The 2021-2030 Integrated National Energy and Climate Plan

April 2020

Contents

List of tables, figures and charts

List of acronyms

CA	Contracting Authority
ANRE	Autoritatea Națională de Reglementare în Domeniul Energiei (*National Energy Regulatory Authority*)
BOE	Barrel of oil equivalent
BRHA	The Bulgaria-Romania-Hungary-Austria Gas Pipeline
CACM	Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management
CCAT	The Centre for Advanced Research on Propulsion (*Centrul de Cercetări Avansate în Propulsie*)
CEE	Central and Eastern Europe
COM	The European Commission
GC	Green Certificate
CWE	Central Western Europe
ENTSO-E	European Network of Transmission System Operators for Electricity
ENTSO-G	European Network of Transmission System Operators for Gas
ETS	Emissions Trading System
SLR	Supplier of last resort
GHG	Greenhouse gases
GD	Government Decision
SME	Small and medium-sized enterprises
INS	National Institute for Statistics (*Institutul Național de Statistică*)
H&C	Heating and cooling
LV	Low voltage

k	Kilo/one thousand
km	Kilometre
kW	Kilowatt
OPL	Overhead power lines
LULUCF	Land Use, Land Use Change & Forestry
MADR	Ministry of Agriculture and Rural Development
m^3	Cubic metre(s)
MEC	Ministry of Education and Research (*Ministerul Educației și Cercetării*)
MEEMA	Ministry of the Economy, Energy and Business Environment (*Ministerul Economiei, Energiei și Mediului de Afaceri*)
MFE MEEMA	Ministry of European Funds (*Ministerul* Ministry of the Economy, Energy and Business Environment (*Ministerul Economiei, Energiei și Mediului de Afaceri*)
m	Million
m t	Million tonnes
m t CO_2	Million tonnes of CO_2
m t CO_2 equivalent $MtCO_2$ equivalent	Million tonnes of CO_2 equivalent
bn	Billion(s)
MLPDA	Ministry of Public Works, Development and Administration (*Ministerul Lucrărilor Publice, Dezvoltării și Administrației*)
MMAP	Ministerul Mediului, Apelor și Pădurilor (*Ministry of the Environment, Waters and Forestry*)
MRC	Multi-regional Coupling
MTIC	Ministry of Transport, Infrastructure and
MV	Medium voltage
MW/MWh	Megawatt/Megawatt hour
TN	Technological node
NTC	Net Transfer Capacity
DSO	Distribution system operator
OPCOM	The Electricity and Gas Market Operator (*Operatorul Pieței de Energie Electrică și Gaze Naturale – OPCOM SA*)
TSO	Electricity Transmission System Operator

PCI	Projects of Common Interest
PJ	Petajoule
NRDIP	The National Research-Development and Innovation Plan
DINECP	The Draft Integrated National Energy and Climate Plan
NEEAP	The National Energy Efficiency Action Plan
VTP	Virtual trading point
EDG	Electricity Distribution Grid
ETG	Electricity Transmission Grid
EUGR	The EU Governance Regulation
SACET	District Heating System
CS	Compression Station
SEE	South East Europe
SDAC	Single Day Ahead Coupling
SIDC	Single Intra-Day Coupling
NES	National Electricity System
SMS	Smart monitoring system
SM	Member State
GMS	Gas measurement station
NTS	National transmission system (for gas and
RES	Renewable energy sources
RES-E	Renewable energy sources in the electricity sector
RES-H&C	Renewable energy sources in the heating and cooling sector
RES-T	Renewable energy sources in the transport sector
LTRS	Long-Term Renovation Strategy
Stakeholder	A party interested in the draft 2021-2030 DNIPECC (natural persons and entities with or without legal personality)
STS	System technological services

t	tonne
toe	tonne of oil equivalent
EU	The European Union
UEFISCDI	The Executive Unit for Financing Higher Education, Research, Development and Innovation (*Unitatea Executivă pentru Finanțarea Învățământului Superior, a Cercetării, Dezvoltării și Inovării*)
EV	Electric vehicle
WACC	Weighted Average Cost of Capital (cost of capital)
WB	Western Balkans
WEM	Modelling scenario with existing measures
WAM	Modelling scenario with additional measures

A. National Plan

1. Overview and plan development process

1.1. Summary

i. Political, economic, social, and environmental context of the plan

Following EU's accession to the Paris Agreement and with the publication of the EU Strategy, the Union has taken a leading role in the fight against climate change by the **five prime dimensions**: **energy safety, decarbonisation, energy efficiency, the energy internal market, and research, innovation and competitiveness.**

The European Union has thus committed itself to leading energy transition globally by achieving the climate change targets of the Paris Agreement, which concern the supply of clean energy throughout the Union. In order to meet this commitment, the European Union has established energy and climate targets for 2030, as follows:

- the target of at least 40 % domestic reduction in greenhouse gas emissions by 2030, compared to 1990;
- the target of 32 % renewable energy consumption in 2030;
- the target of 32.5 % for improvements in energy efficiency in 2030;
- the 15 % electricity interconnection target by 2030.

Consequently, in order to ensure the achievement of these targets, each Member State was required to submit a draft Integrated National Energy and Climate Plan (INECP) to the European Commission for the period 2021-2030 by 31 December 2018. The draft INECPs establish the national targets and shares in the achievement of the EU climate change targets. Consequently, Romania submitted its draft INECP on that date.

The European Commission has assessed the draft national integrated plans for energy and climate under Regulation (EU) 2018/1999 on the Governance of the Energy Union and Climate Action. The assessment comprised the level of ambition of the objectives, targets and shares designed to ensure achievement of the EU targets collectively. In particular, the assessment covered the EU targets for 2030 in the area of renewable energy sources and energy efficiency, as well as the interconnectivity of electricity grids that Member States aim for.

The assessment of the integrated plans submitted by all the Member States has revealed a gap between the EU targets and the Member States' share in matters of energy from renewable sources and energy efficiency:

- There is a gap between the 32 % target for RES, as committed to at EU level, and that inferred from these plans, which ranges between 30.4 % and 31.9 %;
- The Commission's assessment in the field of energy efficiency has revealed a reduction between 26.3 % and 30.2 % in primary consumption and between 26.5 % and 30.7 % in final consumption.

ii. Strategy relating to the five dimensions of the Energy Union

The approach to the five dimensions of the EU considered a multitude of strategies at various stages of preparation or approval, which were conceived by the ministries/stakeholders, taking account of the convergence and development priorities of Romania as an EU Member State.

This Plan integrates, as a priority, the objectives and strands established through the specific energy and climate strategies, at the same time being based on the programmatic documents initiated by other ministries/authorities.

As such, the approach proposed to identify a set of priorities that lead to the achievement of the revised objectives committed to, having regard to the available resources, the need to ensure affordable transition for the industry and the consumers and the institutional implementational capacity.

Similarly to the Union's perspective to build its energy and environmental policy around five pillars by 2030, this Plan was established on a series of core elements for defining the role and contribution of Romania to the strengthening of the European Union.

In this respect, the main elements taken into account in the strategic approach to the Plan were the following:

- developing the holistic energy, economy, environment and climate change approach by closely correlating it with the economic reality of Member States, lest the domestic macroeconomic and social balance be affected;
- restructuring the market framework in the context of the entailing transition costs and the Member States' capacity to sustain such costs in terms of accessibility and competitiveness;
- the economic growth and income per household (by 2030);
- reduction in energy poverty.

Main results

Following the Commission's recommendations, the updated contribution of Romania to the achievement of the EU objectives by 2030 is outlined in the table below:

Table 1 – Overview of the main objectives of the 2021-2030 INECP by 2030

Overview of the main objectives of the 2021-2030 INECP by 2030	
ETS emissions (% compared to 2005)	**-43.9 %***
Non-ETS emissions (% compared to 2005)	**-2 %**
Overall share of renewable energy in gross final energy consumption	**30.7 %**
⬇	
RES-E share	49.4 %
RES-T share	14.2 %
RES-H&C share	33.0 %
Energy efficiency (% compared to the PRIMES 2007 projection for 2030)	
Primary energy consumption	-45.1 %
Final Energy Consumption	-40.4 %
Primary energy consumption (Mtoe)	32.3
Final energy consumption (Mtoe)	25.7

Source: Deloitte analysis based on the official documents prepared by the authorities involved in the preparation of the INECP

** The emission values correspond to those included in the draft INECP submitted to the Commission on 31 December 2018; however, it is estimated that the final value for 2030 is likely to decrease, among others, as a result of the reduction in the final energy consumption and the decrease in production of electricity from coal*

As regards the **share of renewable energy**, the European Commission recommended Romania to increase the level of ambition for 2030 up to a share of renewable energy of at least 34 %. Consequently, the level of ambition regarding the share of renewable energy was revised compared to the updated version of the INECP from an initially proposed share of 27.9 % to 30.7 %. The new target was mainly calculated based on the Commission's recommendation to align the national macroeconomic projections to those in the "Ageing Report: economic and budgetary projections for the EU-27 Member States (2016-2070)", correlatively decommissioning the coal-based capacities.

In order to reach the ambition level regarding the share of renewable energy of 30.7 % in 2030, Romania will thus develop additional RES capacities of approximately 6.9 GW compared to 2015. In order to achieve this target, appropriate funding from the EU is needed in the sense of providing for the appropriate adequacy of electricity grids and flexibility in the production of RES-E by deploying backup gas capacities and storage capacities and by using smart electricity grid management techniques. Romania has chosen to adopt a prudent approach to the level of ambition, taking into account the national particularities and the RES investment demand for both replacement of capacities that have reached the maximum operation period and new ones in order to achieve the targets committed to in the INECP, having regard to the fact that Regulation (EU) 2018/1999 stipulates that, in future revisions of the INECP, shares may be adjusted only upwards. In the context of designing this approach, it is also noteworthy that, in the process of implementation of the recommendations, there was also the issue of absence of the data required to prepare a detailed plan regarding the measures, actions, and financial resources envisaged by the Romanian authorities in order to achieve the RES targets in the period 2021-2030, in particular in the area of RES for heating-cooling and transport. A new review/adjustment of the 2030 target will be possible on revision of the INECP, which will enable to estimate much better the effects of the implementation of Directive (EU) 2018/410 and of the Green Deal support programmes.

In conclusion, in order to reach the proposed RES targets, Romania will develop a series of policies and measures purposed to reduce consumption of energy and to foster the use of RES sources in relevant sectors - heating and cooling, electricity and transport, by maximising the synergies between the various projected actions.

However, the European Commission mentioned that Romania would have to plan a more significant reduction in primary and final energy consumption by 2030 in order to ensure the achievement of the Union's **energy efficiency** objective.

Therefore, Romania aims at primary energy consumption of 32.3 Mtoe and at final energy consumption of 25.7 Mtoe, thus achieving energy savings of 45.1 %, by reference to the primary consumption for 2030, namely 40.4 % for final energy consumption compared to the PRIMES 2007 baseline scenario.

Moreover, in order to comply with the obligations under Article 7 of Directive (EU) 2018/2002 amending Directive 2012/27/EU on energy efficiency, Romania must reach a cumulated value of new energy savings of 10.12 Mtoe in the period 2021-2030. Following a detailed assessment, Romania has decided to prepare and to implement alternative measures and policies in order to foster energy savings. Moreover, a draft Long-Term Renovation Strategy was submitted for public consultation and it is to be adopted by March 2020 (the current

renovation scenario provides for energy efficiency and significant CO_2 savings as well as new facilities for RES-E production installations - most of them in the form of photovoltaic panels for existing buildings).

As regards the **energy security** dimension, the Commission recommended a description of the support measures that facilitate the achievement of the energy security targets, with an emphasis on diversification of energy sources and reduction in energy dependency. In order to ensure energy security at national level, Romania has taken, and commits to take, measures in order to implement several projects on diversification of resources, namely:

- expeditiously implementing the legal framework required for the final decisions on investment in the exploitation of natural gas resources in the Black Sea area;
- adopting the Decarbonisation Plan proposed by the Oltenia Energy Complex (*Complexul Energetic Oltenia*), which is the main producer of coal-based electricity, with the purpose of ensuring sustainable transition towards low-carbon production of electricity;
- diversifying the uranium sources for Nuclearelectrica;
- extending the operating period and building new nuclear capacities;
- developing new RES capacities and ensuring integration in other markets in the region as well as promoting the use of hydrogen;
- developing/upgrading the existing infrastructure of electricity and natural gas networks, with a positive impact on the capacity to take over the RES energy and on the interconnectedness level;
- developing storage capacities.

Moreover, the European Commission suggested to Romania to define more ambitious objectives and targets regarding integration in the **internal energy market**, recommending in particular the adoption of certain measures to develop liquid and competitive wholesale and retail markets. Romania has recently taken significant steps in this respect, also undertaking to follow a liberalisation calendar that will ensure free pricing as of 2020/2021 depending on the demand and offer. On the other hand, the operationalisation of the support measures for **vulnerable consumers** and the alleviation of energy poverty will be considered in strict correlation with the deadlines of the abovementioned calendar.

In the updated version of the Plan, Romania also clarifies the undertaken target regarding the *level of interconnectedness of energy transmission grids, which will reach at least 15.4 % in 2030* based on a progress calendar for current and projected projects, which is administered by the energy transmission system operator.

Moreover, Romania is involved in the European process of integration of energy markets in the context of achieving the Single Day-Ahead Coupling (SDAC) and the Single Intra-Day Coupling (SIDC), involving the corresponding contractual framework.

As regards **research, innovation and competitiveness**, the Romanian Government plans to prepare the National Smart Specialisation Strategy for the period 2021-2027, which is foreseen to be published in the second quarter of 2020. The strategy intends to define the national objectives and targets of funding in the fields of research, innovation and competitiveness, thus addressing the Commission's recommendation.

In conclusion, Romania has initiated various actions with the purpose of increasing the level of ambition as regards the RES share and the energy efficiency targets and is considering several measures to define and to implement strategies and policies that concern reaching the targets committed to. Additional measures will have to be taken, as described in Chapter 3 of this Plan, in order to reach the proposed targets (set out in Chapter 2), which will be subsequently conducive to the achievement of the overarching European Union objectives.

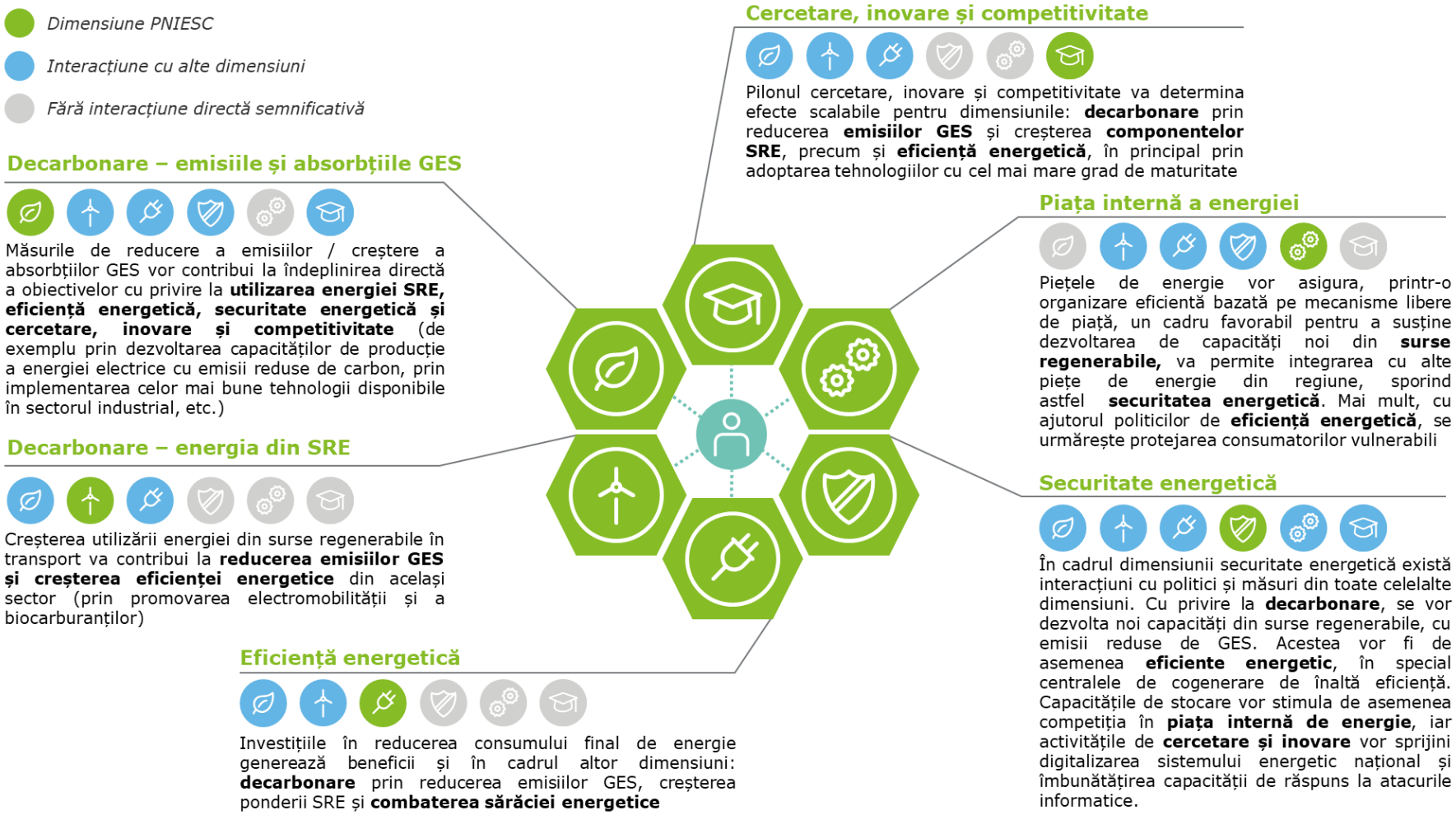
In the context of the Sustainable Europe Investment Plan, which has been recently published by the European Commission, this Plan contemplates also addressing the bases of the policies and interventions designed to ensure socially just transition in Romania.

The priority of the measures and policies aimed at reaching the targets was mainly established according to the interactions between dimensions, having regard to the maximisation of the projected impact of the respective policies and measures. For example, investments to increase energy efficiency will also result in reduction of GHG emissions, the increase in the share of renewable energy and alleviation of energy poverty. Positive effects will be thus recorded also at macroeconomic level, providing for the creation of new jobs, an enhanced quality of life and the reduction in social costs.

