

SITUATION OF EMISSIONS AND ABSORPTION OF GREENHOUSE GAS AND ENERGY FROM RENEWABLE SOURCES IN ROMANIA

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Abstract: *The EU is at the forefront of the fight against climate change. Through its bold policies and actions, the EU sets global standards and sets ambitious climate targets around the world. As a global problem, climate change requires countries around the world to work together. Romania aims to make a fair contribution to achieving the decarbonisation target of the European Union and will follow the best environmental protection practices. In the process of setting objectives regarding energy from renewable sources, Romania follows the recommendations of the European Commission and the provisions of the "Clean Energy for All Europeans" package.*

Key words: *emissions, greenhouse effect, energy, renewable sources, orientational trajectory*

INTRODUCTION

In line with the requirements of the agreement, the EU presented its long-term emissions reduction strategy and updated climate plans before the end of 2020, committing to reduce its emissions by at least 55% below 1990 levels by 2030. [19]

In 2015, world leaders agreed on ambitious new targets to fight climate change. The Paris Agreement sets out an action plan to limit global warming. In line with this commitment, Member States agreed to put the EU on a path to become the first climate-neutral economy and society by 2050 [1], [8].

Following the EU's accession to the Paris Agreement and with the publication of the Energy Union Strategy, the Union has taken on an important role in the fight against climate change, through the 5 main dimensions: energy security, decarbonisation, energy efficiency, internal energy market and research, innovation and competitiveness. [8], [11]

Thus, the European Union is committed to leading the global energy transition by meeting the targets set out in the Paris Agreement on climate change to provide clean energy across the EU [5], [8].

To meet this commitment, the EU has set energy and climate targets for 2030 as follows:

- Target to reduce domestic greenhouse gas emissions by at least 40% by 2030 compared to 1990;
- The target of 32% renewable energy consumption in 2030;
- The target of improving energy efficiency by 32.5% in 2030;
- The target for electricity market interconnection at 15% by 2030 [12], [14], [15].

MATERIALS AND METHODS

The modelling of the Romanian energy system was based on the expected developments of policies and measures, under various other technical and economic factors and indicators. In this respect, the proposed policies determined a series of input data and assumptions as well as output data of the modelling. The paper presents the links between various energy and non-energy parameters and their impact on the indicators analysed and presented. [2], [13]

The modelling aimed to achieve the proposed policy objectives at the institutional level and to adapt the energy and energy-related systems to the objectives of the five dimensions of European energy and climate change policy in a cost-effective, reasonable and technically feasible way. For this paper we (the authors) have studied literature, many articles and studies on this topic. As a result of the study, we have been able to centralize and present several very important data for this field which is more and more studied lately. [4], [18]

RESEARCH RESULTS

The implementation of the EU-ETS and compliance with the annual emission targets for non-ETS sectors are the main commitments to achieve the targets. For the sectors covered by the EU-ETS, Romania's overall emission reduction target is about 44% by 2030 compared to 2005[19].

As a result of the policies and measures envisaged, GETS emissions from the ETS sector in 2030 show a level of 39 million t CO₂ equivalent, as shown in Figure 1. [3]

