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# THE EFFECTS OF ELECTRICITY FROM RENEWABLE ENERGY FOR THE ENERGY SECURITY OF ROMANIA

Case  
Study

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## Keywords

Economic growth;  
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Renewable energy

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## JEL Classification

B41, L51, F41, F43

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## Abstract

*In this article, the author presents some aspects of the Romanian energy system which undergoes crucial transformations in the conditions of sustainable development. The promotion of energy from renewable resources is one of the challenges currently facing the Romanian economy. Due to the efficient political support so far, the electricity generated by renewable energy already represents a relevant share of 24%. As a result, forced market integration and higher renewable energy supply are considered crucial in the next stages of the transformation process. In the long term, the opportunity of installing new coal and natural gas capacities will be given by the evolution of the prices of the ETS certificates, the necessity of establishing a strategic reserve for the SEN safety, the increase of the demand for electricity, the performance of the installed capacities, of the prices of technologies. Romania is among the 14 EU member states that maintain the option of using nuclear energy and investments in two nuclear power plants. But the energy produced by nuclear power plants can be replaced by electricity obtained from renewable sources with much lower costs under sustainable development conditions.*

## INTRODUCTION

In recent years, the European Union has faced major challenges regarding the dependence on energy import. European countries are looking for long-term solutions for increasing energy security by reducing dependence on foreign imports.

In the energy field, the European economy has traditionally relied on fossil fuels (oil, coal and natural gas), and this has led to the conclusion that only the supply of fossil fuels can guarantee future energy security. But the transition to renewable energy in the European Union has begun to change.

### ENERGY SOURCES IN THE COUNTRIES OF THE EUROPEAN UNION

#### European regulations on renewable energy

The European Commission has established several energy strategies for a safer, sustainable and low carbon economy. In addition to combating climate change by reducing greenhouse gas emissions, the use of renewable energy sources can lead to more secure energy supply, greater diversity in energy supply, less air pollution, and the possibility of creating jobs in the environment and renewable energy sectors.

In the field of energy, the European Council adopted 2020 Strategy (European Commission, 2010) ambitious targets for energy and climate change for 2020: reducing greenhouse gas emissions by 20%, increasing renewable energy by 20% and energy efficiency improvement by 20%.

The European Council has also made a long-term commitment to decarbonisation, with a target for EU industrialized countries of 80 to 95% of emissions by 2050.

On sixth of June 2012, the European Commission presented a communication entitled "Renewable energy containing options for a post-2020 renewable energy policy" (European Commission, 2012).

In January 2014, the European Commission presented a set of energy and climate targets for 2030, with the aim of encouraging private investment in infrastructure and low carbon technologies. One of the key goals proposed is that the share of renewable energy should reach at least 27% by 2030. These goals are seen as a step towards meeting the targets for greenhouse gas emissions for 2050, presented in the Roadmap for moving to a low level competitive carbon economy in 2050 (European Commission, 2011).

On December 11, 2018, the European Union adopted Directive 2018/2001/EU on promoting the use of energy from renewable sources (European Parliament and The Council, 2018). The new regulatory framework includes a mandatory renewable energy target for the European Union for

2030, of 32%, with an upward revision clause by 2023. This would allow Europe to retain its leading role in the fight against climate change in the transition of clean energy and in meeting the objectives set by the Paris Agreement.

#### Renewable energy in the European energy mix

A part of the energy system in the European Union is still based on fossil fuels (Figure 1). All the scenarios evaluated suppose that, by the middle of the century, the situation will change radically due to the large-scale electrification of the energy system that is determined by the use of renewable sources, either at the level of the end users or to produce carbon dioxide-free fuels.

In 2014 Wagner addresses the extension of the use of renewable energy in the production of electricity in the European Union (Wagner, 2014). The share of renewable energy in gross final energy consumption is identified as a key indicator for measuring progress under the Europe 2020 strategy for smart, sustainable and inclusive growth. This indicator can be considered as an estimate for the purpose of monitoring the Directive 2009/28/EC on promoting the use of energy from renewable sources; however, in some countries, the statistical system for specific renewable energy technologies is not yet fully developed to meet the requirements of this Directive.

The importance of renewable energy sources in gross domestic consumption in 2017 (Table 1) has been relatively high in the countries that have adopted the legislation on clean energy obtained without carbon dioxide emissions: Denmark, Austria, Latvia, Sweden and Finland.

Hirth (2015) discusses the influence of the variability of renewable energy sources, namely wind and solar energy, on the optimal development of the well-being of renewable energy sources.

There has been a fundamental progress in transforming Europe's electricity production. The expansion of renewable energy sources worldwide, inspired by the leading position of the European Union, has led to massive decreases in technological costs over the last 10 years, especially with regard to solar and wind energy.