The summary of the main trans-sectoral policies and measures and the interaction between dimensions are elaborated in the following section.

iii. Overview table with key objectives, policies and measures of the plan

Figure 1 - Overview of the interactions between dimensions



Source: Deloitte analysis based on the information submitted by the INECP Interinstitutional Working Group

RO	***EN***
Dimensiune PNIESC	INECP Dimension
Interacţiune cu alte dimensiuni	Interaction with other dimensions
Fără interacţiune directă semnificativă	No significant direct interaction
Decarbonare - emisiile si absorbţiile GES	Decarbonisation - GHG emissions and removals
Măsurile de reducere a emisiilor / creştere a absorbţiilor GES vor contribui la îndeplinirea directă a obiectivelor cu privire la utilizarea energiei SRE, eficienţă energetică, securitate energetică şi cercetare, inovare şi competitivitate (de exemplu prin dezvoltarea capacităţilor de producţie a energiei electrice cu emisii reduse de carbon, prin implementarea celor mai bune tehnologii disponibile în sectorul industrial, etc.)	The measures for reducing GHG emissions/increasing GHG removals will contributes directly to the achievement of the targets on the use of RES energy, energy efficiency, energy security and research, innovation and competitiveness (e.g. by developing low-carbon electricity generation capacities by implementing the best available techniques in the industrial sector etc.)
Decarbonare - energia din SRE	Decarbonisation - RES energy
Creşterea utilizării energiei din surse regenerabile în transport va contribui la reducerea emisiilor GES şi creşterea eficienţei energetice din acelaşi sector (prin promovarea electromobilităţii şi a biocarburanţilor)	The increase in the use of renewable energy in transport will result in reduction of GHG emissions and increase in energy efficiency in the same sector (by promoting electromobility and biofuels)
Eficienţă energetică	Energy efficiency
Investiţiile în reducerea consumului final de energie generează beneficii şi în cadrul altor dimensiuni: decarbonare prin reducerea emisiilor GES, creşterea ponderii SRE şi combaterea sărăciei energetice	The investments in the curtailment of final energy consumption also generates benefits under other dimensions: decarbonisation by reducing GHG emissions, increase in the RES share and combating energy poverty
Cercetare, inovare şi competitivitate	Research, innovation and competitiveness
Pilonul cercetare, inovare şi competitivitate va determina efecte scalabile pentru dimensiunile: decarbonare prin reducerea emisiilor GES şi creşterea componentelor SRE, precum şi eficienţă energetică, în	The research, innovation and competitiveness pillar will generate quantifiable effects for the following dimensions: decarbonisation by reducing GHG emissions and increase in RES components, and energy

principal prin adoptarea tehnologiilor cu cel mai mare grad de maturitate	efficiency mainly by adopting technologies with the highest degree of maturity
Piaţa internă a energiei	Internal energy market
Pieţele de energie vor asigura, printr-o organizare eficientă bazată pe mecanisme libere de piaţă, un cadru favorabil pentru a susţine dezvoltarea de capacităţi noi din surse regenerabile, va permite integrarea cu alte pieţe de energie din regiune, sporind astfel securitatea energetică. Mai mult, cu ajutorul politicilor de eficienţă energetică, se urmăreşte protejarea consumatorilor vulnerabili	The energy markets will provide for a favourable environment, through efficient organisation based on free market mechanisms, in order to support the development of new renewable energy capacities and will enable integration with other energy markets in the region, thus enhancing energy security. Moreover, the protection of vulnerable consumers is sought by means of energy efficiency policies
Securitate energetică	Energy security
În cadrul dimensiunii securitate energetică există interacţiuni cu politici şi măsuri din toate celelalte dimensiuni. Cu privire la decarbonare, se vor dezvolta noi capacităţi din surse regenerabile, cu emisii reduse de GES. Acestea vor fi de asemenea eficiente energetic, în special centralele de cogenerare de înaltă eficienţă. Capacităţile de stocare vor stimula de asemenea competiţia în piaţa internă de energie, iar activităţile de cercetare şi inovare vor sprijini digitalizarea sistemului energetic naţional şi îmbunătăţirea capacităţii de răspuns la atacurile informatice.	The dimension energy efficiency provides for interactions with policies and measures from all the other dimensions As for decarbonisation, new renewable energy capacities with low GHG emissions will be developed. They will also be energy efficient, in particular high-efficiency cogeneration plants. Storage capacities will also foster competition on the internal energy market and research and innovation activities will support digitalisation of the national energy system and the enhancement of the capacity of response to cyberattacks.

The table below lists the main policies and measures that impact several dimensions and the correspondence between them and the main determinants of the respective policies/measures.

Table 1 - Summary of interactions between the main policies and measures at the level of various dimensions

Main dimension	Main determinant for achieving targets	Support policy/measure	Interaction with other dimensions	Elaboration on interactions

Main dimension	Main determinant for achieving targets	Support policy/measure	Interaction with other dimensions	Elaboration on interactions
 Decarbonisation - GHG emissions and removals	Decarbonisation of energy sector	Promoting investments in new low-carbon power generation capacities	Decarbonisation - energy from renewable sources	The replacement of existing conventional power generation capacities with low carbon capacities will also result in the further promotion of renewable resources in the production energy (e.g. the wind or solar resource), including for heating in SACET type district heating systems, by energy transit through the National Energy System (NES), and the use of heat pumps at source level by also using the energy market mechanisms
			Energy efficiency	The replacement of the existing power and heat generation capacities will also result in reduction of own technological consumption, in particular by investments for refurbishment and development of high-efficiency cogeneration production units (including methane gas-fired)
			Energy security	The development of new nuclear and storage capacities will contribute to the establishment of the NES, considering that, by the end of 2030, certain coal-based plants having reached the end of their life cycle, the upgrading of which is not warranted, will be decommissioned; the development of new production capacities will thus contribute to the diversification of energy supply sources
	Decarbonisation of energy sector	Using the revenues from the EU ETS Mechanisms and the Structural Funds pertaining to the new Multiannual Financial Framework	Decarbonisation - energy from renewable sources	The revenues from the EU ETS Mechanisms and the Structural Funds pertaining to the new Multiannual Financial Framework for 2021-2027 will be used to fund RES projects that will contribute to the achievement of the target for 2030

Main dimension	Main determinant for achieving targets	Support policy/measure	Interaction with other dimensions	Elaboration on interactions
		for 2021-2027 for RES and energy efficiency projects at national and international level	Energy efficiency	The partial use of revenues from the EU ETS Mechanisms and the Structural Funds pertaining to the new Multiannual Financial Framework for 2021-2027 to ensure the resources needed to fund investments in energy efficiency projects and initiatives [e.g. conversion of conventional plants into combined cycle plants, reduction in consumption of in-house services in plants, reduction in own technological consumption (OTC) in transmission and distribution networks]
	Decarbonisation of the industrial sector	Implementing the best available technologies (BAT) in order to reduce greenhouse gas emissions and to increase energy efficiency in the industrial sector	Energy efficiency	The best available techniques will be adopted in the industrial sector in order to reduce energy intensity and the level of emissions concomitantly in the industrial sectors regulated by the EU ETS
			Research, innovation and competitiveness	the implementation of BAT in the industrial sector will determine the demand for new private investments and the attraction of available funds through the EU ETS Mechanism (Innovation Fund) for refurbishment and implementation of modern technologies in industrial processes. The implementation of demonstration projects for hydrogen use in the industrial sector will also be facilitated
	Decarbonisation of the transport sector	Priority development and fostering the use of rail transport for transportation of passengers (to the detriment of road transport) and its intermodal integration with other modes of transport	Decarbonisation - energy from renewable sources	The fostering of rail transport to the detriment of road transport will contribute to the achievement of the RES-T target for 2030 due to the increased use of electricity in this mode of transport; this is particularly important considering the achievement of the RES-E target for 2030 (which entails a higher share of energy from renewable sources than the present one)
	Waste management	Promoting transition to a circular economy	Energy efficiency	The promotion of circular economy (recycling) contributes to achieving the energy efficiency target by reducing consumption of energy used in the industry in the processing of raw materials

Main dimension	Main determinant for achieving targets	Support policy/measure	Interaction with other dimensions	Elaboration on interactions
 Decarbonisation - energy from renewable sources	Promotion of use of renewable energy in transport (RES-T)	Promoting electromobility in road transport (light vehicles and urban public transport)	Decarbonisation - GHG emissions and removals	Electromobility contributes to the reduction of GHG emissions taking into account the fact that a significant share of GHG emissions (excluding LULUCF) generated in Romania (over 14 %) come from the transport sector (over 20 % of CO_2 emissions)
			Energy efficiency	The promotion of electromobility may have a considerable impact in the sense of an increase in energy efficiency considering the lower consumption of energy for electric vehicles
	Promotion of use of renewable energy in transport (RES-T)	Promoting the use of biofuels in transport (further use of conventional fuels and introduction of advanced fuels in road transport)	Decarbonisation - GHG emissions and removals	Similarly to electromobility, the use of biofuels has beneficial effects by reducing GHG emissions from the transport sector
 Energy efficiency	The residential sector	Implementing the Long-Term Renovation Strategy (LTRS)	Decarbonisation - energy from renewable sources	The draft LTRS involves, in addition to renovation of buildings in order to increase energy efficiency, the adoption of RES technologies, such as installation of heat solar panels, photovoltaic panels and heat pumps, which will contribute to the achievement of the RES-E and RES-H&C targets for 2030
			Decarbonisation - GHG emissions and removals	The reduction in consumption of energy in the residential and tertiary sector (governmental buildings, public buildings, office buildings) will contribute to the reduction of GHG emissions in the same sectors
	The industry sector	Increasing energy efficiency in the industrial sectors regulated by EU ETS	Decarbonisation - energy from renewable sources	Increase in the share of energy from renewable sources through development of power generation facilities by industrial consumers
			Decarbonisation - GHG emissions and	The reduction in energy consumption in the industrial sector will contribute to the reduction of GHG emissions in the sector

Main dimension	Main determinant for achieving targets	Support policy/measure	Interaction with other dimensions	Elaboration on interactions
			removals	
	The transport sector	Developing and promoting alternative mobility	Decarbonisation - GHG emissions and removals	Reduction in GHG emissions by developing and promoting alternative mobility methods
	The transport sector	Renewing the vehicle stock	Decarbonisation - GHG emissions and removals	Reduction in GHG emissions by maintaining a stock of efficient motor vehicles (Euro 6) or electrically-propelled vehicles or natural gas-powered (CNG/LNG) vehicles and by the possibility of prohibiting registration of motor vehicles with Euro 3 and Euro 4 pollution standard
 Energy security	Flexibility of the energy system	Encouraging the development of energy storage capacities	Decarbonisation - energy from renewable sources	The development of energy storage capacities will contribute to the integration of RES in NES, considering their intermittent/variable nature. Specifically, the storage capacities will contribute to the reduction of gaps between the demand and offer of electricity
			Internal energy market	The measure will lead to the increase in the competitiveness of the internal energy market. This will have a positive impact on the prices for energy to final consumers
			Research, innovation and competitiveness	The measures will boost the R&I activities, the pivotal step being to attract Horizon type funding sources for projects involving storage of energy in the electricity grid or low-carbon mobility. Moreover, active participation in the European Battery Alliance will be sought. On the short term, the Romanian State will provide for regulation for the purpose of quantifying the existing local projects (e.g. two objectives in the Constanta area), which are developed with the support of private operators, and inclusion of this topic among the strategic research and development priorities

Main dimension	Main determinant for achieving targets	Support policy/measure	Interaction with other dimensions	Elaboration on interactions
	Flexibility of the energy system	Implementing demand response measures	Decarbonisation - energy from renewable sources	The implementation of demand response measures will contribute to the integration of RES into the NES by reducing/moving consumption at peak hours (towards no-load hours) and providing for the final consumer's possibility to participate (as a prosumer) in the energy market, which are important elements, considering the intermittence of the RES
			Energy efficiency	This measure entails the implementation of dynamic prices (price increase concomitantly with demand increase and vice versa). The consumer's behaviour will thus change by moving consumption at load peak hours towards no-load hours and/or reducing consumption at peak hours (without the concomitant increase of consumption at no-load hours)
			The internal market	The implementation of demand response measures entails adaptation of prices in order to trigger a change in the consumers' behaviour from load peak hours to no-load hours. This will contribute to the increase in the competitiveness of electricity producers
	Adequacy of the energy system	The Decarbonisation Plan of the Oltenia Power Complex Facility (*CE Oltenia*)	Decarbonisation - energy from renewable sources	The development of the new solar energy and micro-hydro-power capacities mentioned in the Decarbonisation Plan will contribute to the achievement of the RES-E target and will ensure diversification of energy sources. In addition, the change from coal plants into (transition fuel) gas plants will balance the system, which is necessary for the integration of RES into the NES
			Decarbonisation - GHG emissions and removals	The new solar energy and hydro-power capacities have a significant positive impact on the reduction of GHG emissions as these technologies are not operated on fossil fuels and, implicitly, do not produce GHG emissions

Main dimension	Main determinant for achieving targets	Support policy/measure	Interaction with other dimensions	Elaboration on interactions
			Energy efficiency	In the Decarbonisation Plan, CE Oltenia envisages the development of energy efficiency improvement works to the coal power units that will remain in operation until 2030.
	Flexibility of the energy system	High-efficiency cogeneration	Energy efficiency	High-efficiency cogeneration is a method of production of electricity and heat which enables to reduce polluting emissions
			Decarbonisation - GHG emissions and removals	High-efficiency cogeneration is a method of production of electricity and heat which enables to reduce polluting emissions
 Internal energy market	Power transmission grids interconnection capacities	Developing the power transmission grid, thus reaching an interconnectivity level of at least 15.4 % in 2030	Energy security	The increase in interconnectedness plays a pivotal role in the security of supply with natural gas and electricity as it will facilitate cross-border trade, in particular in emergency cases
	Support for other dimensions	Digitalisation of the Romanian energy system	Decarbonisation - energy from renewable sources	The development of smart meters and networks will also contribute to greater integration of RES in the NES. The benefits of smart meters will consist in identification of the final consumption profiles of final consumers and thus increase in the predictability of electricity sales. Moreover, digitalisation will be conducive to an increase in RES through the development of smart grids because they enable bidirectional communication; for example, the energy from renewable sources could be fostered by implementing Grid-to-Vehicle and Vehicle-to-Grid technologies (development of electromobility - RES-T). Furthermore, digitalisation of the energy system will be

Main dimension	Main determinant for achieving targets	Support policy/measure	Interaction with other dimensions	Elaboration on interactions
				essential for the safe functioning of smart meters and grids, ensuring protection against cyberattacks.
			Energy efficiency	Digitalisation plays an important role in the observation of consumers' features, thus having a decisive contribution to the identification and prioritisation of their needs for implementation of energy efficiency measures. Moreover, smart meters, as a component of digitalisation, lead to a reduction in final consumption (by reducing commercial grid losses)
			Energy security	The digitalisation of the Romanian energy system will be conducive to its functioning under safety conditions following the improvement in the capacity of response to cyberattacks and the strengthening of efforts in this respect. The Romanian State will support the specific initiatives of the Electricity Transmission Grid (ETG) Development Plan for standardisation of communications protocols with network operators and strengthening efforts to prevent cyberattacks.
			Research, innovation and competitiveness	Moreover, collaboration partnerships between specialised cyber security centres [e.g. CERT-RO (Romanian National Computer Security Incident Response Team)] and private energy operators and support for projects involving new testing centres for industrial control equipment in terms of cyber security will be fostered.
	Liberalisation of energy markets	Implementing a deregulation calendar for the electricity and gas market, which entails full liberalisation of markets as of	Energy security	Market liberalisation and development of a legislative framework that is favourable for investments are likely to contribute to energy security because they will enable to develop new capacities, also enhancing the flexibility of the

Main dimension	Main determinant for achieving targets	Support policy/measure	Interaction with other dimensions	Elaboration on interactions
		2020-2021		national energy system
	Regional integration of the internal energy market	Integrating the Romanian energy markets in the single European energy market (e.g. Single Day-Ahead Coupling and Single Intra-Day Coupling)	Energy security	The integration of Romanian energy markets in the single European market will have a positive impact on the flexibility of the national energy system by ensuring system adequacy
	Vulnerable consumer	Regulating and defining the vulnerable consumer and means for their financing	Energy efficiency	Energy efficiency measures dedicated to vulnerable consumers in order to reduce final consumption, which impact energy costs positively
	Support for other dimensions	Implementing a capacity mechanism	Energy security	The mechanism is purposed to provide for additional production capacities alongside the active capacities on the electricity market, which are required in order to maintain balance between generation and consumption of electricity in extraordinary unpredictable cases, having regard to the particularities of the energy market in Romania. The capacity mechanism thus intervenes to secure supply when the offer on the electricity market becomes scarce in order to enable balance between offer and demand
	Support for other dimensions	Bringing the mechanisms/rules applicable to the electricity market in line with the provisions of the "Clean energy for all Europeans" legislative package	Decarbonisation - energy from renewable sources	The implementation of the "Clean energy for all Europeans" legislative package will result in the promotion of the use of energy from renewable sources as it entails adaptation of market conditions in order to facilitate integration of energy from renewable sources in the NES
			Energy security	The provisions of the "Clean energy for all Europeans" legislative package concern adaptation of market conditions so that they secure electricity supply (e.g. by integrating RES capacities in the NES)
	Support for other dimensions	Developing a support mechanism of the Contracts for Differences (CfD)	Decarbonisation - energy from	The implementation of the "Contracts for Difference" mechanism will provide support to achieve the RES targets

Main dimension	Main determinant for achieving targets	Support policy/measure	Interaction with other dimensions	Elaboration on interactions
		type	renewable sources	for 2030 by bringing about the security and stability of producers' revenues
			Energy security	A mechanism that fosters investments in order to facilitate the development of new low-carbon electricity production capacities (e.g. nuclear power, RES etc.), thus ensuring diversification of energy sources and the flexibility of the national system
	Support for other dimensions	Enabling to conclude long-term power purchase agreements with clients (PPA) outside centralised markets	Decarbonisation - energy from renewable sources	Enabling the conclusion of long-term contracts between project developers/electricity producers and consumers. Such type of contract contributes to an increase in the use of energy from renewable sources in the light of the fact that it secures the return on investment for developers/producers of renewable energy. Moreover, it provides the consumer with the opportunity of negotiating their contract directly with the electricity producer, at the same time being independent and secured against energy price fluctuations in cases of high demand

Main dimension	Main determinant for achieving targets	Support policy/measure	Interaction with other dimensions	Elaboration on interactions
 Research, innovation and competitiveness	Support for other dimensions	Adopting advanced technologies in the energy sector	Decarbonisation - GHG emissions and removals	As regards reduction of GHG emissions, the adoption of advanced technologies may bring its contribution through the implementation of carbon sequestration solutions and the development of energy production capacities without emissions and of new storage capacities. The implementation of pilot and demonstration projects promoting use of hydrogen in the production of electricity and in the industrial sector will also be facilitated. The innovation-research pillar will speed up the creation of these conditions through an increase in and diversification of funding sources, the strengthening of a legal framework dedicated to research and innovation activities, a surge in research and innovation projects in State-owned companies and the development of educational resources at all levels.
			Decarbonisation - energy from renewable sources	The adoption of the advanced technologies will be conducive to the achievement of the RES target through: development of solar and wind power plants, development of storage capacities and digitalisation of the energy system. – Development of solar power plants - supporting new research initiatives (e.g. start-up projects to enhance efficiency in the capturing of solar energy in thermally insulated panels) and supporting the marketing and quantification of potential prototypes – The development of storage capacities, as described in the paragraph applicable to energy security, will lead to additional benefits for quantifying RES solutions at the energy system level, thus enhancing the decarbonisation