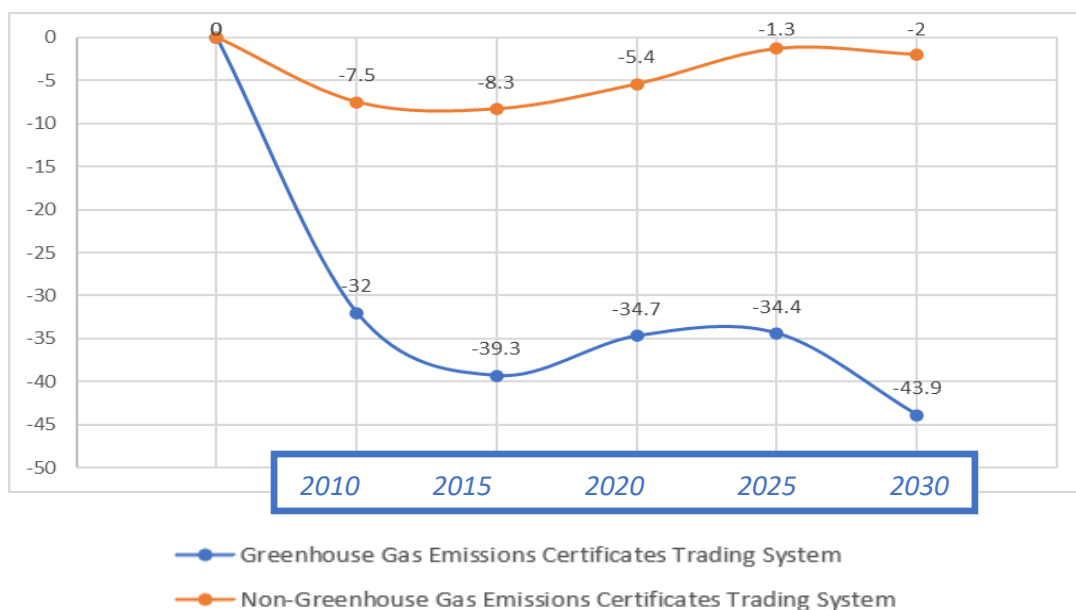


Figure 1. Evolution over time and expected emissions from the ETS and non-ETS sectors - the trading system for greenhouse gas emissions certificates in the EU

Source: Processing according to Deloitte calculations, Regulation no. 2018/841/UE [13],[17]

***ETS- Emissions Trading System

***GETS -greenhouse gas emissions trading system

For Romania, the European Commission has set a reduction target of 2% in 2030 compared to the 2005 level. This target can be achieved by complying with the provisions and conditions of each Member State and by implementing regulations on the inclusion of greenhouse gas emissions and removals from land use, land-use change and forestry activities in the 2030 climate and energy policy framework and by offsetting up to 13.4 million tonnes of CO₂ equivalent for the period 2021-2030 [3],[19].

According to projections made during the preparation of the National Integrated Energy and Climate Change Plan, total GHG (Greenhouse gases) emissions in 2030 will be 118.35 million t CO₂ equivalent. [9]

The decarbonisation process will also be influenced by the achievement of the following strategic objectives related to the circular economy:

- Increase the reuse and recycling rate of municipal waste to at least 70% by 2030 (minimum 50% by the end of 2025);
- Landfill by the end of 2025 only waste that has undergone prior treatment;
- Increase the recycling rate of packaging waste to 80% by 2030, with interim targets of 60% by 2020 and 70% by 2025;
- Ban landfilling of recyclable materials such as plastics, metals, glass, paper and cardboard, and biodegradable waste by 2025, complete elimination of landfilling by 2030;
- Developing markets for high-quality secondary raw materials, including by assessing the added value of end-of-waste criteria for certain materials;
- Increase energy recovery to at least 15% by the end of 2025;
- Increase the separate collection of recyclable waste by three fractions (paper and cardboard, plastic and metal and glass) to reach a minimum capture rate of 52% in each county and Bucharest. [7], [12], [14]

Given that in 2017 the global share of renewable energy in gross final energy consumption exceeded the target of 24% assumed for 2020, as well as its expected evolution, the projections made based on the assumptions used in this Plan, indicate reaching a global share of 30.7% RES by 2030 [10].

The calculation of the overall share of RES in final energy consumption used the calculation methodology set out in Directive 2018/2001 on the promotion of the use of energy from renewable sources [17].

In Figure 2. The indicative trajectory of the RES share in final energy consumption over the period analysed is shown.