Currently, more than a half of Europe's electricity production is realized without greenhouse gas emissions. By 2050, it is assumed that over 45% of electricity will come from renewable energy sources. Together with a share of 29% of nuclear energy, this will constitute the backbone of a European energy system without carbon dioxide emissions (Figure 2). Also, an important role will be given to consumers who produce energy themselves (prosumers), as well as to local communities, in order to encourage the use of energy from renewable sources for residential consumption.

Europe's dependence on energy imports, especially with regard to oil and natural gas imports, stands at around 55% today and is expected to decrease by 20% under these conditions in 2050.

### **PREMISES REGARDING THE ROMANIAN ENERGY MIX**

Romania considers the security of the supply of electricity from internal sources a prime objective for ensuring the national energy security and an indissoluble necessity related to the diversified and balanced energy mix existing at this moment.

Romania's first law for the promotion of renewable energy was adopted in 2005 and has not had major results. Only in 2008, with the adoption of the Law 220/2008, which provided serious incentives, renewable energy was developed in Romania (Romanian Parliament, 2008). The law set the national targets for electricity produced from renewable sources in gross final consumption of electricity at: 33% by 2010, 35% by 2015 and 38% by 2020. The Law 220/2008 was based on mandatory annual quotas and implemented a support system based on green certificates, which was described at the time as one of the most generous in Europe.

Romania is becoming one of the fastest growing markets for renewable energy in the region. Renewable capacity installed in Romania rose from just over 20,500 TWh capacity in 2008 to 24468 TWh at the end of 2017 (Figure 3).

Given that the global share of renewable energy in the gross final energy consumption of 24% for 2020 has been exceeded (25% in 2016, according to Eurostat) as well as its evolution (estimated at 26.2% in 2020), the projections made on the basis of the assumptions used in the realization of this Plan indicate that a share of renewable energy of 27.9% will be reached in 2030.

The widespread use of renewable energy sources will lead to the electrification of the economy and a high degree of decentralization. By 2050, the share of electricity in the final energy demand will double if the same investment regime is continued, and electricity production will significantly increase, to reach the level of zero net greenhouse gas emissions.

A strategic option for Romania is nuclear energy. Anghelache, Bichir, Bodislav and Cara (2013) analyze energy management following the disaster at the Fukushima plant. Romania has two nuclear reactors in operation that provide 18% of the amount of electricity produced. There are two other nuclear reactors in the project, but, given that the renewable energy is produced with lower costs under sustainable development conditions, the author considers that the second option is optimal for the Romanian climate. In these circumstances,

it may be justified to postpone the definitive withdrawal of coal or gas capacities from use. The relative role of natural gas and coal in the electricity mix after 2025 will continue to depend on the price of ETS emissions certificates.

Given the lower costs of wind and photovoltaic equipment, as well as the implementation of policies to establish a special regulatory framework for energy development areas, by 2030, the share of renewable technologies will easily increase without the need for a financial support scheme. It can be stated, therefore, that in Romania a policy of continuing to increase the gross final consumption of energy from renewable sources with a potential of up to 55% in the perspective of 2050 can be implemented at national level (Figure 4).

### **CONCLUSIONS**

Obtaining energy from renewable resources in order to replace much of the expensive imports of foreign fuel is a positive thing for energy security in the economy of any country.

This would have an impact on European Union trade and its geopolitical position as it would lead to a drastic reduction in spending on fossil fuel imports by up to 70% in some scenarios.

Romania has a balanced and diversified electricity mix. It contains all types of primary energy sources available at competitive costs.

Given the energy security considerations, the author considers renewable energy to be a priority in the energy mix due to the reduction of the costs of wind and photovoltaic equipment, but also the implementation of policies to establish a special regulatory framework for the energy development areas. Thus, by 2030, the share of renewable technologies will increase slightly without the need for a financial support scheme.

Under these conditions, renewable energy can continue to increase production in the perspective of the year 2050, for which an increase of the electricity produced from RES up to 55% is expected.

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List of tables

Table 1

Share of renewables in gross inland energy consumption, 2017 (%)