Main dimension	Main determinant for achieving targets	Support policy/measure	Interaction with other dimensions	Elaboration on interactions
				phenomenon – Digitalisation of the energy system by developing Smart Grid projects and supporting the initiatives of Transelectrica/distribution operators
			Energy efficiency	In order to maximise the effects, the implementation of the storage solutions will be completed by the quantification of smart meters, thus contributing to optimised energy consumption
			The internal market	Supporting research-innovation initiatives and gradually adopting technologies with proved functionality and benefits in areas such as the Internet of Things, decentralised storage, blockchain and smart applications by strengthening the public-private partnership
	Support for other dimensions	Fostering investments in the development of the RES equipment manufacturing industry and electromobility	Decarbonisation - energy from renewable sources	Scientific research in the RES area and the fostering of investments in the development of these solutions will contribute to the achievement of the target proposed for 2030 in this respect

Source: Deloitte analysis based on the information submitted by the INECP Interinstitutional Working Group

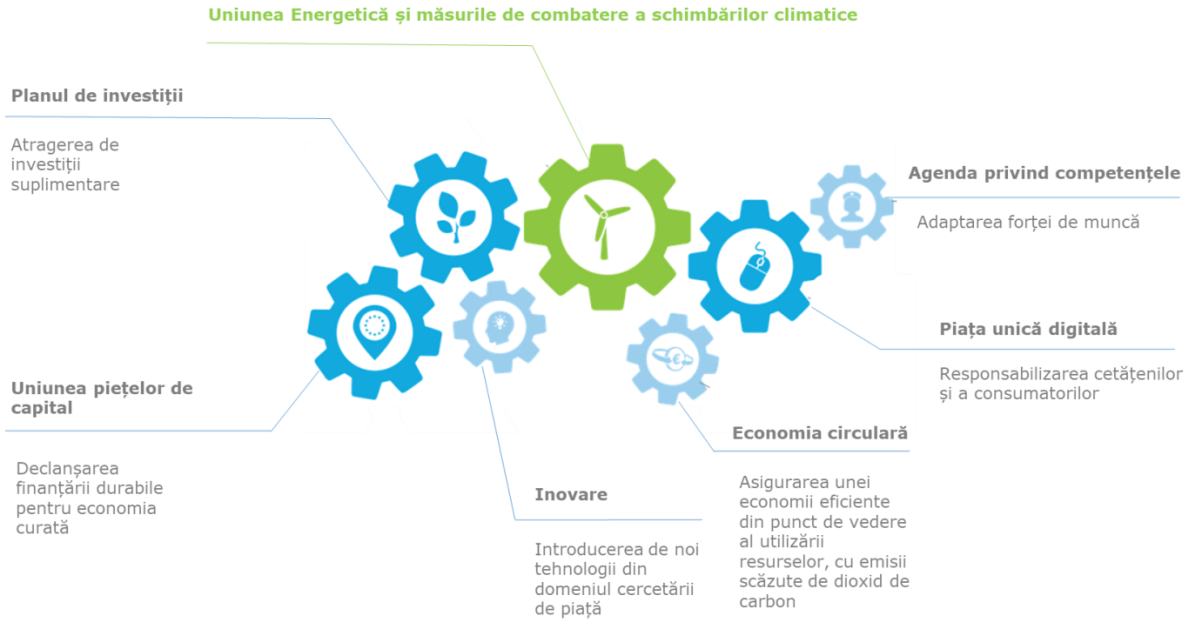
1.2.Overview of the current status of policies in force

i. The EU and Romanian energy system and the background of policies included in the national plan

"The Energy Union" constitutes one of the ten priorities of the current Commission; this objective has been consistently supported ever since the publication of the Energy Union Framework Strategy[1] in that the Commission prepared proposals to deliver on the energy efficiency first principle, support EU global leadership in climate action and renewable energy and provide a fair deal for energy consumers.[2]

The Energy Union is regarded as an essential element in a complex contrivance of flagship initiatives such as the Digital Single Market, the Capital Markets Union and the Investment Plan for Europe[3].

Figure 2 – Modernisation of the economy - Role of the Energy Union and measures for combating climate change



Source: Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee, the Committee of the Regions and the European Investment Bank, Clean Energy for All Europeans, Brussels, 30.11.2016, [COM(2016) 860]

RO	EN
Uniunea Energetică și măsurile de combatere a schimbărilor climatice	Energy Union and measures for combating climate change
Planul de investiţii	Investment plan

[1] "A Framework Strategy for a Resilient Energy Union with a Forward-Looking Climate Change Policy" [COM(2015) 80].
[2] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee, the Committee of the Regions and the European Investment Bank, Brussels, 23.11.2017, [COM(2017) 688 final]
[3] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee, the Committee of the Regions and the European Investment Bank, Clean Energy for All Europeans, Brussels, 30.11.2016, [COM(2016) 860]

Atragerea de investiţii suplimentare	Attracting additional investments
Uniunea pieţelor de capital	Capital Markets Union
Declanşarea finanţării durabile pentru economia curată	Launching of sustainable funding for clean economy
Inovare	Innovation
Introducerea de noi tehnologii din domeniul cercetării de piaţă	Introduction of new market study technologies
Economia circulară	Circular economy
Asigurarea unei economii eficiente din punct de vedere al utilizării resurselor, cu emisii scăzute de dioxid de carbon	Achieving a low-carbon economy that is efficient in terms of resource use
Agenda privind competenţele	Agenda for competences
Adaptarea forţei de muncă	Adapting labour
Piaţa unică digitală	Digital Single Market
Responsabilizarea cetăţenilor şi a consumatorilor	Empowerment of citizens and consumers

In this context, beyond the three objectives set out in the "Clean Energy for All Europeans" Package (putting energy efficiency first, achieving global leadership in renewable energies and providing a fair deal for consumers), the EU plans to establish the regulatory framework for the post-2020 period and to facilitate transition towards clean energy through a set of specific policies consisting of enforcement of EU regulation, application of EU financing and encouragement of partnerships with stakeholders in the civil society at local and regional level. Cities, regions, business, social partners and other stakeholders need to get actively involved in the discussions on energy transition, in particular in the context of the Integrated Energy and Climate Plans so that these respond adequately to the needs of the different territories.[4]

The national energy system (electricity and natural gas)

The sector of electricity in Romania includes the following main activities:

- production of electricity in power plants, including cogeneration plants;
- transmission and distribution of electricity to final consumers through voltage lines;
- the sale and purchase of electricity (on wholesale markets and to final consumers, including import-export activities).

A feature of the electricity production sector is the existence of mono-fuel companies, where production of electricity is based on one type of primary resource, production companies having different production costs and relatively balanced market shares, and the price determined by the demand and offer being strongly influenced by the marginal price (of the producer with the highest cost and of the coal-based producer).

[4] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee, the Committee of the Regions and the European Investment Bank, Clean Energy for All Europeans, Brussels, 30.11.2016, [COM(2016) 860]

Production and marketing/supply of electricity are subject to competition, whereas transmission and distribution are subject to regulation. The competitive segment entails trading in a transparent and non-discriminatory manner (in accordance with Law No 123/2012 on electricity and natural gas, as subsequently amended and supplemented), where prices are freely established on the basis of demand and offer; for these markets, the role of ANRE is to prepare general operating rules. The regulated segment entails ANRE's intervention in pricing/tariff setting.

In addition, the electricity market includes other secondary activities/services, such as:

- system services;
- allocation of cross-border interconnection capacities;
- green certificates trading activities;
- emission allowance trading activities etc.

All the activities pertaining to the electricity market (production, transmission and distribution) are carried out under the licences granted by ANRE.

The electricity market includes the following participants and associated operational structures:

- producers of electricity;
- a transmission system operator (Transelectrica);
- an electricity market operator (OPCOM);
- distribution system operators;
- suppliers;
- traders;
- final consumers.

As regards the natural gas sector, in the past 20 years, following Romania's transition towards the market economy, and after Romania's integration into the EU, implicitly followed by the transposition of the EU law into the Romanian law, the natural gas sector in Romania has been subjected to an extensive restructuring and liberalisation process, which has not been completed yet and which mainly followed the action lines below:

- separating natural gas production, storage, transmission, distribution and supply activities;
- regulating the non-discriminatory access of third companies to the transmission system;
- interconnecting the national transmission system with the systems of neighbouring countries;
- gradually liberalising regulated prices at both non-household and household consumers.

The natural gas market features a rather high level of concentration with the two main large producers, i.e. OMV Petrom and SNGN Romgaz, these companies holding together a market share of over 90 % of the natural gas production within the territory of Romania on the free market. As for the market shares of main suppliers, there is a slight differentiation between the free market and the regulated market, the latter featuring a higher level of concentration. The main players on the free market were OMV Petrom, Romgaz, Engie Romania and E.ON Gaz Furnizare, summing up over 70 % of the market share, whereas the main domestic players on the regulated market are Engie Romania and E.ON Gaz Furnizare, with a total market share of over 90 % at the end of 2017.

Moreover, an operator of the National Gas Transmission System (NGTS) is active on the Romanian market, i.e. Transgaz SA, which ensures transmission of natural gas at national and

international level, the grid being interconnected with Hungary, Bulgaria, the Republic of Moldova, and Ukraine.

The National Gas Transmission System is a radial-ring system interconnected with the starting points in the deposit area of Transylvania, Oltenia and Muntenia East, and the destination area of Bucharest-Ploiești, Moldova, Oltenia and Central and North Transylvania. On 31 December 2018, the system counted over 13 350 km of transmission main lines, of which approximately 370 km of international transmission lines, over 1 100 control and measurement stations, 3 natural gas compression stations with installed capacity of approximately 28.94 MW (the 2019-2028 National Transmission System Development Plan approved by ANRE).

ii. Current energy and climate policies and measures relating to the five dimensions of the Energy Union

The current energy and climate policies are initiated and rooted in the "Energy-Climate Change-2020" Package, which was a first ambitious leap, at that time, to a reduction of greenhouse gas emissions, the improvement of energy efficiency and the increase in the share of energy from renewable sources (20-20-20 objectives). More precisely, the EU planned, at that time, a 20 % decrease in greenhouse gas emissions and a 20 % increase in the energy produced from renewable sources and in energy efficiency.

This directive has underpinned the reformation of the EU emissions trading scheme, has led to the setting of national targets for emissions not regulated by EU ETS and of national targets for renewable energy, to the establishment of a legal framework for the sequestration and storage of carbon dioxide and to the Energy Efficiency Directive.

Last but not least, a wish was asserted at that time to enhance energy security and import dependency; the creation of new jobs coupled with an increase in Europe's competitiveness were also legitimate expectations for the EU.

The table below lists the current energy and climate policies and measures relating to the five dimensions of Romania:

Table 2 - Table of current energy and climate policies and measures in Romania relating to the five dimensions of the Energy Union

Dimension/Pillar	Policies/measures
Decarbonisation	**Reduction of GHG emissions:** • the Programme Fostering Renewal of the National Vehicle Stock; • the Rabla Plus Programme, which provides interested parties, including legal persons, with the possibility of purchasing electric vehicles by receiving a subsidy of up to RON 45 000 for each motor vehicle. Moreover, a subsidy of up to RON 20 000 is offered to purchase a new hybrid electric vehicle with an external supply source, which generates an amount of CO_2 emissions below 50 g/km; • the Programme for the installation of heating systems using renewable energy, including the replacement or completion of classical heating systems under the GREEN HOUSE (CASA VERDE) scheme for natural and legal persons; • the National Programme for improving environmental quality by arranging green areas in localities; • the Programme for production of energy from renewable sources: wind, geothermal, solar, biomass, and hydro; • the Programme for mitigating the impact on the air, including monitoring

Dimension/Pillar	Policies/measures
	of air quality; • the Programme for developing bicycle lanes.
	Renewable energy sources: The main measures taken at national level[5], to this date, in order to promote an increase in the amount of energy from renewable sources, taking account of the indicative trajectory for achieving the RES targets, are set out in the following legislative acts (as subsequently amended and supplemented): • the system promoting production of energy from renewable sources through green certificates (accreditation was allowed by the end of 2016 and the validity of the aid scheme for accredited operators expires in 2032); • developing the electricity transmission and distribution grids to ensure the discharge of electricity produced by power plants using RES [Outlook Plan for the electricity transmission grid (ETG) and the electricity distribution grid (EDG) for 2018-2027]; • updating the Sectoral Operational Programme 'Increase of Economic Competitiveness', Axis 4 Increasing energy efficiency and security of supply, in the context of combating climate change; • the Large Infrastructure Operational Programme (LIOP), Priority Axis 6 - Promoting clean energy and energy efficiency in order to support a low-carbon economy. Specific Objective 6.1 Increasing production of energy from less exploited renewable resources (biomass, biogas, geothermal); • the Regional Operational Programme (ROP) Priority Axis 3 Supporting transition towards a low-carbon economy (the National Environmental Fund); • placing on the market only biofuels and bioliquids produced from raw materials meeting the defined sustainability criteria and providing for the obligation to control compliance with these criteria; • determining the content of biofuels for petrol and gas oil placed on the market; • certification of compliance with the sustainability criteria for biofuels and bioliquids, which are voluntary schemes recognised by the European Commission for demonstrating compliance with the sustainability criteria under Directive 2009/28/EC (Order No 136/2012 of the current Minister for the Economy and Business Environment); • Law No 184/201 approving Government Emergency Order No 24/2017 amending and supplementing Law No 220/2008 establishing the system for the promotion of energy production from renewable energy sources and amending certain legislative acts.
Energy efficiency	According to NEEAP, the current policies and measures are reflected in the implementation of the 11 national energy efficiency programmes, as follows: • P0 Development of energy services; • P1 The National Investment Plan; • P2 Energy efficiency increase in networks;

[5] Indicated in the progress reports of Romania on the promotion and use of energy from renewable sources under Article 22 of Directive 2009/28/EC, 2015-2016, and in other official documents (legal provisions and documents prepared by authorities)

Dimension/Pillar	Policies/measures
	• P3 Promotion of high-efficiency cogeneration (through the support scheme for promotion of high-efficiency cogeneration, which was established in Romania under Government Decision No 219/2007 promoting cogeneration based on useful heat); • P4 Multiannual Programme to fund investments for the upgrading, rehabilitation and extension or deployment of centralised heat supply systems for localities, which is implemented in the period 2019-2027 by updating the 2006-2020 'Heat and Comfort' District Heating Programme; • P5 Energy efficiency in the ETS sector industry; • P6 Energy audit and energy management; • P7 Energy efficiency in the residential sector (through thermal rehabilitation works on the envelope and heating system); • P8 Energy efficiency in governmental buildings and public services by partial thermal insulation of the building envelope, replacement of exterior joinery with energy efficient joinery, and by complex energy performance enhancing works (in-depth renovation); • P9 Energy efficiency in the services sector by the thermal rehabilitation of buildings (offices, commercial areas), purchase of equipment and high-efficiency electrical appliances; • P9 Energy efficiency in the services sector by the thermal rehabilitation of buildings (offices, commercial areas), purchase of equipment and high-efficiency electrical appliances; • P10 Renewal of the vehicle stock by accessing the 'Rabla Plus' Programme; • P11 Energy efficiency in the transport sector by upgrading urban public transport and rail transport and by extending the underground in Bucharest.
Energy security	• Law No 85/2018 on the establishment and preservation of minimum crude oil reserves and/or oil products (the level of minimum stocks is at least the highest value between the amount of net imports for a period of 90 days, as calculated on the basis of the daily mean of net imports, and the amount of domestic consumption for a period of 61 days, as calculated on the basis of the daily mean of domestic consumption); • the annual determination of minimum stocks and approval of the method of calculation of emergency stocks for crude oil and/or oil products, the establishment of which lies with those entrusted with storage duties in order to maintain them in 2019; • the annual determination of the minimum natural gas stock for holders of natural gas supply licences (under an ANRE order, holders of natural gas supply licences must establish a minimum stock of natural gas in underground storage facilities in each 'n' year until 31 October inclusive); • the annual approval, under a Government decision (prepared annually, Government Decision No 593/2019 being the most recent), of the measures on the level of safety and security in operation of the National Electricity System, and of the measures related to the establishment of safety stocks for the National Electricity System as regards fuels and the water volume in the reservoirs (the Winter Programme); • the definition of the category of "protected client" in accordance with Regulation (EU) 2017/1938 of the European Parliament and of the Council concerning measures to safeguard the security of gas supply and repealing Regulation (EU) No 994/2010.