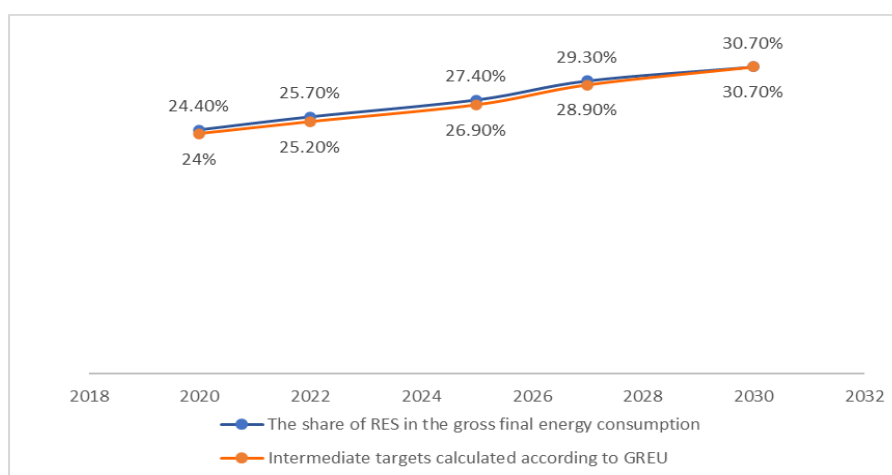


Figure 2. Indicative trajectory of RES share in final energy consumption (2020–2030, %)

Source: Processing according to Deloitte calculations, <https://www.europarl.europa.eu> [13], [15],[16]

***RES -Renewable Energy Sources

***GREU- Governance Regulation of the Energy Union

The RES target in the intermediate points was calculated as the minimum value required by the Union Regulation, namely:

- By 2022, the trajectory must reach the target of at least 18% of total expected growth between 2020 and 2030, compared to the 2020 target of 24%;
- By 2025 the trajectory should reach the target of at least 43% of the total expected growth in the period 2020-2030, compared to the 2020 target (24%);
- By 2027 the trajectory should reach the target of at least 65% of total projected growth in 2020-2030, compared to the 2020 target (24%)[18], [19].

Romania has chosen to adopt a relatively cautious approach to the level of ambition, taking into account national particularities related to both the stability and reliability of the NEPS (National Electric Power System) and the need for storage capacities, as well as the impact of investment costs on the consumer price, In shaping this approach, it should be noted that the process of implementing the recommendations has also faced a lack of data needed to increase the level of ambition in the area recommended by ECOM (The European Commission) and to develop a more detailed plan on measures, actions, [6], [14].

An additional constraint is a fact that no official data is currently available on the real potential of biogas and biomass resources at the national level, a situation that is further complicated by the existence of an unclear legislative framework in this area, which does not allow a clear classification of certain natural resources under the biomass category. [7]

Such situations/factors have underpinned Romania's decision to adopt a cautious approach. However, given the absence of legislative barriers to RES capacity growth and the availability of particularly RES-friendly financing instruments for 2021-2030, RES will be able to develop in line with market demand and the capacity developed will be able to exceed the amount proposed in the Plan at this point, if market demand and actual usable potential allow this. [14]

The total share of renewable energy in gross final energy consumption includes the contribution of renewable energy from each sector to final energy consumption. Romania's contribution to achieving the 2030 targets is illustrated in the graphs below, based on the MSA/SM scenario and the assumptions and calculation projections used (Figure 3.) [13], [15].

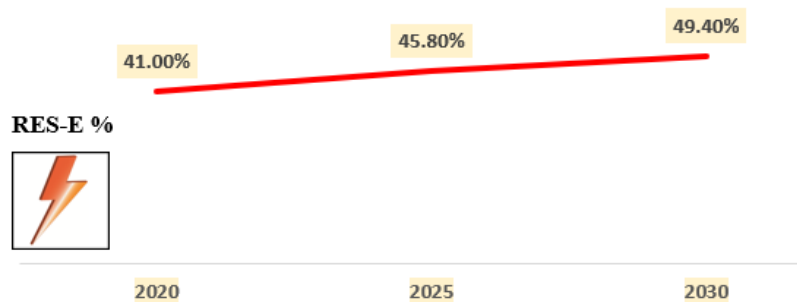


Figure 3. The indicative trajectory of the share of energy from renewable sources in the final gross electricity consumption (2020-2030)

Source: Processing according to Deloitte calculations, <https://www.europarl.europa.eu> [13], [15],[16]

***RES-E Renewable Energy Sources in the Electric Energy sector

***MSA- Modeling scenario based on additional/supplementary measures

Normalised values of electricity from hydro and wind power were used to calculate the share of renewable energy in gross final electricity consumption. (Figure 4.) [13].

