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Green Economy - the Engine of Economic Growth and Development in Romania in the Context of Climate Change

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Abstract: In recent years, the issue of climate change management has been intensely debated as a subject of national interest, as extreme weather events have had negative effects on Romania through significant economic losses in most industrial sectors. In the context of a negative scenario of increasing global warming, the country's economic situation, under the impact of climate change, would deteriorate significantly. However, as a responsible member of the European Union and the global community, Romania contributes to harnessing the opportunities for gains from active climate change management by increasing the expansion and efficient use of resources that will improve competitiveness, by green technologies and practices that will reduce local pollution, and by resilient approaches to climate change that will protect against weather-related risks. Resilient and adaptive measures by the state to manage the impacts of climate change can generate inclusive, green and long-term growth in the state's economy, resulting in improved human well-being and social equality.

Keywords: Green economy; Climate change; Green Growth; Sustainable Development.

JEL Classification: Q01; Q56; R11

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1. Introduction

Challenges in the energy sector are often debated by authorities at global, regional and national level. Romania, as a member state of the European Union, is taking up the best practices in the field of energy and energy security, while adhering to the Green Energy for All Europeans legislative package, as well as to the provisions of the European Green Pact, which builds another energy system based on innovation, development, digitalisation and security. For a successful approach to the transition to green energy, Romania needs efficiency as a fundamental principle in linking investments, technologies, policies with the climate and geopolitical specifications of the state. Investments in improving energy efficiency, including energy production, transport, distribution and end-use, will bring major environmental benefits, reduce a large part of greenhouse gas emissions, improve energy security, contribute to reducing energy poverty and increase the competitiveness of economic activity in all sectors of the Romanian economy.

The use of renewable energy sources in Romania is expected to increase, given the country's commitment to phase out coal and lignite-based electricity generation. The plan foresees the phasing out of coal and lignite power generation by 2032; this is essential for the decarbonisation of the energy sector and supports the transition to green sources for energy production (European Commission, 2022).

The review of the scientific approaches of researchers on the transition from energy to renewable energy sources revealed that recently strategies, policies and regulations are being addressed for each country to increase the share of renewable energy in gross final energy consumption.

The literature is approached in this paper from two perspectives. On the one hand, the approach of the literature which reflects the pillars of the energy development process in Romania, and on the other hand, the approach of the literature which addresses the provisions, clear directions and defines the benchmarks that Romania should consider for the implementation of the European Green Pact directives and which require the transformation of the energy sector into another system model, based on clean, innovative technologies, which can face competition in an integrated electricity market.

European level policy on energy production from renewable sources and promotion of the use of this form of energy is laid down in EU Regulation 28/2009. The European Commission has released a proposal for a revised Renewable Energy Directive with the aim of making the EU a world leader in the renewable energy market by 2030. This policy aims to set national renewable energy targets for each Member State, based on each country's unique renewable energy potential.

In 2016, the European Commission presented two packages of proposals for reforming Europe's energy policy. This is planned for 2015 through the Energy

Coalition's Framework Strategy. These packages define the European energy sector and implicitly the Romanian sector for the period 2020-2030 and aim to accelerate the energy transition in the EU. The first set of proposals was announced in July 2016. This is the reduction of non-ETS emissions of each member state in the period 2021-2030 (Romania is allocated the reduction quota of 2%), its GHG emissions from land refer to the calculation of quantities. Communication on uses, land-use change and forestry, and a European strategy for decarbonizing the transport sector (Pakulska, 2021).

At the end of 2019, the EC presented a new proposal for tackling climate and environmental challenges in the form of a growth strategy, with the objective of transforming the EU into a fair and prosperous society with a modern, competitive and resource-efficient economy with zero net greenhouse gas emissions in 2050 and with economic growth decoupled from resource use.

Subsequently, at the end of 2021, the European Commission sends Romania a late warning on the transposition of the EU Energy Efficiency Directive 2012/2002 into national legislation. This means that Romania will assume the EU energy efficiency target for 2020 of at least 32.5%.

2. Share of Renewable Energy in Gross Final Energy Consumption

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 provides in Article 3 (Overall binding Union target for 2030) that Member States shall collectively ensure that the share of energy from renewable sources in the Union's gross final consumption of energy in 2030 is at least 40%.

The European Commission said in its Green Deal announcement at the end of 2019 that the EU aims to become a world leader in tackling the impacts of climate change and the first continent to achieve net zero greenhouse gas emissions by 2050. Essentially, it aims to transform the economy in a sustainable and lasting way by phasing out fossil fuels, promoting clean and renewable energy and developing a circular economy (European Commission, 2020).

At the national level, Romania has already taken important steps in this direction by developing the National Integrated Energy and Climate Change Plan 2021-2030 (PNIESC), which will form the basis of the national strategy in this area. The plan is currently being updated following recommendations from the European Commission and Romania will increase its ambition for the share of renewable energy in gross final consumption to 30.7% by 2030 (National Integrated Energy and Climate Change Plan, 2020).