Dimension/Pillar	Policies/measures
Internal energy market	The main current policies and measures regarding the internal energy market are found in both primary legislative framework (e.g. Law No 123/2012 on electricity and natural gas, as subsequently amended and supplemented) and the secondary legislative framework (e.g. ANRE orders), and they concern: Policies: • ensuring the functioning of the competitive electricity markets; • providing for non-discriminatory and regulated access of all participants to the electricity market and to public interest electricity grids; • transparency of electricity tariffs, prices and taxes in the framework of a pricing policy, seeking to enhance energy efficiency throughout the electricity production, transmission, distribution and use cycle; • improving the competitiveness of the internal electricity market and active participation in the creation of the regional market and of the internal EU energy market, and in the development of cross-border trading; • providing for the operational security of the NES. Measures: • management by OPCOM of the day-ahead market (DAM) in Romania under a coupled regime, by pricing, based on the available interconnection capacity (ATC - available transfer capacity) with the markets in Hungary, Slovakia and the Czech Republic (4 M MC); • OPCOM's participation in the project of flow-based coupling of the CORE region; • maintaining the OPCOM's capacity of DEMO (designated electricity market operator) of the day-ahead market (DAM) and of the intraday market (IM) of electricity for the Romanian bidding zone for the purposes of Regulation (EU) 2015/1222; • OPCOM's participation in the cooperation of all European DEMOs for the functioning of coupling mechanisms within the DAM and IM, in the process of implementation of Regulation (EU) 2015/1222, including in the context of European multiparty cooperation dedicated to the implementation, operation and development of coupled electricity markets (Single Day Ahead Coupling - SDAC and Single Intra-Day Coupling - SIDC); • participating in the European implementation project of cross-border intra-day trading by developing and implementing the XBID solution locally; • the development by Transelectrica, in collaboration with other TSOs, of the intra-day allocation rules for the coordinated allocation of the inter-zone capacity at the borders between various bidding zones; • the development by Transelectrica, in collaboration with other TSOs, of the harmonised allocation rules - HAR) for the long-term transmission rights in rem at the borders of the various bidding zones; • the development by Transelectrica, in collaboration with other TSOs, of the trading platforms for balancing products; • standardising the energy bill for the purposes of costs comparability and transparency, and of fair information of consumers; • the implementation by ANRE of the comparator of type energy and natural gas supply bids. As regards the natural gas market, the main measures and policies emerge from the following provisions and initiatives:

Dimension/Pillar	Policies/measures
	• separation of activities in the natural gas sector (transmission, storage, distribution, supply); • definition and implementation of the Network Code in accordance with Commission Regulation (EU) No 312/2014 and Regulation (EC) No 715/2009; • definition and monitoring of performance indicators in the area of transmission/distribution of natural gas and in trading activities; • revision of the capacity auction calendar, as offered by SNTGN TRANSGAZ SA, in accordance with the ENTSO-G calendar. • designation of the forecasting party in the balancing zone of the national transmission system and selection of one of the models for information defined in Commission Regulation (EU) No 312/2014; • fostering trading in short-term standardised products on the centralised markets in Romania at the level of network users, for the commercial balancing of own source-consumption portfolios, and at TSO level, for the physical balancing of the NTS in accordance with Commission Regulation (EU) No 312/2014 of 26 March 2014 establishing a Network Code on Gas Balancing of Transmission Networks;
Research, innovation and competitiveness	The National Research-Development and Innovation Plan for 2015-2020 (NRDIP III), as approved by Government Decision No 583/2015 and amended by Government Decision No 8/2018, proposes the following programmes in the energy sector: • Programme 3: European and International Cooperation – Subprogramme 3.2 – Horizon 2020/Horizon Europe; • Programme 5: Research in Strategic Fields – Subprogramme 5.2 - Participation in the international research and development bodies and programmes in the atomic and subatomic field – Subprogramme 5.5 - Programme for research, development and innovation for Generation IV reactors - ALFRED; – other funding options are included in the financing mechanisms of the European Economic Area (EEA) - FM EEA 2014-2021 and the 2014-2021 Norwegian financing mechanism under the programmes coordinated by the Ministry of European Funds; • the "Renewable Energy, Energy Efficiency, Energy Security" Programme (programme operator - Innovation Norway); • the "Business Development, Innovation and SME" Programme (programme operator - Innovation Norway) by the Green Industry Innovation component; • The "Research" Programme - for research projects and projects in the area of generation efficiency, transmission, smart grids and distribution of electricity, green energy production technologies, and diversification/balancing of energy sources.

Source: Deloitte analysis based on the official documents submitted by the authorities involved in the preparation of the INECP

iii. Key issues of cross-border relevance

The key issues of regional/cross-border relevance arise from the legislative provisions applicable at Union/national level and concern the interconnections of energy/natural gas transmission systems, the market integration and coupling and the national contribution/regional cooperation in the field of energy security.

These issues are found in the current approach, in the light of the current policies and measures (as described in Chapter 1.2. ii. and in Chapter 4.4. and 4.5.), as well as in the projected policies and measures (as described in Chapter 3.3. and 3.4.).

iv. Administrative structure of implementing national energy and climate policies

The administrative structure implementing the national energy and climate policies consists of ministries and other institutions with various responsibilities for the implementation of current strategies and plans, or of strategies and plans under preparation, in the area of energy and climate change.

For the implementation of INECP, the main stakeholders are represented by the Ministry of the Economy, Energy and the Business Environment (*Ministerul Economiei, Energiei și Mediului de Afaceri*), the Ministry of the Environment, Waters and Forests (*Ministerul Mediului, Apelor și Pădurilor*), the Ministry of Transports, Infrastructure and Communications (*Ministerul Transporturilor, Infrastructurii și Comunicațiilor*), the Ministry of Agriculture and Rural Development (*Ministerul Agriculturii și Dezvoltării Rurale*), the Ministry of Public Works, Development and Administration (*Ministerul Lucrărilor Publice, Dezvoltării și Administrației*), the Ministry of Education and Research (*Ministerul Educației și Cercetării*), the Ministry of European Funds (*Ministerul Fondurilor Europene*), the National Energy Regulatory Authority (*Autoritatea Națională de Reglementare în domeniul Energiei*), Transelectrica, Transgaz and OPCOM, and other entities to be designated under legislative acts, ministerial orders etc., which (will) have duties in this respect.

1.3. Consultations and involvement of national and Union entities and their outcome

i. Involvement of the national parliament

In the framework of the public consultation process on the topic of the draft INECP, the Chamber of Deputies of the Romanian Parliament formulated a series of proposals and recommendations which are elaborated in the Annex entitled "Public Consultation". Below are some of the relevant opinions as examples:

- the need to correlate the data regarding the forecasts on the future electricity production capacities to be deployed in accordance with the draft INECP with other official data such as energy policies and strategies that are to be included in the 2016-2030 Energy Strategy for Romania. - an attempt was made to maintain the correlation of the respective information, however no official document on the 2020-2030 Energy Strategy is currently available, only a draft strategy still under review;

- the need to correlate the target undertaken by Romania as regards the share of energy from renewable sources in the final gross consumption of energy for 2030 with the target of providing for appropriate funding from the EU in the sense of ensuring the appropriate adequacy of electricity grids and the flexibility in RES-E production by deploying storage capacities and by using smart management systems for electricity grids. The draft INECP included the respective information, insofar as it was known, as well as data on EU funding available for supporting RES and for developing investments in the indicated fields;

- identification of sources, more specifically funding schemes at European level to achieve these targets and demanding the development of investment plans in the natural gas and electricity National Transmission Systems for the following ten years for the development of NTS in order to establish interconnections, to extend and to connect the new production capacities, and to develop the storage capacities needed for their operation under conditions of

efficiency and safety - the information made available by Transgaz and Transelectrica was considered;

- the large-scale use of digital innovations in the future complex energy systems, such as the Internet of Things (IoT), the Industrial Internet of Things (IoT), shared storage, advanced models of active consumers, aggregated energy communities, blockchain and smart applications etc., requires an adequate Action Plan for protection of data and information against intrusion and harmful attacks (cybersecurity) and uncontrolled use of data of final consumers at Member State and EU levels. Insofar as there are specific developments, they will be included in the plan revised in the period 2023-2024;

- congestion management - in order to be able to maintain the level of security in the operation of energy systems if renewable energy sources are connected to the electricity grids, special measures are required at system level - information on congestion management methods in accordance with the new EU regulations was included;

- the need for the EU to enable the regular updating of the INECP with more details on the technological novelties, the trend in the costs of each technology, their funding, EU programmes on access to technology, production and contracting programmes, studies on the impact of accelerated introduction of these technologies on the electricity prices, having a separate section for the Technological Development Plan, for which a possibility exists, in the biannual reports to be prepared regarding the implementation of the INEPC;

- updating the INECP with the ANRE orders and decisions indicated in the document, with a view to facilitating its development, and with the need to develop reiterations, adjustments and additions thereto in accordance with the amendments required by the primary and secondary legislation, more specifically directives, EU regulations and national laws, orders and decisions of the regulatory authority in charge with their transposition and compliance - the sections dedicated to market issues, RES and energy efficiency stated the commitments of the Romanian State to transpose the new EU law in the Clean Energy Package. The ANRE orders and decisions can only be deemed consistent with the primary law and the EU regulations in force;

- providing for the energy storage capacities and the back-up systems, i.e. development of the design of the pumping hydropower plant Tarnița Lăpuștești and of other pumping hydropower plants, may contribute to the establishment of power reserve - such requirements are to be implemented depending on the final form of the 2020-2030 Strategy;

- achieving a production-consumption balancing capacity, without jeopardising the safety of the system, for the current structure and the medium-term projection of a new production park of approximately 4 000 MW - information received from CN Transelectrica, which is the entity in charge with the NES balancing issues, was included;

- the development of action plans must be considered for the implementation of INECP, which concern transition in coal regions, energy efficiency, digitisation, storage of natural gas, the map of renewable resources etc. - the various plans will be included in the biannual INECP reports as and when they are available.

ii. Involvement of local and regional authorities

Having regard to the importance and implications of the 2021-2030 Integrated National Energy and Climate Plan for the development of Romania in the forthcoming period, the Ministry of the Economy (the current MEEMA) subjected the draft INECP to a first stage of public consultation in order to collect from stakeholders proposals, suggestions and opinions in the form of recommendations regarding this document of strategic relevance.

The initial consultations on the draft form were purposed to increase the transparency of the decision-making process and, at the same time, they enabled to gather useful information needed to debate certain public policy issues with a major impact for the period 2021-2030.

The first stage of the internal public consultation process was developed in the period 29 November-10 December 2018 and it was initiated with the publication of a notice by the Ministry of Energy (the current Ministry of the Economy, Energy and Business Environment) on the official website of the institution regarding the initiation of the public consultation process on the draft 2021-2030 Integrated National Energy and Climate Plan.

The draft Integrated National Energy and Climate Plan was annexed to this notice of initiation of public consultation.

At this public consultation stage no opinions were received from local and regional authorities.

Moreover, a second stage of internal public consultation was organised in the period 13 February-15 March 2019, which culminated with opinions submitted to the Ministry of Energy and with the organisation of/participation in a series of public events with the draft INECP as the main/secondary topic.

A third stage of public consultation on the topic of the draft INECP, which was revised based on the Commission's recommendations, was organised in the period 31 January-28 February 2020.

The table below lists the activities carried out during the meetings for the draft INECP.

Table 3 - Performance of activities during the meetings for the draft INECP

No	Activity	Date	Description
1.	**Transmission of the draft INECP to the European Commission**	**28 December 2018**	The draft INECP was sent to the European Commission's representatives, being also published on the website of the Ministry of Energy (the current MEEMA) in Romanian and English.
2.	**Meeting of the Technical Working Group established by the Commission (NECPs) for the INECP, Brussels**	**29-30 January 2019**	INECP summary presentation by each Member State and related debates.
3.	**CESEC meeting, Vienna**	**31 January 2019**	The RES related aspects were presented, as set out in the INECP.

No	Activity	Date	Description
4.	**Round table organised by the European Project Life PlanUp, European Climate Foundation and Orașe Energie România**	**14 February 2019**	The event was focused on the presentation of the main elements of the INECP from the viewpoint of the Ministry of Energy (the current MEEMA) and the Ministry of the Environment, Waters and Forestry, at the same time providing participants (in particular representatives of the local authorities and certain NGOs) with the possibility of commenting or delivering their opinion on the objectives undertaken in the INECP and, implicitly, on the policies and measures included in the Plan.
5.	**The "Romanian Energy Industry - Past, Present and Future" Conference - The Institute for Energy Studies and Engineering (*Institutul de Studii și Proiectări Energetice - ISPE*)**	**28 February 2019**	Presentation of the main elements of the draft INECP and related debates with the participants in the conference
6.	**CESEC – "Regional Cooperation NECPs", Brussels**,	**11 March 2019**	INECP summary presentation by each Member State and related debates.
7.	**Discussions with the representatives of the World Bank on the topic of the INECP**	**21 March 2019**	Presentation of the main elements of the INECP (mainly with reference to the energy efficiency dimension)
8.	**Energynomics - short presentation of the INECP**	**27 March 2019**	Romania has met its European commitment for 2020 to increase the RES share to 24 % of the gross final energy consumption, reaching a level of 26.27 % in 2015 for this target. Moreover, Romania has endeavoured to achieve the targets for energy produced from renewable resources. The total installed electrical capacity at the end of 2018 in accredited renewable energy production units was 4 955 MW. The structural changes in the energy industry to achieve the targets for 2030 and 2050 are significant in terms of costs and technologies and ultimately the costs will be transferred to the consumers. We know that decarbonisation is the appropriate solution - we need clean energy and to stop/mitigate climate

No	Activity	Date	Description
			change. But this approach will have its costs and, considering the economic differences at EU level, we need to make sure that there will be fair burden-sharing and distribution of financial efforts in order to reach the common energy and climate objectives.
9.	**Meeting of the Technical Working Group established by the Commission (NECPs) for the INECP, Brussels**	**2-3 July 2019**	INECP summary presentation by each Member State and related debates.
10.	**Discussions with the representatives of DG CLIMA, Bucharest**	**16 October 2019**	Detailed discussions on the topic of the INECP.

Source: Deloitte

iii. Consultations with stakeholders, including social partners, and involvement of the civil society and the general public

Three stages of public consultation were conducted throughout the process of preparation of the draft INECP in the periods 29 November-10 December 2018, 13 February-15 March 2019 and 31 January 2019-28 February 2020 in order to collect from stakeholders proposals, suggestions and opinions as recommendations regarding this document of strategic relevance.

The "Public Consultations" Annex lists the stakeholders, and the proposals and observations received throughout the stages of public consultation from respondents.

At the stage of updating of the draft 2021-2030 INECP (conducted as a result of discussions with the European Commission, and of the outcome of initial internal and regional consultations), the general and specific observations and comments were assessed and partially taken over, mainly concerning the following:

- prudently increasing the RES target, having regard, among others, to the assessments of the stability of the networks and of the NES safety, the impact on the price at the consumer, the maturity of storage technologies and, last but not least, the possibility of

updating the RES target on revision of the 2023 Plan only upwards in accordance with the Governance Regulation;
- including information on the actions envisaged for gradually renouncing the use of coal in the energy industry;
- including information on the assessment of the possibility of injecting hydrogen in the natural gas transmission/distribution systems and of the interest in participation in relevant research projects;
- enhancing the coherence of the integrated plan and outlining the interconnections among the five dimensions considered;
- integration with other available strategic documents, which are currently still under review;
- more detailed information on the use of European mechanisms to support projects that foster decarbonisation of the economy;
- including the possibility of bilateral energy contracting under long-term contracts and regarding the implementation of the other legislative provisions in the Clean Energy Package [with direct reference to Regulation (EU) 2019/943];
- removing references to construction of new coal-based capacities and including natural gas as fuel of transition towards a decarbonised energy industry;
- promoting electricity storage solutions;
- presenting the sources for covering the investments required to achieve the proposed targets depending on the available information;
- maintaining the intention to use the support instruments provided by the EU (also with reference to the just transition mechanism - Just Transition Fund);
- including measures to implement the Energy Performance of Buildings Directive by indicating, among others, the provisions of the draft Long-Term Renovation Strategy.

Following the review of the draft INECP, which took into account, as far as possible, the Commission's recommendations and part of the observations received from the stakeholders during the previous public consultation rounds of February 2020, a new internal public consultation session was conducted. The observations and comments received during this round are elaborated in the "Public Consultations" Annex.

The recommendations received at the third stage of public consultation were assessed and partially implemented. The INECP updating following this stage of public consultations thus concerned:

- adding explanations on the projected trend in the natural gas-fired installed capacities by 2030 to the WAM scenario;
- as regards the nuclear power production capacities (the two nuclear plants - a capacity of 1 300 MW), adding the mention that they concern net installed capacities;
- adding an estimation of the number of electric vehicles and charging stations in 2030 to the WAM scenario;
- indicating the level of electricity grid interconnection of at least 15.4 % for 2030 and the minimum available capacity for cross-border trade of at least 70 % of the transport capacity (2030), within the safety limits in operation after considering contingencies as per the action plan of CNTEE Transelectrica, which was developed in accordance with Article 15 of Regulation (EU) 2019/943 of 5 June 2019 on the internal market for electricity;
- making corrections in the text as per the delivered recommendations (e.g. on the list of acronyms, updating the names of central authorities throughout the entire document etc.);
- as regards the measure promoting investments in new low-carbon energy production capacities, indicating the fact that it will be implemented also for heating in SACET district heating systems, through the transit of energy through the NES, and the use of heat pumps at source level by also using the electricity market mechanisms;

- adding the Horizon 2020 financing fund as a source for the implementation of the best available techniques (BAT);
- adding the measure fostering energy symbioses between SACETs and the industry in the proximity to promote transition towards a circular economy;
- removing the "Oxigen" vignette measure and indicating the possibility of introducing a measure prohibiting the access of certain types of motor vehicles to city centres, and adding the possibility of including a measure that entails revising the annual tax for ownership of motor vehicles depending on the type of motor vehicle owned;
- including the additional mentions regarding the measure promoting the development of alternative fuels (including LPG, CNG and LNG), namely the fact that the measure concerns promotion of development of production of such fuels as well as of the infrastructure required to reach them;
- removing the reference to the measure promoting the conclusion of long-term sales contracts only with final consumers (PPA), so the updated version makes reference to the general term "clients";
- adding the measure of sustainable development of hydrogen production from renewable sources within the territory of Romania (as far as possible);
- adding the measure of development of research and development of technologies for production of biofuels (e.g. production of advanced biofuels and coprocessing of oils) and biogas within the territory of Romania;
- indicating the accessing of the Mechanism for Sustainable Transition to ensure just transition for affected workers and their communities;
- including additional explanations regarding the historical and projected trend in the electricity price in both scenarios (WEM and WAM), namely the fact that:
    - the quarterly historical average electricity prices for household consumers include all the taxes and excise duty;
    - the quarterly historical average electricity prices for industrial consumers exclude the VAT and other recoverable taxes;
    - the projected final electricity price (in the WEM and WAM scenarios) is an average of the final price to household and industrial consumers and includes all the fees relating to the system services (e.g. transmission, distribution) and other costs (e.g. green certificates) and does not include the VAT and excise duties;
- adjusting the funding sources so as to make reference to the 2021-2027 multiannual funding framework under preparation.

iv. Detailed presentation of the measures fostering consumption of renewable energy, in particular in the area of heating, where the development of household consumers will lead to a decrease in the use of traditional biomass and the potential migration towards natural gas-fired technologies. Moreover, the use of biogas should be considered in the I&R sector, in particular in the areas with farming potential - the information currently available on this topic was used

Consultations with other Member States

At the same stage of public consultation, the Ministry of Energy sent letters to the Ministry of Energy from Bulgaria and the Ministry of Innovation and Technology in Hungary on 5 December 2018, which are institutions that manage the issue of the INECP from the respective Member States, enclosing a summary of the INECP in English.

In this respect, an official letter was received from the representatives of the Ministry of Energy in Bulgaria, in which they appreciated the fact that the international projects mentioned in the draft INECP for Romania are consistent with the policies and measures set out in the draft INECP for Bulgaria, without adding any other comments and suggestions. Moreover, the following are included at the stage of regional public consultation:

- the presentation of the RES component in the INECP at the CESEC/RES meeting of 31 January 2019 in Vienna;
- the presentation of the RES and energy efficiency objectives and targets in the draft INECP of Romania at the RACVIAC meeting on the topic of energy security of 5 June 2019 in Zagreb;
- transmission of information letters on 13 February 2019 to the Ministry of Energy in Bulgaria and to the Ministry of Innovation and Technology in Hungary regarding the publication of the full INECP report in English on the website of the Ministry of Energy;
- CESEC – „Regional Cooperation NECPs" of 11 March 2019, Brussels, setting up of a dedicated working group that facilitated exchange of relevant opinions for the draft INECP and its implementation.

v. Iterative process with the Commission European

In accordance with Article 3(1) of Regulation (EU) 2018/1999 and Annex I thereto, each Member State must submit to the European Commission a final draft version on the own integrated national energy and climate plan for the period 2021-2030. The first drafts of the integrated national energy and climate plans were submitted on 31 December 2018.