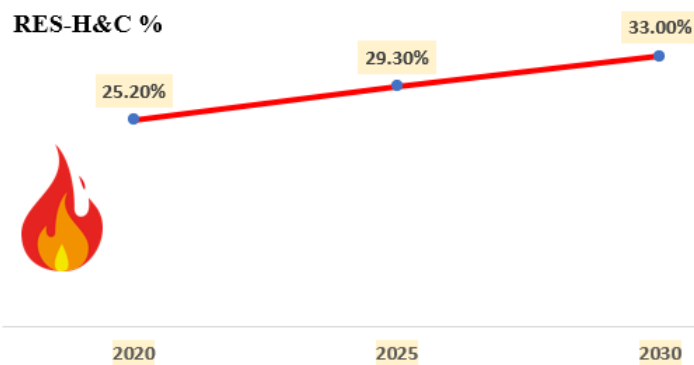


Figure 4. The indicative trajectory of the share of energy from renewable sources in the final gross energy consumption in the heating and cooling sector (2021–2030)

Source: Processing according to Deloitte calculations, <https://www.europarl.europa.eu> [13], [15],[16]

***RES-H&C Renewable Energy Sources in the Heating and Cooling sector

*** H&C- Heating and Cooling sector

According to the data, the gross final consumption of renewable energy used in the H&C sector is expected to increase by 24% between 2021 and 2030, given the availability of biomass sources (mainly firewood and agricultural waste), while respecting sustainability criteria. [10]

An alternative in 2030 is the introduction of heat pumps to meet heating needs and the installation of solar panels on roofs. The calculation assumptions are considered the most cost-effective investments to cover the national heat demand, given the expected increased availability of natural gas for heating processes and the dispersion of households/inhabitants in rural areas of Romania. [15], [17]

Romania faces certain constraints to reach the indicative target set out in Article 23 of the EU Directive, not least because the RES share in the heating and cooling sector is already relatively high, estimated at 25.6% in 2020.

This is due to the significant share of biomass used at the national level which, according to ECOM definitions, is considered RES [18].

However, the subject is a sensitive one for Romania, as at the national level there are no clear statistics on the real biomass potential, and the unclear national legislative framework in this area leads to some uncertainties about the classification of certain resources, such as firewood, which is used at a high level especially in rural areas, in the biomass category. [15]

Romania will make efforts, as described in the plan, to increase the level of ambition in the field of RES, but considers it important that the difficulties and constraints mentioned above are taken into account.

In the context of the provisions of Directive 2018/2001 on the promotion of the use of energy from renewable sources, Romania aims to explore different ways of overcoming the structural barriers mentioned above to reach the indicative target of 1.3% per year by 2030 (Figure 5.) [9].

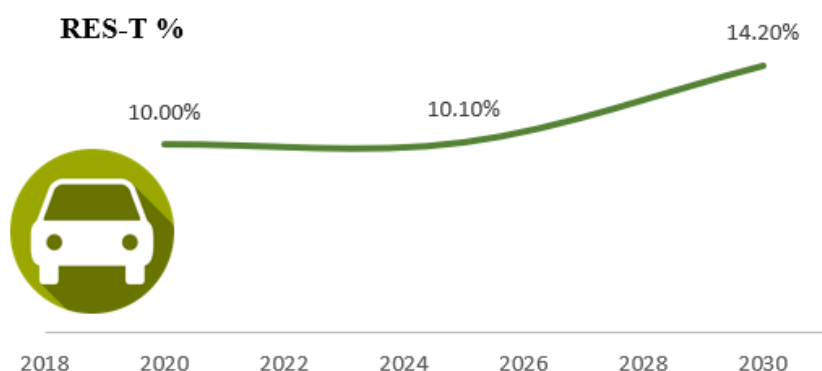


Figure 5. The indicative trajectory of the share of energy from renewable sources in the final gross energy consumption in the transport sector (2021–2030)

Source: Processing according to Deloitte calculations, <https://www.europarl.europa.eu> [13], [15],[16]
 ***RES-T- Renewable Energy Sources in the Transport sector

In the case of renewable energy in the transport sector, an EU-wide target of 14% of final energy consumption in transport by 2030 has been set for each Member State. The plan projects accelerated electrification in the transport sector, based on the set of priorities identified, as well as on the assumption that the costs of light electric vehicles will converge with those of internal combustion cars by 2024, according to independent studies. [18]

Thus, by 2030, there are expected to be around 700,000 private electric cars (including hybrids) and around 650,000 charging points in circulation (of which around 40,000 are fast and semi-fast charging). [19]

The 2030 target takes into account the current level of RES-T share (6.56% as of 2017) and therefore the efforts needed to reach 14.2% in 2030 [15]. The 2030 projections foresee an increase in wind capacity to 5,255 MW hour and in PV capacity to approx. 5,054 MW, as illustrated in the graph below.