	Renewable energy	Biofuels	Hydro power	Wind power	Solar energy	Geothermal energy	Ambiental heat
EU 28	13,9	8,5	1,5	1,9	0,9	0,4	0,7
Belgium	7,2	5,5	0,0	1,0	0,5	0,0	0,1
Bulgaria	10,3	6,9	1,3	0,7	0,8	0,2	0,5
Czechia	10,5	9,2	0,4	0,1	0,5	0,0	0,3
Denmark	32,8	24,0	0,0	7,0	0,7	0,0	1,2
Germany	13,3	8,2	0,5	2,8	1,3	0,1	0,3
Estonia	18,4	17,3	0,0	1,1	0,0	0,0	0,0
Ireland	9,0	4,1	0,4	4,4	0,1	0,0	0,0
Greece	12,0	4,9	1,4	2,0	2,5	0,0	1,2
Spain	13,0	5,6	1,2	3,2	2,5	0,0	0,4
France	10,4	6,4	1,7	0,8	0,4	0,2	0,9
Croatia	21,4	14,7	5,1	1,2	0,2	0,1	0,0
Italy	18,1	8,6	2,0	1,0	1,4	3,4	1,7
Cyprus	6,5	2,4	0,0	0,7	3,3	0,1	0,0
Latvia	42,5	33,9	8,3	0,3	0,0	0,0	0,0
Lithuania	21,2	18,8	0,7	1,5	0,1	0,0	0,0
Luxembourg	6,3	5,3	0,2	0,5	0,3	0,0	0,1
Hungary	11,1	10,0	0,1	0,2	0,2	0,5	0,0
Malta	5,3	1,5	0,0	0,0	3,8	0,0	0,0
Netherlands	5,5	3,7	0,0	1,2	0,3	0,1	0,2
Austria	28,9	16,1	9,6	1,6	0,8	0,1	0,7
Poland	8,5	6,9	0,2	1,2	0,1	0,0	0,1
Portugal	20,1	12,1	2,1	4,4	0,7	0,8	0,0
Romania	18,1	11,8	3,7	1,9	0,5	0,1	0,0
Slovenia	15,9	9,8	4,9	0,0	0,5	0,7	0,0
Slovakia	9,2	6,7	2,2	0,0	0,3	0,0	0,0
Finland	34,7	28,1	3,7	1,2	0,0	0,0	1,6
Sweden	41,2	23,7	11,1	3,0	0,1	0,0	3,3
United Kingdom	9,8	6,0	0,3	2,3	0,6	0,0	0,6

Source: Eurostat, 2018

List of figures

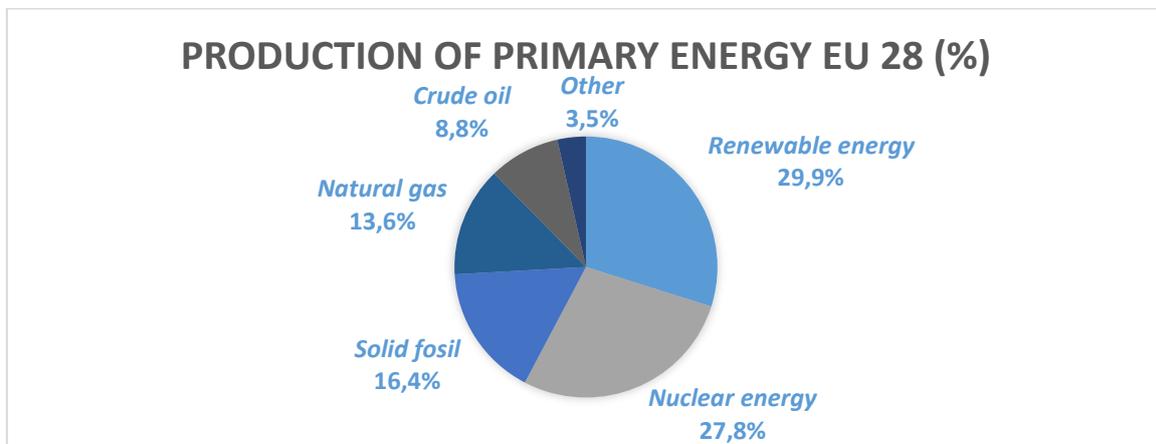


Figure No. 1

Production of primary energy in EU 28, 2017

Source: Eurostat, 2018

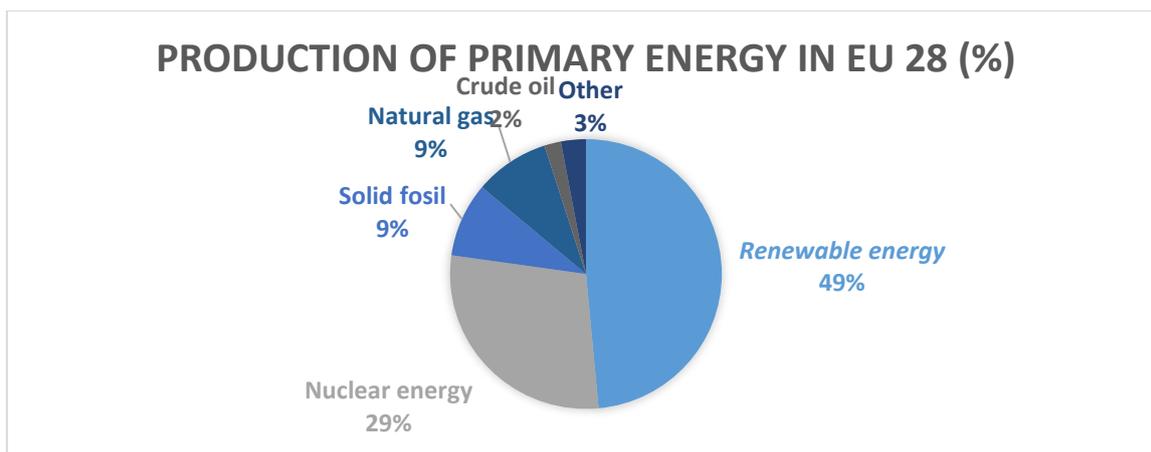


Figure No. 2  
**The share of energy resources in final energy consumption (%) in 2050**  
 Source: (European Commission, 2012)