Romania submitted its own draft integrated national energy and climate plan on 31 December 2018. The submission of this draft plan constitutes the basis and first stage of the iterative process between the Commission and Member States, which is purposed to complete the integrated national energy and climate plans in a form that enables to reach the common EU targets in 2030.

In the period January-December 2019, the Romanian authorities debated on the draft 2021-2030 INECP at the stages of consultation and negotiation with the European Commission. The following actions were carried out at this stage:

- participation in the consultation and negotiation rounds;
- supporting and submission of the draft 2021-2030 INECP and of its main outcomes, including justification of the use of variables and parameters other than those recommended by the European Commission;
- examination of the document submitted to the INECP Working Group established by the Commission through the Secretariat of the INECP Working Group established at national level.

Table 4 - List of sessions of consultation and negotiation with the European Commission

Date	Representatives	Meeting agenda
18 July 2019	• Representatives of the European Commission • Representatives of the Romanian authorities • Deloitte Representatives	• Assessing the RES target for 2030 from the viewpoint of application of the formula referred to in the Governance Regulation, i.e. 34 % for Romania • Assessing the level of ambition regarding the energy efficiency target for 2030 • Discussing the energy poverty issues • Discussing the issues related to the energy security dimension (details regarding the applicable measures for the construction of new nuclear capacities, the achievement of the target for the level of interconnection of electricity transmission grids, provision of conditions to initiate investments in production of natural gas on the continental plateau of Romania in the

Date	Representatives	Meeting agenda
		Black Sea etc.) • Assessing the financing sources/programmes available at EU level in order to support the policies and measures needed to achieve the targets committed to • Assessing the macro-economic projections used in the INECP, e.g. the projections of the country's GDP are approximately 30 % higher, in the additional measures (WAM) scenario, and 5 % lower, in the existing measures (WEM) scenario, than the projections used officially by the Commission in the document entitled "2018 Ageing Report Economic and Budgetary Projections for the 28 EU Member States (2016-2070)"
16/10/2019	• Representatives of the DG Clima of the European Commission • Representatives of the Romanian authorities • Deloitte Representatives	• Presenting the situation facing Romania • The renewable energy target for 2030 in the context of the European Commission's recommendations to increase the ambition level from 27.9 % to 34 % • The biogas and biomass potential in Romania • Reducing greenhouse gas emission • Applying the European Commission's recommendations and using the available financial resources required for the implementation of the INECP measures • Preparing the environmental assessment (SEA) for the INECP • Conducting public consultations for the final version of the INECP • Stage of development of the Long-Term Strategy for the INECP (LTS, 2050) • Completion of the INECP by 31 December 2019

Source: Deloitte

Following the assessment of the integrated plans submitted by all EU Member States, the European Commission establishes that, based on the national commitments, it is possible to achieve the targets committed to at EU level for 2030, namely:

- the target of at least 40 % domestic reduction in greenhouse gas emissions by 2030, compared to 1990;
- the target of 32 % renewable energy consumption in 2030;
- the target of 32.5 % for improvements in energy efficiency in 2030;
- the 15 % electricity interconnection target by 2030.

In the preparation of its recommendations, the Commission took into account, on the one hand, the need to strengthen certain quantified planned contributions of all Member States in order to assess ambition at EU level and, on the other hand, the need to grant the Member State concerned sufficient time to take due account of the Commission's recommendations before completing the national plan. The European Commission published "Commission Recommendation of 18 June 2019 on the draft integrated National Energy and Climate Plan of Romania covering the period 2021-2030" on 18 June 2019, in which it issued a series of recommendations.

1.4. Regional cooperation in preparing the plan

i. Elements subject to joint or coordinated planning with other Member States

Not applicable.

ii. Explanation of how regional cooperation is considered in the plan

Not currently applicable.

2. National targets

2.1.The Decarbonisation Dimension[6]

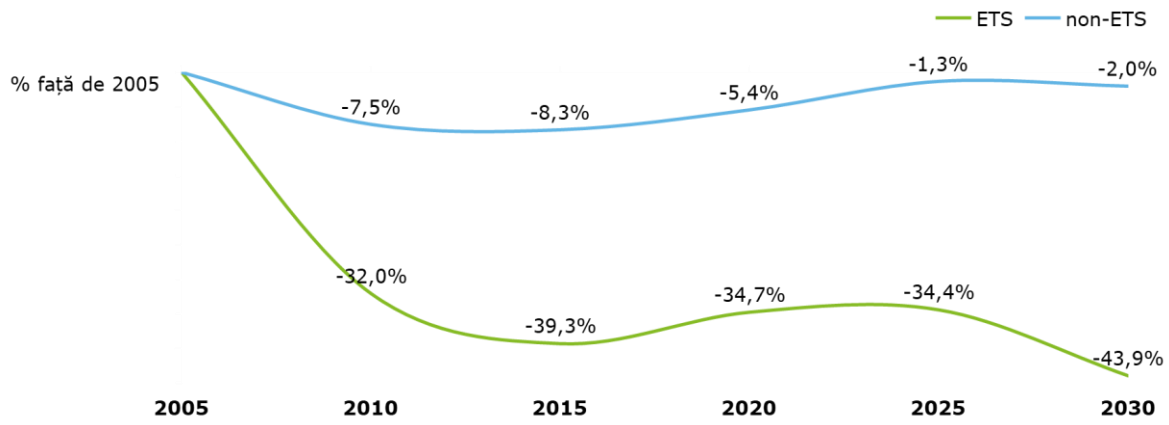
2.1.1. GHG emissions and removals

i. The elements set out in point (a)(1) of Article 4

Romania plans to make a fair contribution to the achievement of the decarbonisation target of the EU and will follow the best environmental protection practices. The application of the EU-ETS scheme and compliance with the annual emissions targets for the non-ETS sectors are the main commitments to achieve the targets. For the sectors covered by the EU-ETS scheme, the overall emissions reduction target of Romania reaches approximately 44 % by 2030 compared to 2005.[7]

Following the projected policies and measures, as detailed in Chapter 3, GHG emissions from the ETS sector for 2030 show a level of 39 million tonnes of CO_2 equivalent.

Chart 1 - Historical and projected trend in emissions in ETS and non-ETS sectors



Source: The Ministry of the Environment, Waters and Forestry, the National Inventory of Greenhouse Gas Emissions, 2018, Deloitte calculations based on Romania's report on the GHG emission projections issued by the European Environment Agency

EN	***RO***
% față de 2005	% compared to 2005

Note: The emission values are consistent with the projections issued in December 2018 in accordance with the draft INECP; it has been estimated that the final value for 2030 will drop following the reduction in final energy consumption, along with a decrease in the coal-based production of energy

[6] Consistency must be established with long-term strategies under Article 15
[7] Regulation (EU) 2018/842/EU of the European Parliament and of the Council of 30 May 2018 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation (EU) No 525/2013

Emissions from non-ETS economic activities for the period 2021-2030 are established in *Regulation (EU) 2018/842 of the European Parliament and of the Council of 30 May 2018 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation (EU) No 525/2013*, in order to ensure that the Community's commitments to reduce greenhouse gas emissions by 2030 have been met.

The European Commission set a 2 % reduction target for Romania compared to the value for 2005,[8] whereas the average for EU28 is a 30 % reduction. The implementation of Regulation (EU) 2018/841 *of the European Parliament and of the Council of 30 May 2018 on the inclusion of greenhouse gas emissions and removals from land use, land use change and forestry in the 2030 climate and energy framework, and amending Regulation (EU) No 525/2013 and Decision No 529/2013/EU* may also lead to the achievement of this target by ensuring compliance by each Member State with their provisions and requirements through a maximum compensation of 13.4 million tonnes of CO_2 equivalent for the period 2021-2030.

According to the projections issued during the preparation of the INECP, the total GHG emissions in 2030 (EU-ETS and non-ETS, excluding LULUCF) will be 118.35 million tonnes of CO_2 equivalent.[9]

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

- **increasing the municipal waste reusage and recycling rate to a minimum 70 % by 2030** (a minimum of 50 % by the end of 2025);
- **reducing the amount of stored municipal biodegradable waste** to 35 % of the amount of municipal biodegradable waste generated in 1995, by the end of 2020;
- by **2025, storing only waste undergoing prior treatment operations**;
- **increasing the package waste recycling rate to 80 % by 2030**, with the interim target of 60 % by 2020 and 70 % by 2025;
- prohibiting storage of recyclable materials such as plastics, metal, glass, paper and cardboard, and of biodegradable waste by 2025, **completely removing storage of waste by 2030;**
- **developing the markets of high quality secondary raw material**, including by assessing the value added by the criteria establishing the end of the status of waste applicable to certain materials;
- increasing the energy recovery rate to a minimum of 15 % by the end of 2025;
- increasing the rate of separate collection of recyclable waste by three fractions (paper and cardboard, plastic and metal and glass) in order to reach a minimum collection rate of 52 % in each county and in the Bucharest Municipality.

Romania will therefore contribute to the decarbonisation process of EU28 considering that, in 2030, the total greenhouse gas emissions in the national economy sectors will be reduced by approximately 50 % compared to 1990. This reduction will also result from the sectors covered by the ETS system and from non-ETS activities.

Moreover, GHG emissions are likely to be further reduced, according to the WAM scenario updated following the Commission's recommendations, after the strategic documents prepared by the government institutions in Romania have been completed. The following reports will

[8] Regulation 2018/841/EU, Annex 1
[9] Projections issued in the framework of this Plan, taking into account the projected emission levels in the Seventh National Communication from Romania

thus envisage harmonisation with the INECP and the abovementioned assessment is to be included in the future plan revisions. When the INECP was prepared, the Forestry Reference Level (FRL) and the National Forestry Accounting Plan (NFAP) were under development. The updating of the GHG emissions/removals in the LULUCF sector, which is part of the National Inventory of Greenhouse Gas Emissions (INEGES), with an impact on the determination of FRL and of GHG emissions/removals projections, is under preparation. The completion deadline for Biannual Report No 4 is 31 December 2019[10], and the remaining reports are to follow their normal course in 2020, starting with 15 January, when the INEGES data will be reported to the Commission and the European Environment Agency.

When the INECP was prepared, there were no sufficiently advanced draft versions of the indicated documents/reports to extract and to process the data needed for an updated calculation of the GHG emissions target.

In conclusion, the GHG emissions and removals targets, and related policies and measures, will be updated in the INECP after the strategic documents have been completed.

ii. Where applicable, other national objectives and targets consistent with the Paris Agreement and the existing long-term strategies. Where applicable for the contribution to the overall Union commitment to reducing the GHG emissions, other adaptation targets, if available

Currently not applicable.

2.1.2. Renewable energy

i. The elements set out in point (a)(2) of Article 4

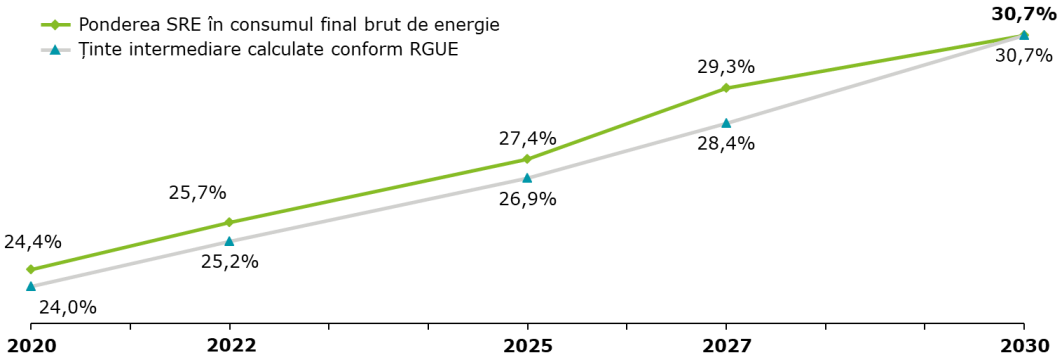
In its setting of the targets for energy from renewable sources, Romania followed the Commission's recommendations and the provisions of the "Clean Energy for All Europeans" Package.

Considering that, in 2017, the global renewable energy share in the gross final energy consumption exceeded the 24 % target undertaken for 2020 (24.5 % in 2017 according to Eurostat), and the expected trend in such share, the projections based on the assumptions used in the development of this Plan indicate a global RES share of 30.7 % for 2030.

The calculation methodology set out in Directive (EU) 2018/2001 on the promotion of the use of energy from renewable sources was used in the calculation of the global RES share in the final energy consumption.

[10] https://www4.unfccc.int/sites/SubmissionsStaging/NationalReports/Documents/3791685_Romania-BR4-1-BR4-Romania.pdf

Chart 2 – Indicative trajectory of the RES share in the final energy consumption, 2021-2030, [%]



Source: Deloitte calculation based on the information submitted by the INECP Interinstitutional Working Group and of the Commission's recommendations

RO	***EN***
Ponderea SRE în consumul final brut de energie	RES share in the gross final energy consumption
Ținte intermediare calculate conform RGUE	Interim targets calculated under EUGR

The RES target at interim points was calculated as the minimum value indicated in Regulation (EU) 2018/1999, namely:

- By **2022**, the trajectory must reach the target of **at least 18 % of the total increase** projected in the period 2020-2030 compared to the target projected for 2020 (24 %);
- By **2025**, the trajectory must reach the target of **at least 43 % of the total increase** projected in the period 2020-2030 compared to the target projected for 2020 (24 %);
- By **2027**, the trajectory must reach the target of **at least 65 % of the total increase** projected in the period 2020-2030 compared to the target projected for 2020 (24 %)

In accordance with Regulation (EU) 2018/1999 of the European Parliament and of the Council of 11 December 2018 on the Governance of the Energy Union and Climate Action, the assessments made during the preparation of the Plan show that the interim targets for 2022, 2025 and 2027 were met and exceeded respectively.

The level of ambition regarding the share of energy from renewable sources has increased in the revised version of the INECP from an initial proposed rate of 27.9 % to a revised rate of 30.7 % following the Commission's recommendations prepared for Romania and sent on 18 June 2019, and the opinions and comments received during the public consultations.

The rate was also recalculated based on the Commission's recommendation to align the national macroeconomic projections to those in the "Ageing Report Economic and Budgetary Projections for the 28 EU Member States (2016-2070)", based on which the National Strategy and Prognosis Commission (*Comisia Națională de Strategie și Prognoză - CNSP*) prepared and submitted new macroeconomic projections. Moreover, the decrease in the cost of RES technologies has influenced the projected increase in these capacities and the coupling with other measures to increase the flexibility of the system will offset the decrease in the share of coal-based electricity taking account of the costs for compliance with the environmental requirements.

Romania has chosen to adopt a relatively prudent approach to the level of ambition, taking into account the national particularities pertaining to the stability and safety of the NES, and to the demand for storage capacities as well as the impact of investment costs on the price to the consumer, and having regard to the fact that Regulation (EU) 2018/1999 stipulates that, in future revisions of the INECP, shares may be adjusted only upwards. In the context of designing this approach, it is noteworthy that, in the process of implementation of the recommendations, there was also the issue of absence of the data required to increase the level of ambition in the area recommendation by the Commission and to prepare a more detailed plan regarding the measures, actions, and financial resources envisaged by the Romanian authorities in order to achieve the RES targets in the period 2021-2030. For example, the fact that no official data is currently available regarding the actual potential of biogas and biomass resources at national level, which is also hindered by the existence of an unclear legislative framework in this field, which does not enable a clear classification of certain natural resources as biomass (one example in this respect is firewood, i.e. a resource widely used in the rural area as fuel for heating), constitutes an additional constraint. Such situations/factors substantiated Romania's decision to adopt a prudent approach.

Nevertheless, considering that there are no legislative barriers to the increase in the RES capacities and in the availability of certain funding instruments for 2021-2030, which are particularly RES-friendly, it will be possible to develop them according to the market demand and the developed capacities will be able to exceed the value currently proposed in the Plan if the market demand and the actual exploitable potential will allow it.

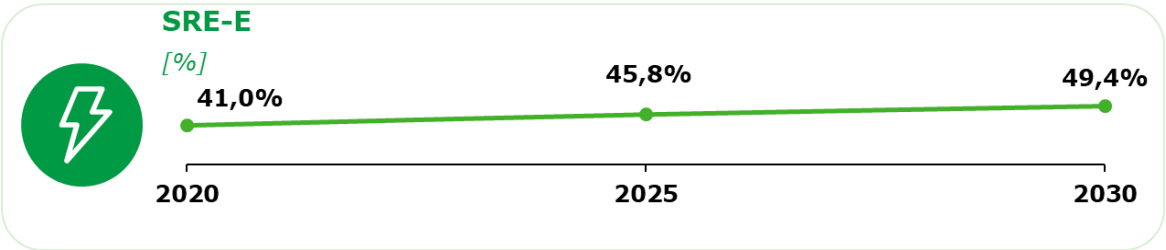
Moreover, a new assessment/adjustment of the target for 2030 will be possible with the revision of the INECP, when a series of strategies, which are still under development, have been completed and approved and when it will also be possible for the effects of the implementation of Directive (EU) 2018/410 and of the Green Deal support programmes to be known and estimated much better at national level.

ii. Estimated trajectories for the sectoral share of renewable energy in gross final energy consumption from 2021 to 2030 in the electricity, heating and cooling, and transport sector

The total renewable energy share in the gross final energy consumption includes the renewable energy contribution of each sector to the final energy consumption. The sectoral renewable energy shares were calculated in accordance with Directive (EU) 2018/2001 on the promotion of the use of energy from renewable sources, including relevant annexes, as the methodological basis.

The contribution of Romania to the achievement of the targets set for 2030 is shown in the charts below based on the WAM scenario and on the calculation assumptions and projections used.

Chart 3 - Indicative trajectory of the RES share in the gross final electricity consumption, 2021-2030

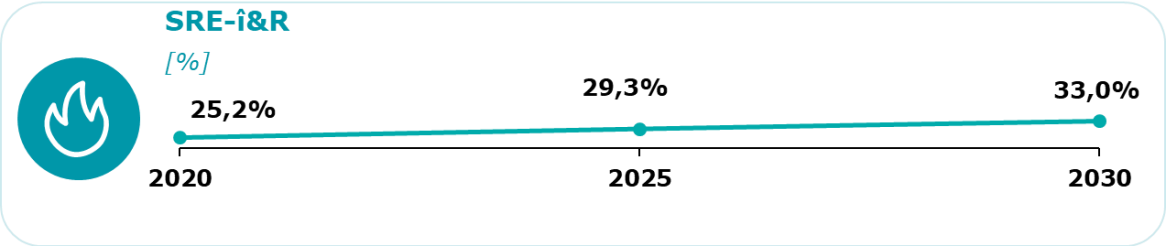


Source: Deloitte calculation based on the information submitted by the INECP Interinstitutional Working Group and of the Commission's recommendations

RO	***EN***
SRE-E	RES-E

The normalised values of the electricity produced from a hydro-power and wind source were used to calculate the RES share in the gross final electricity consumption, as per the methodology described in Directive (EU) 2018/2001, Annex II.