Romania has rich and varied renewable energy resources: biomass, hydropower, geothermal potential, wind and photovoltaic. These are distributed throughout the country and will be exploited on a larger scale as the performance-price ratio of the technologies improves with the maturity of new generations of equipment and related installations.

The use of renewable energy has many potential benefits, including a reduction in greenhouse gas emissions, diversification of energy supply and reduced dependence on fossil fuel markets (in particular, the oil and gas market), especially at this time in terms of the Ukraine-Russia border conflict. The development of renewable energy sources may also have the potential to boost employment in the EU by creating jobs in the new 'green' technology sector (Ministry of Economy, Energy and Business, 2020).

In order to analyse Romania's integration into EU standards for achieving energy targets, we will see the share of renewable energy use in gross final energy consumption from 2010 to 2019, according to data published by the Romanian National Institute of Statistics.

The analyzed indicator measures the share of renewable energy consumption in total final energy consumption in accordance with the Renewable Energy Directive. Total final energy consumption is the energy consumed by final consumers (final energy consumption) plus network losses and consumption of the power plant itself.

This indicator is part of a set of indicators:

(a) The EU Sustainable Development Goals (SDG) indicators refer to SDG 7 for clean and affordable energy, SDG 12 for ensuring sustainable consumption and production patterns and SDG 13 used for climate protection. SDG 7 calls for ensuring universal access to modern energy services, improving energy efficiency and increasing the share of renewable energy. To accelerate the transition to affordable, reliable and sustainable energy systems, countries should facilitate access to clean energy research and encourage investment in energy infrastructure and clean energy technologies. SDG 12 calls for sustainable consumption and production that uses resources efficiently, reduces food and other waste worldwide and safely disposes of toxic waste and pollutants. SDG 13 aims to implement commitments to the United Nations Framework Convention on Climate Change and operationalize the Green Climate Fund.

(b) The EU 2020 Strategy Indicator is used to monitor progress towards the EU climate and energy target of "reaching 20% of total final energy consumption from renewable sources". Furthermore, this indicator is part of the impact indicators of the European Commission's Strategic Plan 2016-2020, which relates to its 10 priorities and is included in the set of EU Framework Strategy for Resilient Energy Union increase.

This can be equated with global SDG indicator 7.2.1 "Renewable energy share in total final energy consumption". The Europe 2020 Strategy sets the goal of increasing the share of renewable energy in total final energy consumption to 20% by 2020. By 2030, this share will further increase to at least 27%, according to the 2030 Climate and Energy Policy Framework. Renewable energy is emphasized as part of the effort. The EU Cohesion Policy (2014-2020) has invested 29 billion dollars in sustainable energy, including energy efficiency, renewable.

Table 3. Share of Renewable Energy in Gross Final Energy Consumption in Romania 2010-2019

Year	Share of renewable energy in gross final energy consumption in Romania 2010-2019 (Percentages)
2010	22,8 %
2011	21,2 %
2012	22,8 %
2013	23,9 %
2014	24,8 %
2015	24,8 %
2016	25 %
2017	24,5 %
2018	23,9 %
2019	24,3 %

Source: National Institute of Statistics, http://statistici.insse.ro:8077/tempo-online/#/pages/tables/insse-table

In the period 2010-2019, with the exception of the years 2011, 2017, 2018, there is a continuously increasing trend of the share of renewable energy in the gross final energy consumption, which demonstrates the promotion of renewable energy sources, encouraging the production of energy from less exploited renewable resources.

In terms of energy consumption, in 2019, just over 24% of energy consumption came from renewable energy sources, placing our country in 10th place in the EU and above the EU average level. In 2030, Romania aims to achieve a share of energy from renewable sources in the final gross consumption of electricity (SRE–E) of 49.4%, from 41% in 2020 (MMediu, 2020).

Also for the same period of time, 2010-2019, we will analyse the CO2 emissions intensity in Romania, as well as the greenhouse gas emissions by economic activities, in order to intensify Romania's efforts to achieve the transition to a green, low-carbon, climate resilient economy and to integrate climate change adaptation measures in vulnerable economic, social and environmental sectors, in line with EU policies.

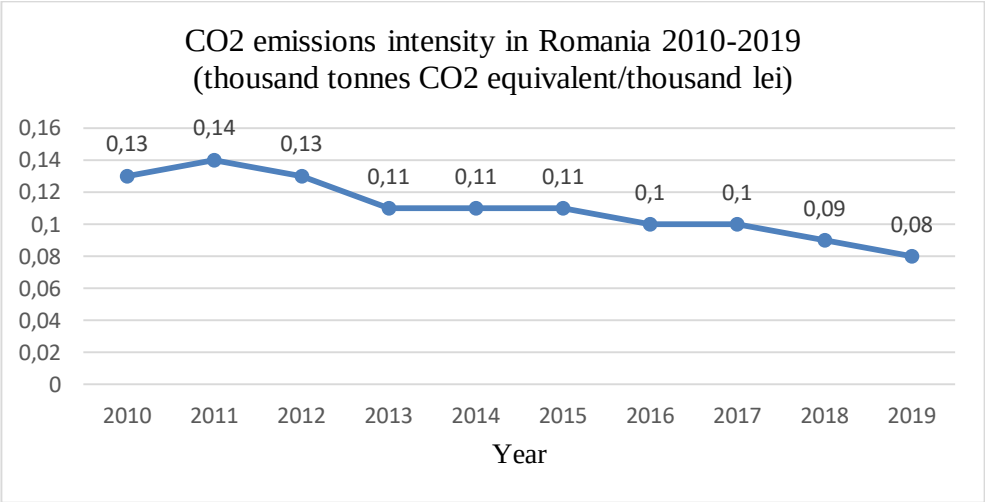

Chart 1. CO2 emissions intensity in Romania 2010-2019

(Own production following data collection from National Institute of Statistics)

