meant to accelerate the energy transition in the EU.

In July 2016, a first package of proposals was published on: reducing non-ETS emissions in each state for the period 2021-2030. In this proposal Romania is allocated a 2% reduction rate, accounting for the resulting GHG emissions from land use, land use change and forestry, as well as a communication on a European strategy for the decarbonisation of the transport sector.

The EC proposal for updating the RES Promotion Directive (EC 2016b) provides for six directions for action. The first proposes general principles to be followed when Member States define support policies for RES, using the principles of transparency, economic efficiency based as much as possible on competitive market mechanisms. These elements are brought together in the Strategy, under the principle of technological neutrality.

## 4. RENEWABLE ENERGY SOURCES IN ROMANIA SO FAR

In order to decarbonizing the power sector while keeping up with the continuously growing energy demand, renewable energy technologies is essential. Renewable energy in Romania had a delayed boom compared to the European Union, yet Romania managed to meet the 2020 targets. So far, the most used renewable energy source in Romania is the hydropower and it is followed by wind, solar, biofuel and biogas (Fig. 1).

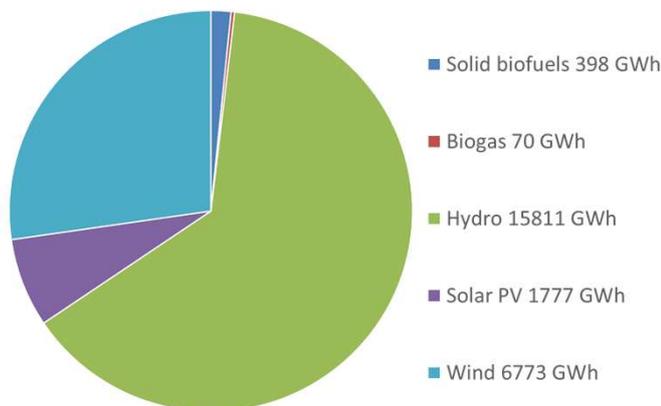


Fig.1. Renewable and waste energy data in Romania in 2019 [3]

## 5. NATIONAL STRATEGIES

The National Integrated Plan in the field of Energy and Climate Change 2021-2030, provides that the share of renewable energy will reach 27.9% of Romania's gross final energy consumption in 2030, just an idea higher than the level achieved 15 years earlier. According to Eurostat, the statistical office of the European Union, 25% of energy consumption in 2016 was from renewable sources. [3]

The Ministry of Energy mentions, in PNIESC, that more production capacities will be installed, but also the final consumption will increase, by approximately 18% in the period 2021-2030. Half (50.9%) of the energy consumed in Romania will be for heating or cooling, according to estimates, a slightly lower percentage than at present (54.6%), but still significant. [3]

## 6. DEVELOPMENT PROJECTIONS OF THE ROMANIAN ENERGY SECTOR

The development perspective of the energy sector by 2050 is useful for two main reasons: (1) the energy sector has a high capital intensity and many projects have a long investment cycle, so a large part of the investment decisions that will have place in the near future will continue to take effect in 2050; and (2) EU energy and environmental policies, including targets for 2030, are built around the long-term goal of reducing GHG emissions by at least 80% by 2050.

The global goal of climate change mitigation can only be achieved through transformative actions and measures at the global level. A main direction of action will be to accelerate the energy transition. Many of the long-term transformations of the energy sector can be anticipated, given the slow pace of energy infrastructure replacement.

Development trends refer to: increasing the sustainable role of biomass in the energy mix; the future of electromobility; increasing the share of RES in the electricity mix and the use of CCS technologies; forms of energy storage; energy efficiency, especially of buildings; electric heating based on heat pumps. [4]

All these developments, although expected to reduce GHG emissions, could have a strong impact on the environment, and the opportunity for the development of new technologies on a large scale needs to be carefully considered. Most likely, new generations of these technologies, more efficient and greener, will be widely adopted.

According to Romanian Wind Energy Association (RWEA), Romania can reach a share of 32.4% conservatively and inertially in 2030, with the more ambitious potential to reach 35%, with additional wind capacities between 3000 and 4000 MW; and this is achievable with significantly lower investments than those considered by PNIESC.[3]

With existing policies and measures, the projection shows a decrease of energy generation, which is mainly caused by a reduction of solid fuels and natural gas production. [4]

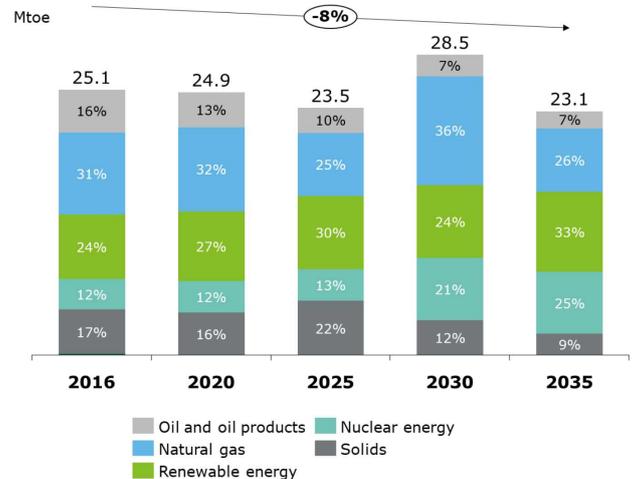


Fig.2. Expected development of the primary energy generation, by energy sources, with existing policies and measures [5]

## 7. CONCLUSIONS

The use of renewable resources in energy generation has experienced an upward trend in recent decades, the determining factor for this trend being the research and accelerated development of new technologies that were possible only through the financial support of several countries. And, perhaps the most important aspect relates to that energies renewable energy sources lead to a reduction in energy dependence.

## References:

- [1] [https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal\\_en](https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en) (accessed in the 1<sup>st</sup> of October)
- [2] <https://www.iea.org/data-and-statistics/data-tables/?country=ROMANIA&energy=Renewables%20%26%20waste&year=2019> (accessed in the 1st of October)
- [3] <https://www.euractiv.ro/economic/tinta-deloc-ambitioasa-pentru-energiile-regenerabile-romania-nu-vrea-sa-fie-e2-80-9eprea-verde-13899>
- [4] [https://ec.europa.eu/energy/sites/ener/files/documents/romania\\_draftnecp\\_en.pdf](https://ec.europa.eu/energy/sites/ener/files/documents/romania_draftnecp_en.pdf)
- [5] PRIMES 2016 scenario, prepared for the Ministry of Energy, EU Commission, Energy datashets – EU 28, 20 August 2018