Chart 4 - Indicative trajectory of the renewable energy share in the gross final electricity consumption in the sector of heating and cooling, 2021-2030



Source: Deloitte calculation based on the information submitted by the INECP Interinstitutional Working Group and of the Commission's recommendations

RO	***EN***
SRE-Î&R	RES-H&C

According to the calculation assumptions used, the gross final consumption of renewable energy used in the I&R sector is estimated to increase by 24 % in the period 2021-2030, considering the availability of the biomass sources (mainly firewood and agricultural waste) in accordance with the sustainability criteria. An alternative for 2030 is the introduction of the heat pumps to meet the heating demand (against the background of an estimated decrease of at least 25 % in the costs for heat pumps in 2030 compared to the current values, without taking into account the support measures at national and European level, which are likely to lead to an even more significant decrease in these costs[11]), and the installation of solar panels on roofs.

The calculation assumptions took into account the most cost-effective investments in order to cover the domestic heat demand, considering the estimated increased availability for use of natural gas in the heating processes and the dispersion of households/inhabitants in the rural areas of Romania.

Romania is facing certain constraints in order to reach the indicative target under Article 23 of Directive (EU) 2018/2001, also because the RES share in the heating and cooling sector is already relatively high, being estimated to 25.6 % in 2020. This is due to the significant share of biomass used nationally, which is deemed to be RES according to the Commission's definitions. However, the topic is sensitive to Romania because there are no accurate statistics regarding the actual biomass potential[12] at national level and the vague legislative framework in this field leads to certain uncertainties regarding the classification of certain resources, such as firewood, which is widely used especially in the rural areas, as biomass. Moreover,

[11] Technology pathways in decarbonisation scenarios, E3 Modelling, Ecofys, Tractebel, July 2018
[12] Preliminary indications in this respect are set out in the National Forests Accounting Plan for Romania, which was launched for public consultation on 6 December 2019

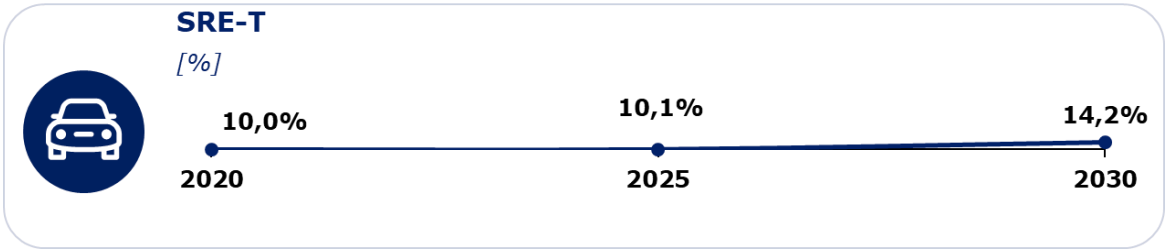
considering that this target is expressed as a ratio between the RES quantity and the gross final energy consumption, both variables may influence the target value. Uncertainties regarding the gross final energy consumption, which is likely to be affected by various factors such as weather conditions or volume and type of industrial activity, may therefore result in difficulties in achieving the target in the I&R sector.

Romania will make efforts, as described in the plan, in order to increase the level of ambition in the RES field, however it considers it noteworthy to take into account the abovementioned difficulties and constraints.

The RES target in the heating and cooling sector was updated to take into account, in addition to the Commission's recommendations to increase the level of ambition in this respect, also the draft Long-Term Renovation Strategy prepared by the Ministry of Public Works, Development and Administration. Moreover, the RES target was updated to take into account also the sustainable use of biomass in the energy sector.

In the context of Directive (EU) 2018/2001 on the promotion of the use of energy from renewable sources, Romania plans to explore various methods in order to overcome the abovementioned structural obstacles with a view to reaching the indicative target of 1.3 % per year by 2030.

Chart 5 - Indicative trajectory of the renewable energy share in the gross final electricity consumption in the transport sector, 2021-2030



Source: Deloitte calculation based on the information submitted by the INECP Interinstitutional Working Group and of the Commission's recommendations

RO	***EN***
SRE-T	RES-T

For renewable energy in the transport sector, a European target of 14 % of the final energy consumption in transport for 2030 was set for each Member State. The projections of the plan indicate a surge in electrification in the transport sector based on the identified set of priorities and on the assumption of convergence of costs for light electric vehicles and those of internal combustion vehicles in 2024 according to independent studies[13]. By 2030, approximately 700 000 private electric vehicles (including hybrid vehicles) and approximately 600 000 charging points (of which approximately 40 000 under a fast-charging and semi-fast charging regime) are thus estimated to be put into circulation. The target for 2030 takes into account the current RES-T share (6.56 % for 2017) and, implicitly, the efforts required to reach a value of 14.2 % in 2030.

[13] Energy Transition Outlook 2018, Executive Summary, A global and regional forecast to 2050, DNV-GL

The calculation methodology described in Directive (EU) 2018/2001 on the promotion of the use of energy from renewable sources was used in the calculation of the renewable energy share in the gross final energy consumption in the transport sector. The multipliers used in the RES-T calculation after 2020 were thus listed in Article 27 of the abovementioned directive, namely:

- the share of **biofuels and biogas for transport produced from the feedstock listed in Annex IX** was considered to be **twice** its energy content (x2);
- the share of renewable electricity used in **road transport** was considered to be **four times** its energy content (x4);
- the share of renewable electricity used in **rail transport** was considered to be 1.5 times its energy content (x1.5).

Moreover, in the calculation of the target account was taken of the fact that the share of biofuels and bioliquids, and of biomass fuels consumed in transport (conventional biofuels) would not exceed more than 7 % of the final energy consumption in the road and rail transport sector, as stipulated in Article 26 of Directive (EU) 2018/2001.

iii. The estimated trajectories, as broken down by renewable energy technology, which the Member State intends to use to obtain the sectoral trajectories and the global renewable energy trajectory in the period 2021-2030, including the projected gross final total energy consumption per technology and sector, in Mtoe, and the planned total installed capacity (divided into new capacity and repowering) per technology and sector in MW

Considering the calculation assumptions used by the project team (mainly based on the information sent by the INECP Interinstitutional Working Group), the estimated trajectories, as broken down by RES technology which Romania intends to use in order to meet the sectoral and global trajectories, are listed in the tables below:

Table 5 – Indicative trajectory, as broken down by technology, for renewable energy in gross final electricity consumption, 2021-2030, [ktoe]

ktoe	2020	2025	2030
Hydro[14]	1 415.9	1 457.9	1 460.3
Wind[15]	564.6	828.8	1 004.9
Solar energy	170.4	424.6	632.6
Other renewable sources	77.4	77.4	77.4
Gross final consumption of electricity from renewable sources	**2 228.4**	**2 788.7**	**3 175.2**

Source: Deloitte calculation based on the information submitted by the INECP Interinstitutional Working Group and of the Commission's recommendations

Table 6 - Projected trend in renewable energy and in the gross final energy consumption in the heating and cooling sector, 2021-2030, [ktoe]

ktoe	2020	2025	2030
Final Energy Consumption	3 481.2	3 892.1	4 026.5
Derived heat	76.2	170.0	263.7
Heat pumps	-	55.0	119.6

[14] Normalised values as per Annex II to Directive (EU) 2018/2001, electricity produced in pumping plants from water previously pumped upwards is excluded
[15] Normalised values as per Annex II to Directive (EU) 2018/2001

ktoe	2020	2025	2030
Total gross final consumption of electricity from renewable sources in the heating and cooling sector	**3 557.4**	**4 117.0**	**4 409.8**

Source: Deloitte calculation based on the information submitted by the INECP Interinstitutional Working Group and of the Commission's recommendations

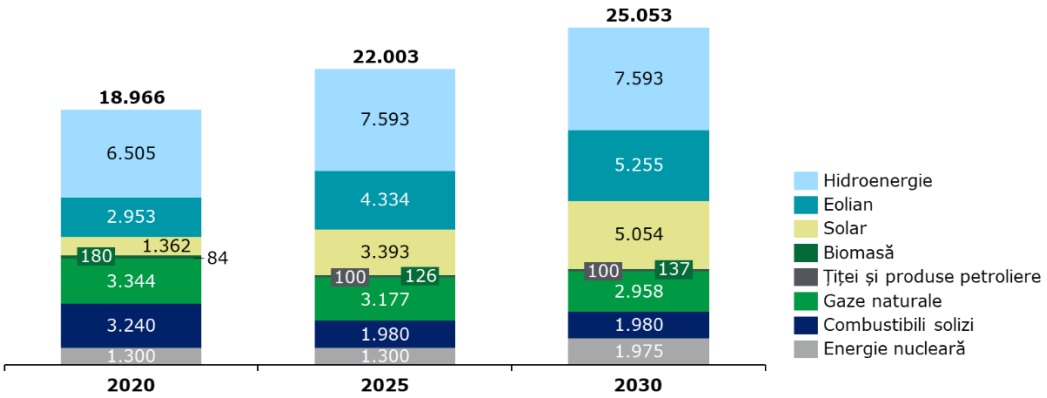
Table 7 – Indicative trajectory, as broken down by technology, for renewable energy in gross final energy consumption in the transport sector, 2021-2030, [ktoe]

ktoe	2020	2025	2030
Renewable energy in road transport	2.2	10.5	55.7
Renewable energy in the rail transport	46.9	72.2	97.6
Renewable energy in other types of transport	1.3	5.3	16.2
Biofuels of Generation I[16]	505.7	490.5	474.3
Biofuels of Generation II[17]	-	40.5	63.6
Total gross final renewable energy consumption in the transport sector	**635.4**	**728.4**	**989.9**

Source: Deloitte calculation based on the information submitted by the INECP Interinstitutional Working Group and of the Commission's recommendations

The trend in the installed capacities for the period 2021-2030 indicates an increase compared to the total installed capacities in 2018 according to the calculation projections for the future policies and measures, having regard to the tendency of increase in the electricity demand. Projections for 2030 reflect **an increase of up to 5 255 MW in the wind capacities and of approximately 5 054 MW in the photovoltaic capacities**, as illustrated in the graph below. As regards the projected trend in the natural gas-fired capacities, although the Development and Decarbonisation Plan for CE Oltenia 2020-2030 presents an additional natural gas-fired capacity of 1 400 MW as from 2024 (for more details, please see Section 3.3.i), considering the age of the current natural gas-fired capacities, it has been estimated that the decrease due to their decommissioning will exceed the increase foreseen through the new capacities. Nevertheless, the gross energy production from natural gas will increase (based on the increased efficiency of new capacities and the increase in the level of use of existing ones).

Chart 6 – Indicative trajectory of the net installed capacity per source, [MW]



Source: Deloitte calculation based on the information submitted by the INECP Interinstitutional Working Group and of the Commission's recommendations

RO	***EN***
Hidroenergie	Hydro

[16] Biofuels of Generation I are considered to be those biofuels produced from traditional sources, which are not listed in Annex IX to Directive 2018/2001

[17] Biofuels of Generation II are considered to be advanced biofuels produced from the feedstock listed in Annex IX to Directive 2018/2001

Eolian	Wind
Solar	Solar energy
Biomasă	Biomass
Ţiţei şi produse petroliere	Crude oil and petroleum products
Gaze naturale	Natural gas
Combustibili solizi	Solid fuels
Energie nucleară	Nuclear energy

in order to be able to meet the trajectory of the global RES share proposed in the INECP, the new net RES energy production capacities that need to be deployed are:

a) Wind:
   - + 822 MW additional installed capacity in 2022 compared to 2020;
   - + 559 MW additional installed capacity in 2025 compared to 2022;
   - + 556 MW additional installed capacity in 2027 compared to 2025;
   - + 365 MW additional installed capacity in 2030 compared to 2027.

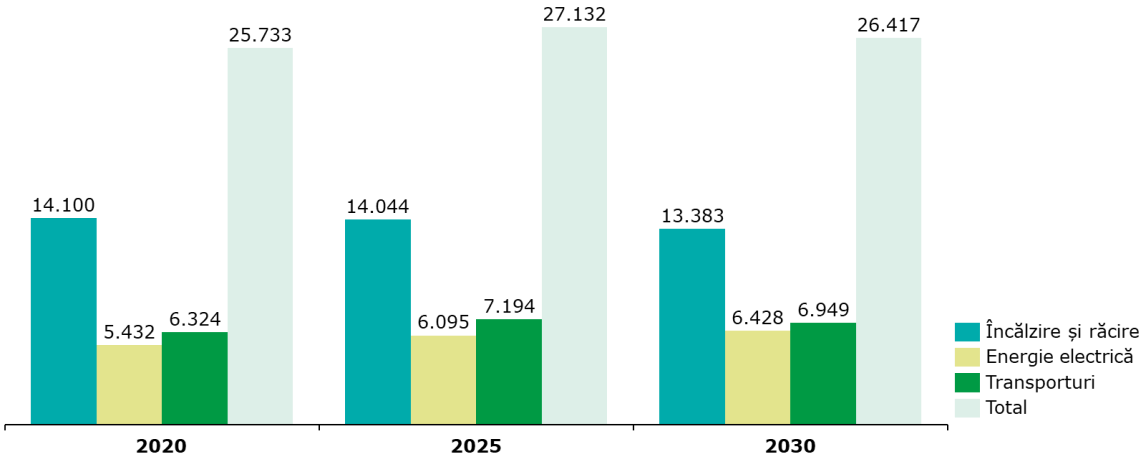
b) Solar:
   - + 994 MW additional installed capacity in 2022 compared to 2020;
   - + 1,037 MW additional installed capacity in 2025 compared to 2022;
   - + 528 MW additional installed capacity in 2027 compared to 2025;
   - + 1,133 MW additional installed capacity in 2030 compared to 2027.

Moreover, by 2027-2030, in addition to deploying additional wind and solar capacities, it will be necessary to keep the existing capacity by repowering. In this respect, the capacities resulting from the repowering considered during the preparation of this Plan are:

- Wind ☐ ~ 3 GW installed capacity from repowering;
- Solar ☐ ~ 1.35 GW installed capacity from repowering.

An approximate 2.7 % increase is projected for gross final energy consumption in the period 2021-2030, according to the WAM scenario, with a significant increase by 2025, followed by a drop due to the energy efficiency measures, as also shown in the chart below. Such consumption is broken down by the three relevant sectors: heating and cooling, electricity and transport. According to the calculation projections, the heating and cooling sector for 2030 is responsible for approximately 50 % in the gross final energy consumption.

Chart 7 – Indicative trajectory of the gross final energy consumption by sector, [ktoe]



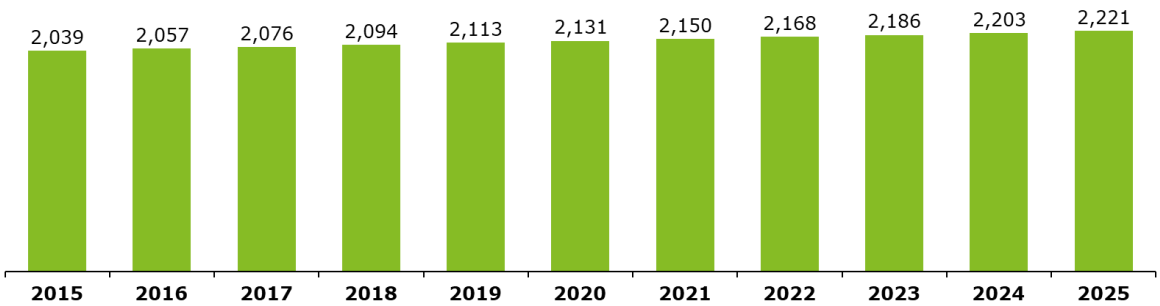
Source: Deloitte calculation based on the information submitted by the INECP Interinstitutional Working Group and of the Commission's recommendations

RO	***EN***
Încălzire şi răcire	Heating and cooling
Energie electrică	Electricity
Transporturi	Transport
Total	Total

iv. Estimated trajectories on bioenergy demand, disaggregated between heat, electricity and transport, and on biomass supply by feedstocks and origin (distinguishing between domestic production and imports). For forest biomass, an assessment of its source and impact on the LULUCF sink

According to the "National Forests Accounting Plan for Romania", which was prepared by the Ministry of the Environment, Waters and Forests and which is currently at the stage of public consultation, the living biomass volume will evolve by 2025 according to the chart below.

Chart 8 - Trend in the living biomass volume by 2025 [million cubic meters]



Source: Ministry of the Environment, Waters and Forests, National Forestry Accounting Plan of Romania, Deloitte

The biomass potential in agriculture, which mainly consists of stems, including maize cobs, was estimated between 21.5 and 35.8 million tonnes, with the year 2017 as the reference year, according to the Fundulea National Agrricultural Research and Development Institute (*Institutul Național de Cercetare-Dezvoltare Agricolă Fundulea*).

v. Where applicable, other national (including long-term or sectoral) trajectories and objectives (e.g. renewable energy share in district heating, use of renewable energy in buildings, renewable energy produced by localities, energy communities and indigenous consumers, energy recovered from the sludge obtained from the treatment of wastewater)

According to the available data and the WAM scenario, the amount of renewable energy used in district heating from geothermal energy is projected to increase from 31 ktoe in 2016[18] to 45 ktoe in 2030.

In the context of the "Smart City" strategies under preparation (e.g. Bucharest, Cluj-Napoca), local authorities have planned a series of projects focused on the production of electricity and heat from renewable sources by using photovoltaic panels, heat solar panels or biomass.

As regards the use of renewable energy in buildings, information can also be found in Section 2.2.ii.

Moreover, the draft Long-Term Renovation Strategy includes information on the projected trend in the use of RES in residential, governmental and commercial buildings. Specific details regarding this draft are found in Section 3.1.2 "Renewable Energy" (The Decarbonisation Dimension) and Section 3.2 "The Energy Efficiency Dimension" in Chapter 3.

As regards the option of energetic recovery of used sludge, which consists in the dedicated incineration of sludge and recovery of related energy, according to the National Strategy for the Management of Wastewater Sludge, the operation entails large investments and high operating costs, which are feasible only in certain regions in Romania (Bucharest-Ilfov).

2.2. Dimension Energy efficiency

i. The elements set out in point (b) of Article 4

The Energy Efficiency dimension has a significant importance in the 2021-2030 INECP because the "Clean Energy for All Europeans" package prioritises energy efficiency in the process of transition towards clean energy.