Source: National Institute of Statistics, http://statistici.insse.ro:8077/tempo-online/#/pages/tables/insse-table

Greenhouse gas emissions intensity shows how much gas was emitted to produce one unit of GDP (constant 2010 prices), with a decreasing trend, this shows a positive aspect in terms of the environmental impact of economic activity.

The development of the energy sector is part of Romania's development process. The vision of Romania's Energy Strategy is one of growth of the energy sector in conditions of sustainability, economic growth and accessibility, in the context of the implementation of the new legislative package (Oncioiu I. et al., 2017). Clean energy for all Europeans in 2030, is the ideal to be achieved with regard to setting targets for reducing greenhouse gas emissions, renewable energy sources and energy efficiency and with the prospect of Romania implementing the European Green Pact 2050.

The EU aims to reduce greenhouse gas emissions by 80-95% below 1990 levels by 2050, with targets of 40% by 2030 and 60% by 2040. With the European Green Deal, it is proposed to revise this target from 50% to 55% in 2030 and to reach "net zero" emissions in 2050 (MMediu, 2020).

Using the aggregate form of greenhouse gas emissions, the evolution of the global warming potential of greenhouse gases in industry and households is tracked, in 2016 85.4% of greenhouse gas emissions were distributed in industry and 14.6% in households (INS, 2018).

Table 2. Greenhouse Gas Emissions in Romania by Activity Sectors in 2010 and 2019

Year	2010	2019
CAEN Rev.2 (activities of the national economy - sections) (Thousand tonnes CO2 equivalent)		
A Agriculture, forestry and fisheries	104861,38	96839,22
B Mining and quarrying	18715,88	20838,49
C Manufacturing	7696,06	5723,34
D Electricity, gas, electricity, gas, hot water and air conditioning supply	26658,1	24797,98
E Water supply; sewerage, waste management, remediation activities	31409,96	22394,69
F Construction	6676,28	6944,55
G Wholesale and retail trade; repair of motor vehicles and motorcycles	3316,75	3644,49
H Transport and storage	1410,2	1673,24
I Hotels and restaurants	5494,47	6753,07
J Information and communication	169,05	197,31
K Financial intermediation and insurance	291,36	354,53
L Real estate	223,36	240,16
M Professional, scientific and technical activities	473,12	506,31
N Administrative and support service activities	526,45	630,98
O Public administration and defence; public social insurance	358,78	412,34
P Education	434,85	480,08
Q Health and social assistance	253,99	293,2
R Performing, cultural and recreational activities	343,35	424,86
S Other service activities	112,43	162,6

Source: National Institute of Statistics, http://statistici.insse.ro:8077/tempo-online/#/pages/tables/insse-table

We observe that in a rather long period of time, about 10 years, there are no big changes in the sectors of activities of the national economy, by sectors, in terms of greenhouse gas emissions, which leads the state to implement as effectively as possible the directives of the European Union and stimulate a green economy, sustainable at the level of each activity.

The estimate of the total amount of GHG fluxes to the atmosphere should be provided as an aggregate emission in tonnes of CO2 equivalent. The largest share of GHG emissions belongs to the activities of production and supply of electricity and heat, gas, hot water and air conditioning (CAEN D), both in 2010 and 2015-2019, followed by activities in agriculture, forestry and fishing (CAEN A). For Romania, the European Commission has set a reduction target of 2% in 2030 compared to 2005 levels (Regulation (EU) 2018/842) while the average for the EU28 is a 30% reduction (European Parliament, 2021).

Conclusion

Climate change is driven by anthropogenic activities that produce greenhouse gas (GHG) emissions, which are most often expressed as CO2 emissions. The effects of climate change are felt differently at local, regional or even continental level.

The European Union, following the global trend, is moving towards a sustainable energy system, promoting high consumption of energy from renewable sources and energy efficiency in all sectors. Policy instruments have a key role to play in achieving the targets set (energy efficiency, increased renewable energy production, biomass use, etc.) and implementing this energy system.

Following the European trend, at national level, the legislative framework has started to adapt to the new energy production and promotion systems, thus Romania is involved in the European process of integration of energy markets.

The potential of renewable energy in the local market could be the driving force behind the decarbonization of Romania's energy sector.

Romania is committed to achieving a 30.7% share of renewable energy in the total energy mix by 2030, according to the National Integrated Energy and Climate Change Plan 2021-2030.

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