As regards the expected evolution of natural gas capacity, given the age of existing natural gas capacity, the decrease due to decommissioning is expected to exceed the expected increase in new capacity. However, gross electricity generation from natural gas will increase. (Figure 6.) [14]

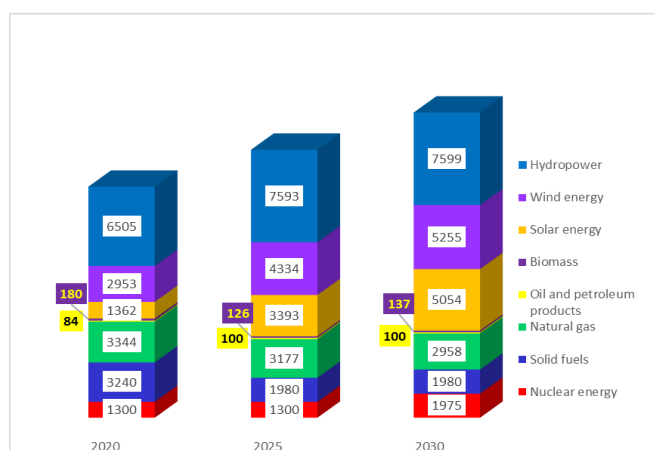


Figure 6. Indicative path of net installed capacity, by source [MW hour]

Source: Processing according to Deloitte calculations, <https://www.europarl.europa.eu> [13], [15],[16]

In terms of gross final energy consumption, an increase of about 2.7% is expected over the period 2021-2030, with a sharp increase until 2025, followed by a decrease due to energy efficiency measures, as can be seen in the graph below. This consumption is broken down by the 3 sectors of interest: heating and cooling, electricity and transport. [19]

According to calculation projections, in 2030, the heating and cooling sector is responsible for approx. 50% of gross final energy consumption (Figure 7.). [13], [16]

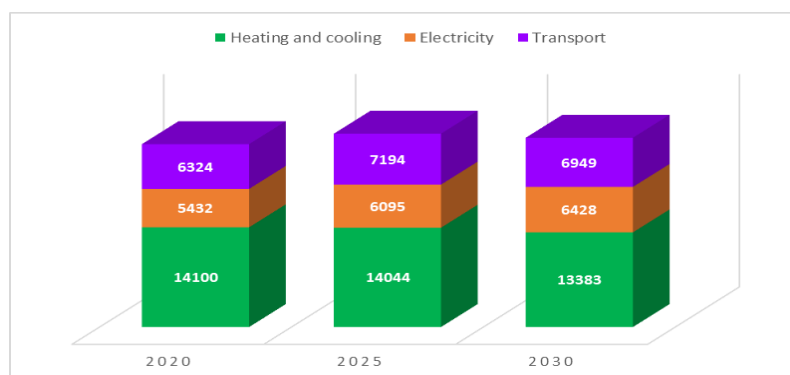


Figure 7. The indicative trajectory of final gross energy consumption, by sector (ktoe)

Source: Processing according to Deloitte calculations, <https://www.europarl.europa.eu> [13], [15],[16]

***Kilo tonnes of oil equivalent=ktoe

***PINPEC- Project of the Integrated National Plan in the field of Energy and Climate Change

According to the "National Forest Accounting Plan for Romania", developed by the Ministry of Environment, Water and Forests and currently in the public consultation stage, the volume of living biomass will evolve until 2025 according to the graph below. [17]