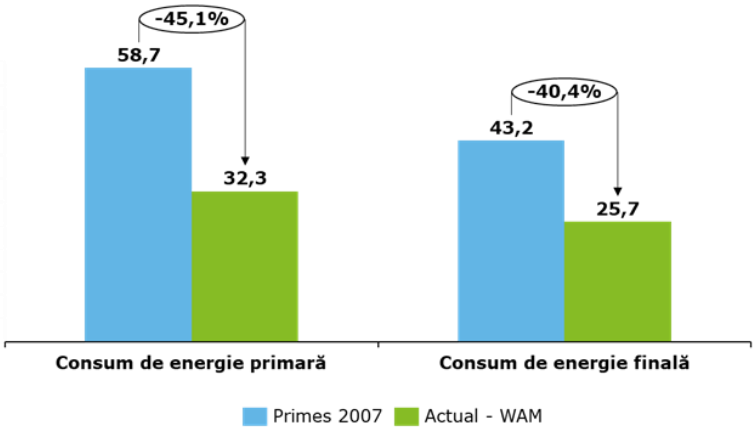
By the relevant target commitments, Romania must contribute to the achievement of the EU energy efficiency target (maximum consumption of primary energy of 1 273 Mtoe and of final energy of 956 Mtoe).[19] The global target is thus at least 32.5 % in 2030 at EU level, as indicated in Article 1(1) and in Article 3(5) of Directive 2012/27/EU, and it may be revised upwards in 2023.

Having regard to the calculation assumptions and projections used, which take into account the increase in industrial production and in the standard of living, which is reflected in the increase in energy consumption, primary energy consumption is projected to reach 32.3 Mtoe in 2030 compared to 32.1 Mtoe in 2020.

[18] The Progress Report of Romania on the promotion and use of renewable energy in accordance with Article 22 of Directive 2009/28/EC
[19] Article 3(4) of Directive 2012/27/UE, see the proposal to amend the Directive

With reference to the projection for primary energy consumption for 2030, as calculated in the PRIMES 2007 scenario for Romania, i.e. 58.7 Mtoe, the WAM scenario indicates a 45.1 % decrease for 2030. In the context of additional measures and policies, Romania aims at achieving primary energy consumption of 32.3 Mtoe and final energy consumption of 25.7 Mtoe by 2030.

Chart 9 - Primary and final energy consumption for 2030 [Mtoe]



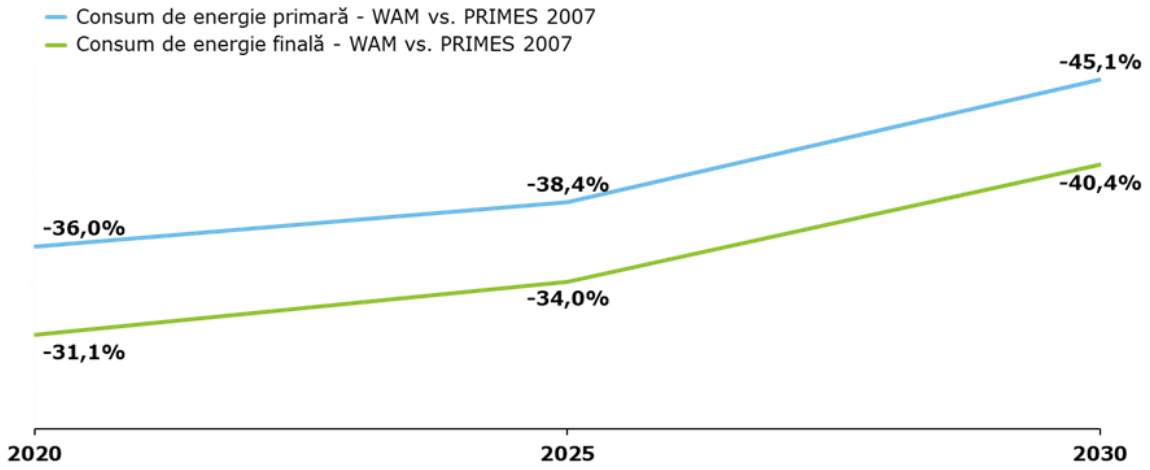
Source: PRIMES 2007; Deloitte calculation based on the information submitted by the INECP Interinstitutional Working Group and of the Commission's recommendations

RO	***EN***
Consum de energie primară	Primary energy consumption
Consum de energie finală	Final energy consumption
Actual – WAM	Current – WAM

Trajectories of primary and final energy consumption indicate a slower decrease in the period 2020-2025, with a 2.4 % decrease for primary consumption and a 2.9 % decrease for final consumption recorded.

The policies and measures which Romania plans to adopt in order to achieve the consumption targets have a wide scope and require, where applicable, a longer period of confirmation of effects produced. This is the reason why most of the consistent effects, in the sense of reduction of energy consumption, will be felt from 2025 onward, when the reduction trend is increasing, being influenced by the effects of the investments made in the period 2020-2025. The trajectory thus indicates a savings increase from 38.4 % in 2025 to 45.1 % in 2030 for primary consumption and from 34.0 % to 40.4 % for final consumption in the same period in relation to the PRIMES 2007 baseline scenario.

Chart 10 - Indicative trajectory regarding the contribution of Romania to the EU energy efficiency targets [%]



Source: PRIMES 2007; Deloitte calculation based on the information submitted by the INECP Interinstitutional Working Group and of the Commission's recommendations

RO	***EN***
Consum de energie primară - WAM vs. PRIMES 2007	Primary energy consumption - WAM vs PRIMES 2007
Consum de energie finală - WAM vs. PRIMES 2007	Final energy consumption - WAM vs PRIMES 2007

On the other hand, in order to achieve the target of new binding energy savings, a trajectory was prepared having regard to compliance with Article 7 of Directive (EU) 2018/2002, which provides for a minimum annual reduction of 0.8 % in final energy consumption for the period 2021-2030 compared to the average consumption recorded in the period 2016-2018. The measures designed to achieve these savings will also be focused on combating energy poverty (see Chapter 2.4.4.)

The calculation of the savings target entails identifying the amount of domestic final energy consumption in the abovementioned years. The table below lists data about the situation of Romania

Table 8 – Final energy consumption and average energy consumption in the period 2016-2018 [Mtoe]

Indicator	2016	2017	2018
Final Energy Consumption	22.2	23.2	23.5
Average final energy consumption in the period 2016-2018	**22.9**		
New annual energy savings (according to the annual minimum target of 0.8 %)	**0.18**		

Source: Eurostat, Deloitte calculations

The cumulated target of energy savings in accordance with Article 7(1)(b) is achieved through a gradual increase in the annual rate, as follows: 0.5 % in 2021 and 2022, 0.7 % in 2023, 0.8 % in 2024, 2025 and 2026, 1.375 % in 2027 and then 1.5 % by 2030.

The cumulated value of energy savings in the covered period equates to 10.12 million toe, the table below listing the staggered rates:

Table 9 – Energy efficiency to be achieved in the period 2021-2030 based on the average final energy consumption in the period 2016-2018 [Mtoe]

Year	Annual energy savings										TOTAL
2021	**0.11**										0.11
2022	0.11	**0.11**									0.23
2023	0.11	0.11	**0.16**								0.39
2024	0.11	0.11	0.16	**0.18**							0.57
2025	0.11	0.11	0.16	0.18	**0.18**						0.76
2026	0.11	0.11	0.16	0.18	0.18	**0.18**					0.94
2027	0.11	0.11	0.16	0.18	0.18	0.18	**0.32**				1.26
2028	0.11	0.11	0.16	0.18	0.18	0.18	0.32	**0.34**			1.60
2029	0.11	0.11	0.16	0.18	0.18	0.18	0.32	0.34	**0.34**		1.95
2030	0.11	0.11	0.16	0.18	0.18	0.18	0.32	0.34	0.34	**0.34**	2.29
TOTAL cumulated energy efficiency in the period 2021-2030[20]											**10.12**

Source: Deloitte calculation based on the information submitted by the INECP Interinstitutional Working Group and of the Commission's recommendations
*Note: The values **in bold** are energy savings from the new annual measures*

In this context, Romania could rely on the flexibility mechanism provided for by the applicable law in order to cover up to 35 % of the required annual amount of energy savings by using one or more of the following measures:

- energy savings from transformation, transmission and distribution, including efficient heating and cooling to be taken into account for the total required amount of energy savings;
- taking into account energy savings achieved individually through activities initiated after 1 January 2018 until 31 December 2020, which continue to generate energy savings after 2020.

ii. The indicative milestones for 2030, 2040 and 2050, the domestic measurable progress indicators and their contributions to the Union's energy efficiency targets as included in the roadmaps set out in the long-term renovation strategies for the national stock of residential and non-residential buildings, both public and private, in accordance with Article 2a of Directive 2010/31/EU

The draft Long-Term Renovation Strategy (LTRS) proposes measures to improve energy efficiency, to reduce greenhouse gas emissions and to increase the renewable energy share in the total energy consumption through renovation of the national stock of buildings. The national stock of buildings has a share of 41.64 % in the final consumption of 22.86 Mtoe, as estimated for 2019, and estimated consumption of 9.52 Mtoe.

The strategy proposes three (minimal, medium, maximum) renovation packages for the buildings located in three climatic zones in Romania:

[20] The total values, as listed, may not coincide with the sum of components because of the rounding

- Package 1 (minimum) - entails renovation up to a level which ensures compliance with the national law, which is close to class C corresponding to an Energy Performance Certificate;
- Package 2 (medium) - entails structural renovation of the building in order to avoid the lock-in effects or the implementation of inadequate measures, which requires subsequent replacement in order to achieve future targets of nearly zero energy buildings (NZEB) and to use renewable energy solutions at a minimum.
- Package 3 (maximum) - entails renovation of the building up to a level that it may be deemed a nearly zero energy building (NZEB) through the extensive use of solutions to improve energy efficiency and of solutions to obtain renewable energy (photovoltaic panels, solar panels for hot water, geothermal pumps).

The selection of renovation packages is based on a multicriteria assessment with the purpose of achieving an energy class A for all types of buildings, with the exception of single-family residences (SFR), for which energy class B is considered to be acceptable.

The strategy contains three scenarios with different assumptions, each of them facing various financial and social challenges. Moreover, the strategy also includes a baseline scenario, under which the assumption is to continue renovations at the current pace and which is used for scenario benchmarking.

The detailed assessment conducted in the framework of the strategy revealed that the MLPDA decision was, on the date when this document was prepared, consistent with the outcome of Scenario 2. Its underpinning assumption consists in a significant increase in the pace of renovations for 2021-2030 compared to the first scenario. Scenario 2 concerns renovation of a larger portion of buildings with the lowest performances in order to achieve higher energy efficiency by 2030 compared to Scenario 1. Therefore, scenario 2 entails an increased share of residential condominiums, as they have the highest potential for enhanced energy efficiency. Moreover, scenario 2 is feasible compared to scenario 3, which is less feasible considering the characteristics of the construction sector in Romania. Moreover, scenario 2 is also optimal in terms of renovated area, number of beneficiaries, and of the estimated reduction in CO_2 emissions.

Table 10 - Contributions of renovation scenarios to the Union energy efficiency targets for 2030, 2040 and 2050

	Annual renovation rates 2021-2030	Annual renovation rates 2031-2040	Annual renovation rates 2041-2050
Baseline scenario	0.50 %	0.50 %	0.50 %
Scenario 1	Gradual increase from 0.53 % to 1.56 %	Gradual increase from 2.22 % to 4.78 %	Gradual increase from 4.85 % to 6.41 %
Scenario 2	**Gradual increase from 0.69 % to 3.39 %**	**3.79 %**	**4.33 %**
Scenario 3	3.13 %	3.24 %	3.62 %

Source: The 2020-2050 Long-Term Renovation Strategy

Table 11 - Detailed presentation of Renovation Scenario 2

Types of buildings	Category	Area [million m²]	Buildings [number]	Investment [million EUR]	Energy savings [million toe]	CO_2 reduction [million tonnes]	Increased renewable energy share [million toe]

Types of buildings	Category	Area [million m^2]	Buildings [number]	Investment [million EUR]	Energy savings [million toe]	CO_2 reduction [million tonnes]	Increased renewable energy share [million toe]
Residential – Single-family residences	Rural	10.57	162 475	1 736.87	0.17	0.04	68.63
	Urban area	9.39	102 120	1 449.88	0.14	0.11	39.77
Residential– Multi-family condominium	<= ground-floor + 4 floors	21.62	21 124	2 791.47	0.11	0.47	24.96
	> ground-floor + 4 floors	44.04	23,471	4 877.24	0.36	1.41	50.64
Education	Educational establishments	4.24	4 361	874.84	0.03	0.14	14.81
Health	Hospitals	1.61	161	318.33	0.01	0.06	5.28
	Other	1.07	14 324	192.52	0.01	0.02	3.11
Administrative offices		1.35	1 539	236.55	0.01	0.03	4.41
Commercial	Hotel	0.04	73	9.38	-	0	0.18
	Restaurants/cafes	0.12	2 394	27.05	-	0	0.50
	Shops	1.31	7 686	269.40	0.01	0.6	5.03
Total		95.36	339 728	12 783.53	0.83	2.34	217.31

Source: The 2020-2050 Long-term Renovation Strategy

The recommended scenario (Scenario 2) leads to a reduction of 0.83 Mtoe in the final consumption in 2030 compared to the baseline scenario. All of the three scenarios lead to final energy consumption of 3.38 Mtoe in buildings in 2050, which is a 66 % reduction compared to the same year in the baseline scenario. Moreover, Scenario 2 leads to a reduction in CO_2 emissions of 2.34 million tonnes compared to the baseline scenario, with an estimated value of 7.50 million tonnes of CO_2 emissions generated by the stock of buildings in Romania in 2030.

For the implementation of the recommended scenario, LTRS states an amount of EUR 12.8 billion for necessary investments. Moreover, an estimated amount of EUR 1 billion should be committed to cover the technical assistance costs. The recommendations regarding the sources of the abovementioned investments are the following:

- EUR 3 billion should come from non-reimbursable funds from the State budget or from funds offered by the EU;
- EUR 6 to 9 billion should be allocated as funds through reimbursable financial mechanisms, including reimbursable grants;
- EUR 1.8 billion should be provided by the owners of the buildings to be renovated under a co-financing regime.

iii. Where applicable, other national objectives, including long-term targets or strategies and sectoral targets, and national objectives in areas such as energy efficiency in the transport sector and with regard to heating and cooling

The industry, transports and the residential sector could contribute in approximately equal shares (each with a rate of 29 %) to the achievement of the energy efficiency target in the period 2021-2030 (new annual savings of ~1.83 Mtoe).

Considering the contribution brought by the draft Long-term Renovation Strategy (presented in the table below), INECP reflects a continuation of the actions set out in the NEEAP IV in regard to the policies and measures required in other sectors, in particular in the industry and transport sectors, which record the highest share of final energy consumption after the residential sector.

Table 12 - Energy efficiency in the residential sector to be achieved in the period 2021-2030 [Mtoe]

Year	Energy saving in the residential sector										TOTAL
2021	**0.03**										0.03
2022	0.03	**0.04**									0.07
2023	0.03	0.04	**0.05**								0.12
2024	0.03	0.04	0.05	**0.05**							0.17
2025	0.03	0.04	0.05	0.05	**0.06**						0.23
2026	0.03	0.04	0.05	0.05	0.06	**0.08**					0.31
2027	0.03	0.04	0.05	0.05	0.06	0.08	**0.11**				0.42
2028	0.03	0.04	0.05	0.05	0.06	0.08	0.11	**0.12**			0.54
2029	0.03	0.04	0.05	0.05	0.06	0.08	0.11	0.12	**0.14**		0.68
2030	0.03	0.04	0.05	0.05	0.06	0.08	0.11	0.12	0.14	**0.15**	0.83
TOTAL cumulated energy efficiency in the residential sector in the period 2021-2030											**3.4**

Source: World Bank

By complying with the obligations (regarding the measures derived from the energy audits and/or the good practices in energy management) set out in Law No 121/2014 on energy efficiency, in correlation with other programmes and measures fostering relevant investments (including under current support schemes/EU grants in the period 2021-2027), the industrial sector will thus have to attain an annual pace of savings of approximately 0.6 Mtoe in the period 2021-2030 (according to the NEEAP IV, the energy savings estimated for the industrial sector in 2020 amount to 0.3 Mtoe).

Similarly, new annual savings of approximately 0.6 Mtoe are required in the transport sector in the period 2021-2030 considering that the NEEAP IV estimations indicate potential savings of 0.4 Mtoe in the sector in 2020, which are mainly due to the renewal of the vehicle stock (passenger cars and cargo vehicles), i.e. 0.2 Mtoe. In order to achieve the annual targets, sustained measures will be required to upgrade urban public and rail transport. Last but not least, fostering alternative mobility (estimated to bring about energy savings of 0.16 Mtoe only in 2020) may significantly contribute to a reduction in final energy consumption in transport.

2.3.Dimension energy security

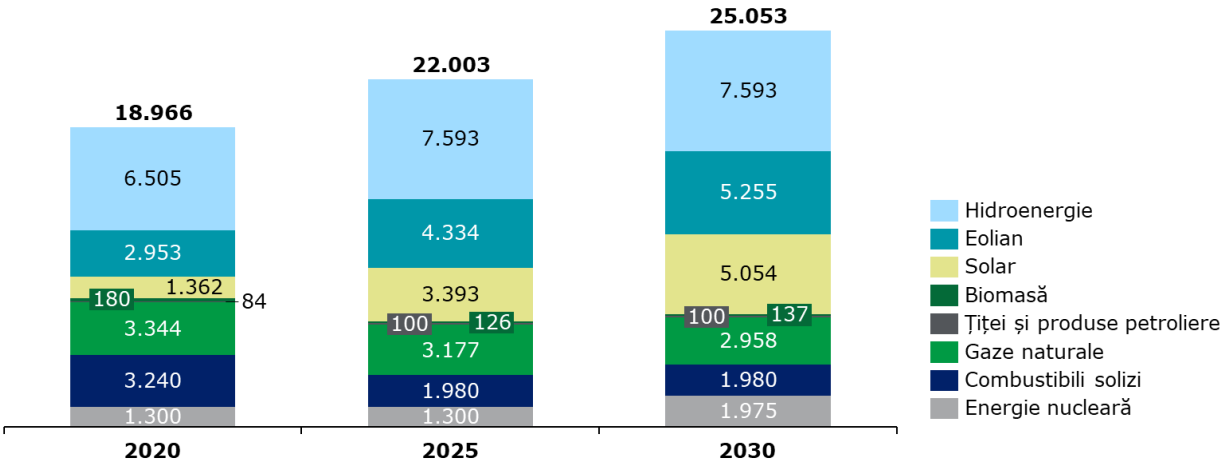
i. The elements set out in point (c) of Article 4

In order to establish and to align the national objectives pertaining to this dimension, an inventory was made with the various initiatives, decisions and current developments that bring forward the specific objectives of this dimension and which underpin the activities and strategic action plans for the period 2021-2030, with an outlook on 2050.

ii. National objectives with regard to increasing: the diversification of energy sources and energy supply from third countries; for the purpose of reducing import dependency

Romania considers that the primary objective for the national energy security is to ensure energy supply from internal sources. Romania proposes to maintain a diversified energy mix by 2030 taking into account both the decarbonisation objective of the energy system and the assurance of its flexibility and adequacy. In this respect, the trend in the installed capacities in the period 2020-2030 is set out in the chart below:

Chart 11 – Indicative trajectory of the net installed capacity per source, [MW]



Source: Deloitte calculation based on the information submitted by the INECP Interinstitutional Working Group and of the Commission's recommendations

RO	***EN***
Hidroenergie	Hydro
Eolian	Wind
Solar	Solar energy
Biomasă	Biomass
Ţiţei şi produse petroliere	Crude oil and petroleum products
Gaze naturale	Natural gas
Combustibili solizi	Solid fuels
Energie nucleară	Nuclear energy

In order to secure energy consumption, the installed capacity will increase by approximately 35 % in 2030 compared to 2020 due to the deployment of new wind energy capacities (of 2 302 MW by 2030) and solar energy capacities (3 692 by 2030), which will result in an increase in the domestic energy production, thus ensuring a higher level of energy independence. The positive impact is visible especially in the reduction of dependency on imports from third countries from a rate of 20.8 %, as projected in 2020, to 17.8 % in 2030, accounting for one of the lowest rates of dependency on energy imports in the EU.