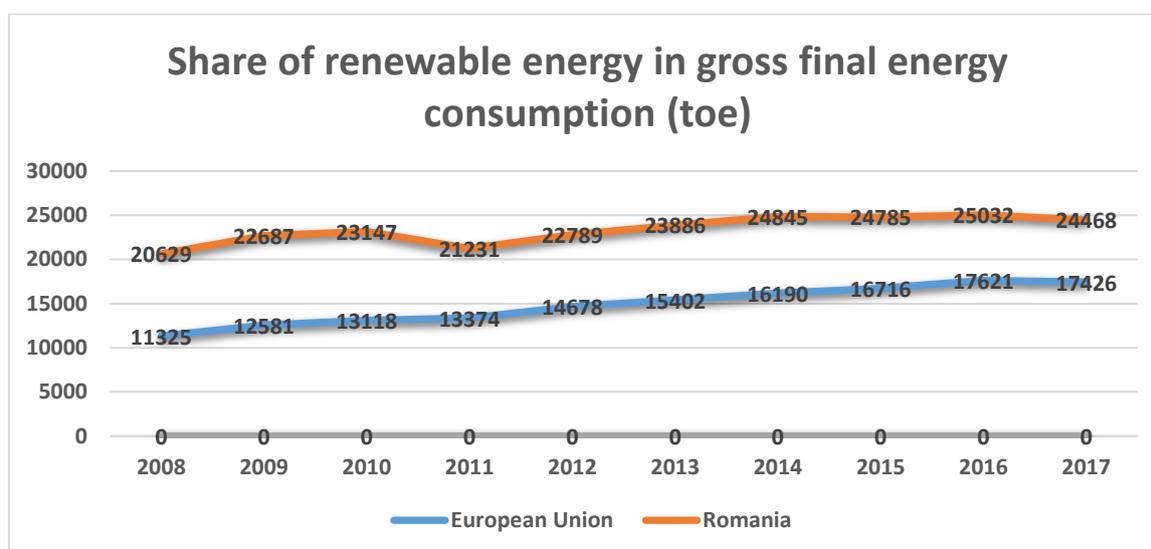


Figure No. 3  
**Share of renewable energy in gross final energy consumption (Mtoe)**  
 Source: Eurostat, 2018

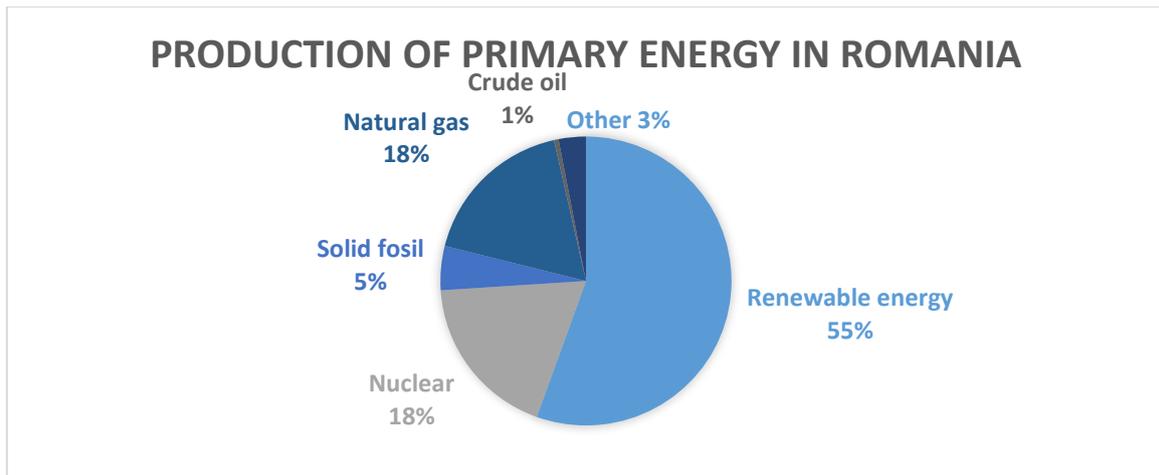


Figure No. 4

**The share of energy resources in final energy consumption (%) in 2050**

*Source: Own calculations*