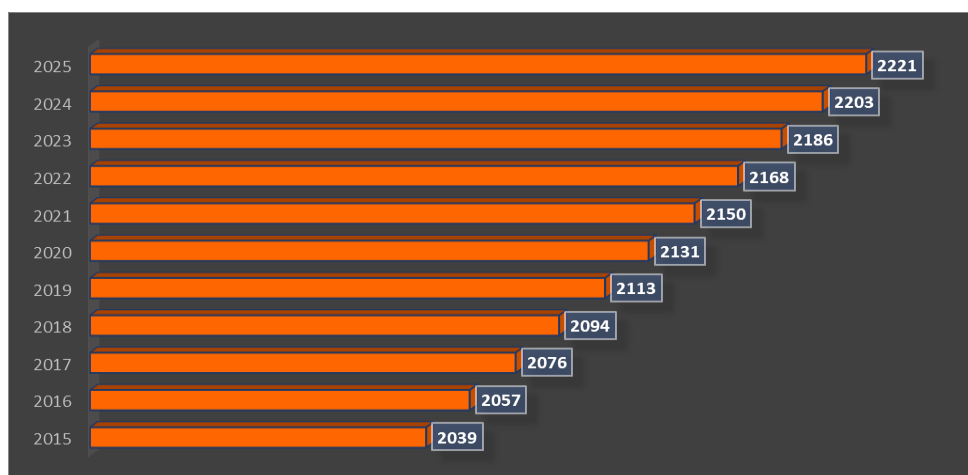


Figure 8. Evolution of the volume of live biomass until 2025 (mil. cm)

Source: Processing according to Deloitte calculations, Regulation no. 2018/841/UE [13],[17]

*** million cubic meters =mil. cm

In this context, Romania could use the flexibility mechanism provided for in the applicable legislation to cover up to 35% of the annual amount needed for energy savings, using one or more of the following measures:

- Energy savings from transformation, transmission and distribution, including efficient heating and cooling, are to be counted towards the total amount claimed for energy savings;
- Count energy savings from individual activities started after 1 January 2018 and up to 31 December 2020 that continue to achieve energy savings beyond 2020 [6], [10].

CONCLUSIONS

Romania has reached the 2020 target of 24% of total energy consumption from renewable sources. For 2030, the new target set by the Romanian government is 30.7%, achievable by adding 7GW in renewable capacity. In recent years, Romania has suffered a decline in attractiveness for renewable energy investment, partly due to a lack of regulation and adequate government support.

Romania will therefore contribute to the EU decarbonisation process, as total greenhouse gas emissions in the national economy sectors will be reduced by about 50% in 2030 compared to 1990.

Romania has reached the 2020 target of 24% of total energy consumption coming from renewable sources. For 2030, the new target set by the Romanian government is 30.7%, achievable by adding 7GW in renewable capacity. In recent years, Romania has suffered a decline in attractiveness for renewable energy investment, partly due to a lack of regulation and adequate government support.

Both ETS and non-ETS sectors will contribute to this reduction. Moreover, GHG emissions could be further reduced according to the updated WAM scenario following the COM-European Commission recommendations, after the finalisation of the strategic documents elaborated by the Romanian governmental institutions.

In conclusion, GHG emissions and removal targets and related policies and measures will be updated in PINPEC (Project of the Integrated National Plan in the field of Energy and Climate Change) after the finalisation of these strategic documents.

Renewable energy sources (wind, solar, hydro, ocean, geothermal, biomass and biofuels) are alternatives to fossil fuels that contribute to reducing greenhouse gas emissions, diversifying energy supply and reducing dependence on volatile and uncertain fossil fuel markets, in particular oil and gas.

EU legislation on the promotion of renewables has evolved significantly over the last 15 years. In 2009, EU leaders set a target of 20% of the EU's energy consumption coming from renewable energy sources by 2020. In 2018, a target was set for 32% of EU energy consumption to come from renewable energy sources by 2030. In July 2021, given the EU's new climate ambitions, the co-legislators received a proposal to revise the target to 40% by 2030.

After Russia invaded Ukraine and the ensuing energy crisis, the EU agreed to rapidly reduce its dependence on Russian fossil fuels before 2030 by accelerating the transition to clean energy. Discussions are taking place on the updated policy framework for 2030 and beyond.

In Romania, the decarbonisation of the energy sector relies heavily on the support provided by the European Green Pact. The potential of renewable energy in the local market can become the driver of decarbonisation of the Romanian energy sector, as long as public initiatives are synchronised with business intentions.

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