Moreover, there is a prospect of replacing several coal-based units with natural gas-supplied combined cycle units, of refurbishing a nuclear plan and of building at least one new nuclear plant by 2030.

As regards natural gas supply[21], Romania envisages in particular the development of the National System of Natural Gas Transmission on the Bulgaria-Romania-Hungary-Austria Corridor (BRHA) and the development of the Southern Transmission Corridor to take over the natural gas from the Black Sea shore. The current interconnections will be further used to the north-east (Medieşul Aurit), to the south-east (Isaccea) with Ukraine, to the west with Hungary, to the south with Bulgaria and to the east with the Republic of Moldova.

iii. Where applicable, national objectives with regard to reducing energy import dependency from third countries, for the purpose of increasing the resilience of regional and national energy systems

Romania considers that it still has primary resource deposits so their tapping was included as an objective in this Plan in order to achieve a low level of energy dependency and to secure the operation of the NES. In this respect, the expeditious implementation of the legal framework required for the final decisions on investment in the tapping of natural gas resources in the Black Sea area is a significant objective for Romania. See Chapter 3.3.i for more details.

iv. National objectives with regard to increasing the flexibility of the national energy system, in particular by means of deploying domestic energy sources, demand response and energy storage

A significant objective for Romania in the field of energy security is to ensure the flexibility and adequacy of the national energy system. In connection with the objective of ensuring a diversified energy mix, as described in Chapter 2.3.ii, Romania proposes to replace the electricity production capacities to be decommissioned with new effective low-carbon capacities by 2030 (see the Decarbonisation Plan proposed by the Oltenia Energy Complex Unit). Until the replacement of coal-based capacities with new capacities based on low-carbon technologies, rehabilitation works will be envisaged, as well as the increase in energy efficiency on the existing capacities, which will remain in operation for reasons of energy security for Romania.

Romania also sets forth objectives to foster demand response consumption in order to ensure response to the demand variations and objectives regarding storage of energy. The development and tapping of the technical and economic potential of RES in the NES depend on the development of storage capacities and of technologies for injection of hydrogen in the form of synthesis gas from RES and the use of hydrogen in industrial processes.

As regards the response to the demand variations, Romania implemented in 2012[22] a legal framework regarding consumption management by using a legal act to limit consumption of electricity for each concessionaire distribution system operator. Another important objective for consumption management is to operationalise the dynamic tariffs under the secondary law applicable to TSO and DSO. Romania also proposes to integrate battery energy storage systems (BESS) into the NES based on the calculation assumptions and information available at TSO level. See Chapter 3.3.i for further details.

As regards the assurance of adequacy for the energy system, according to the assessments of Transelectrica, the acceptable limits for the power produced from wind and photovoltaic

[21] Development Plan for the National Natural Gas Transmission System for 2019-2028 (NNGTS) - Transgaz SA - approved by ANRE
[22] Government Decision No 83/2012 for adopting certain security measures on the electricity market

sources are highly contingent on the level of hydraulicity and heat regime. From the viewpoint of the flexibility of residual power, hours with high consumption in winter/summer, heat minimum/maximum hours and extreme (minimum/maximum) hydraulicity hours are thus essential. The abovementioned assessments point to the need to install additional capacities of at least 400 MW by 2020 and 600 MW (in addition to 2020) in 2025. Having regard to the abovementioned deadlines, Romania is likely to give priority to certain projects (indicated in Chapter 3.3) for the support of which to provide for support scheme (CfD), where the market mechanisms are not sufficient.

2.4. Dimension internal energy market

2.4.1. Electricity interconnectivity

i. The level of electricity interconnectivity that the Member State aims for in 2030 in consideration of the electricity interconnection target for 2030 of at least 15%, with a strategy with the level from 2021 onwards defined in close cooperation with affected Member States, taking into account the 2020 interconnection target of 10 % and the following indicators of the urgency of action:

1) the price differential on the wholesale market exceeding an indicative threshold of EUR 2/MWh between Member States, regions or bidding zones;
2) the nominal transmission capacity of interconnectors below 30 % of peak load;
3) the nominal transmission capacity of interconnectors below 30 % of installed renewable energy production capacity.

According to the assessments of the Romanian transmission system operator, Romania meets the indicators for peak load (recording between 66 % and 75 % in the ratio between current interconnection and peak load capacities depending on the projection scenario) and installed renewable energy capacity (indicator ranging between 30 % and 44 % depending on the RES scenario).

Romania proposes to supplement the interconnection capacities by 2030 having regard to the cost-benefit analyses from the social-economic and environment viewpoint and projects where potential benefits exceed costs are to be implemented.

At the same time, Romania will also provide for the maximisation of the offered interconnection capacities under the primary and secondary law and by completing the projects related to the closure of the 400 kV national ring (internal lines).

The implementation of Projects of Common Interest (PCIs) and the completion of the other electricity transmission grid development projects, which are included in the Electricity Transmission Grid (ETG) Development Plan for 2018-2027, will significantly contribute to the achievement of an electricity grid interconnection rate of at least 15.4 % by 2030.

Moreover, CNTEE Transelectrica has developed an action plan in accordance with Article 15 of Regulation (EU) 2019/943 of 5 June 2019 on the internal market for electricity, which provides for a minimum available capacity for cross-border trade of 70 % of the transmission capacity, within the allowances of safety in operation after consideration of contingencies.

Therefore, having regard to the projects included in the ETG Development Plan for 2018-2027 and to the resulting estimations, Romania will reach an interconnection rate of at least 15.4 % of the total installed capacity by 2030.

2.4.2. Power transmission infrastructure

i. Key electricity and gas transmission infrastructure projects, and, where relevant, modernisation projects, that are necessary for the achievement of objectives and targets under the five dimensions of the Energy Union Strategy

The key electricity and gas transmission infrastructure projects are set out in Chapter 4.5.2.ii.

ii. Where applicable, main infrastructure projects envisaged in addition to Projects of Common Interest (PCIs)[23]

The main grid development projects (with the exception of PCIs), as communicated by CNTEE Transelectrica, are the following:

- overhead power lines (OPL) of 400 kV Porțile de Fier – Reșița (first stage of transition to 400 kV voltage on the route of Porţile de Fier – Reşiţa – Timişoara – Săcălaz – Arad);
- connection of OPL of 400 kV Stupina – Varna (Bulgaria) entry to – exit from the 400kV station in Medgidia through a 400 kV d.c. OPL;
- connection of OPL of 400 kV Rahman – Dobrudja (Bulgaria) entry to – exit from the 400kV station in Medgidia South through a 400 kV d.c. OPL;
- the second transformer of 250 MVA, 400/110 kV in the Sibiu South Station;
- connection of the 220 kV station in Ostrovu Mare (Porțile de Fier II hydro-power plant) entry to – exit from a circuit of a 220 kV d.c. OPL; Porțile de Fier – Cetate;
- the second autotransformer of 400 MVA, 400/220 kV in the Iernut Station;
- the second autotransformer of 400 MVA, 400/220 kV in the Brazi West Station;
- 400 kV d.c. OPL (1 equipped circuit) Smârdan – Gutinaș;
- 400 kV d.c. OPL Cernavodă – Gura Ialomiței – Stâlpu;
- transition to 400 kV voltage of OPL Brazi West – Teleajen – Stâlpu;
- 400 kV d.c. OPL (1 equipped circuit) Medgidia South – Constanța North;
- 400 kV d.c. OPL Reșița – Timișoara/Săcălaz – Arad (second stage of transition to 400 kV voltage on the route Porţile de Fier – Reşiţa – Timişoara – Săcălaz – Arad);
- 400 kV d.c. OPL Gădălin – Suceava;
- 400 kV d.c. OPL Suceava – Bălți;
- 400 kV d.c. OPL Stâlpu – Brașov (1 equipped circuit).

The development of smart energy systems, grids and storage outside the TEN-E will be sought for the optimum operation of the energy system. In this context, the following investment priorities have been identified:

- the digitisation of the national energy system on the transmission, distribution and consumption segments and the introduction of smart management systems and support measures for the gradual implementation of the smart city concept;
- strengthening of the electricity transmission and distribution grids in order to ensure the required technical parameters for good interconnection with the trans-European energy infrastructure for electricity;
- smart equipment and systems to ensure the quality of electricity;
- the implementation of digital solutions to contain breakdowns and to re-supply power to the rural and urban area;

[23] In accordance with Regulation (EU) No 347/2013 of the European Parliament and of the Council of 17 April 2013 on guidelines for trans-European energy infrastructure and repealing Decision No 1364/2006/EC and amending Regulations (EC) No 713/2009, (EC) No 714/2009 and (EC) No 715/2009 (OJ L 115, 25.4.2013, p. 39).

- digitisation of transformer stations and solutions for remote grid control - integration of stations in SCADA;
- implementation of solutions for storage of electricity in order to improve consumption and to recover major output fluctuations;
- increase in the available capacity for cross-border trade;
- measures to increase the adequacy of the national electricity grid in order to enhance the integration capacity for the energy produced from renewable sources, which is variable in nature.

The selected fields (applicable at transmission and distribution network level) will also be supported by providing for access to structural funds under the European Regional Development Fund (ERDF) and the Cohesion Fund (CF) under the new Multiannual Financial Framework 2021-2027.

2.4.3. Market integration

i. National objectives related to other aspects of the internal energy market such as increasing system flexibility, in particular related to the promotion of competitively determined electricity prices in line with relevant sectoral law, market integration and coupling, aimed at increasing the tradeable capacity of existing interconnectors, smart grids, aggregation, demand response, storage, distributed generation, mechanisms for dispatching, re-dispatching and curtailment, and real-time price signals, including a timeframe for when the objectives shall be met

Objectives concerning the promotion of competitively determined electricity prices

Romania aims at deregulating the internal energy and gas markets in order to ensure harmonisation with the Community acquis. The calendar proposes staged liberalisation to ensure that the impact of transition on the consumer is low, as much as possible. Moreover, the liberalisation measures are purposed to develop a legislative framework that is favourable for investments that will contribute to energy security, also enhancing the flexibility of the national energy system.

Therefore, Romania plans to complete the liberalisation of the electricity market by the end of 2020, and of the natural gas market by 30 June 2020.

Market integration and coupling

Aiming at achieving the priority objective of integration in the internal market, Romania will continue the process of integration of the day-ahead and intra-day electricity markets under the pan-European Single Day-Ahead Coupling - SDAC and the Single Intra-Day Coupling - SIDC, having regard to the methodology of implicit allocation of the cross-border flow-based capacities applicable to the CORE region (implementation term: according to the roadmaps of the projects implementing the provisions of relevant EU regulations), to which it belongs, and without opting out the early implementation of the NTC-based single coupling of electricity markets.

At regional level, one of Romania's strategic actions is still to ensure integration in the single day-ahead and intra-day coupling of markets (SDAC and SIDC) as a Member State, such approach emerging from the need to ensure compliance with EU regulations.

Moreover, Romania will continue to collaborate with the contracting parties of the Energy Community in the context of their accession to SDAC and SIDC, however this process will

depend on the evolution of the process of determination of market mechanisms in the Balkan area.

Smart grids

The digitisation of the Romanian energy system, including transmission and distribution grids (smart grids), plays an essential role in reducing own technological consumption (OTC) and in turning the Romanian energy market into a "fit-for-RES" market (by increasing the possibilities of integration of additional renewable energy production). In order to achieve this objective, Romania aims at implementing the smart grid concept, including by large-scale introduction of smart meters.

The introduction of smart measurement systems in the energy sector is a national priority as a first step in the digitisation of the infrastructure. Smart metering is recognised for its benefits for final consumers, utilities companies and the whole energy system, including benefits for the environment, by enhancing energy efficiency and the RES integration in the NES.

Aggregation

From 2020 onward, the day-ahead and intra-day markets are organised such as to ensure that all market participants can have access to the market individually or by aggregation. Final consumers may thus participate in organised electricity markets either directly or by aggregation if they have power above 500 kW approved in the connection certificate. If they have such approved power up to 500 kW inclusive, final consumers may participate in organised electricity markets excluding aggregation.

Mechanisms for dispatching, re-dispatching and curtailment

As regards the objectives concerning dispatchable consumption (demand response), Romania has already introduced a secondary legislative framework regarding:

- the obligation of TSO to offer dynamic transmission tariffs, at the request of final consumers connected to the ETG, from 2019 onward;
- the obligation of DSO to offer dynamic distribution tariffs, at the request of users or their suppliers, from 2020 onward.

ii. National objectives with regard to ensuring electricity system adequacy, as well as for the flexibility of the energy system with regard to renewable energy production, including a timeframe for when the objectives are to be met

The abovementioned objectives have been approached in Chapter 2.3. iv. The deadlines for achievement of the objectives depend on the updating and accuracy of the available information (in particular as regards the feasibility of proposed projects) and the timeframe for most of them is the trajectory set in the Governance Regulation (2022, 2025, 2027 and 2030).

iii. Where applicable, national objectives to protect energy consumers and improve the competitiveness of the retail energy sector

Romania has implemented all the legislative provisions entitling final consumers to choose/change their supplier without additional costs with prior notice of 21 calendar days. At the same time, suppliers are prohibited from withdrawing from the supply contracts.

As regards the treatment of complaints, the regulatory authority has implemented a series of legislative acts (e.g. performance standard for supply of electricity and natural gas) regarding

the management of relevant conflicts arising at the pre-contractual stage and during the implementation of contracts.

2.4.4. Energy poverty

i. Where applicable, national objectives with regard to energy poverty, including a timeframe for when the objectives are to be met

According to the European Commission's recommendations, Romania should define its objectives for energy poverty in accordance with the national specificity. Member States having a significant number of households in energy poverty must include in their integrated national energy and climate plans an indicative objective to reduce energy poverty.

According to the Eurostat data for 2019, Romania is listed in the lower third of the electricity price for household consumers in the EU. However, considering the relatively low purchase power, the affordability of the price is a prime issue that leads to a high rate of energy poverty.

In order to measure the energy poverty rate as accurately as possible at EU Member State level, the EU Energy Poverty Observatory provides for the use of main indicators and values are sourced in the Eurostat databases. The indicators for which sufficient data exists at country and EU level are the rate of arrears on utility bills and the inability to keep home adequately warm.

In Romania, 14.4 % of the households recorded arrears on utility bills in 2018. By comparison, the EU average was 6.6 % in the same year. The trend in the indicator for Romania and the EU for the period 2010-2018 is presented in the below table.

Table 13 - Arrears on utility bills [%], 2010-2018

	2010	2011	2012	2013	2014	2015	2016	2017	2018
EU average	9.1	9.0	9.9	10.2	9.9	9.1	8.1	7.0	6.6
Romania	26.5	27.3	29.7	29.7	21.5	17.4	18.0	15.9	14.4

Source: Eurostat, Arrears on utility bills - EU-SILC survey [ilc_mdes01]

The inability to keep home adequately warm is another indicator that quantifies the share of households with no such ability based on the question "Can you afford to adequately heat your home?". You may refer to the trend in the indicator for Romania and the EU for the period 2010-2018 in the below table.

Table 14 - Inability to keep home adequately warm [%], 2010-2018

	2010	2011	2012	2013	2014	2015	2016	2017	2018
EU average	9.5	9.8	10.8	10.7	10.2	9.4	8.7	7.8	7.3
Romania	20.1	15.6	15.0	14.7	12.9	13.1	13.8	11.3	9.6

Source: Eurostat, Inability to keep home adequately warm - EU-SILC survey [ilc_mdes01]

The comparison of indicators shows, on the one hand, the progress of Romania in the combating of energy poverty and outlines, on the other hand, the need to recover the lagging behind the EU average. The national objective in this regard is thus to reduce the energy poverty rate and to ensure the protection of the vulnerable consumer in order to safeguard human rights, considering that the EU average rate for 2015 was achieved.

The appropriate policies and measures for achieving the objective are set out in Chapter 3.4.4

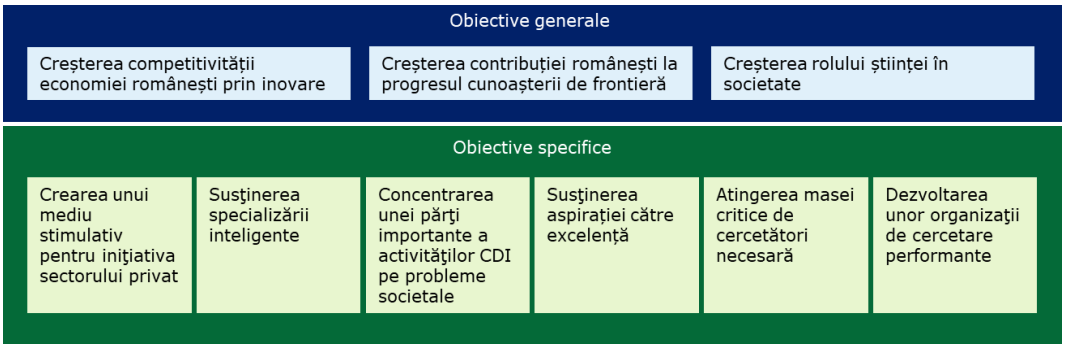
2.5.Dimension research, innovation and competitiveness

i. National objectives and funding targets for public and, where available, private research and innovation relating to the Energy Union, including, where appropriate, a timeframe for when the objectives are to be met

The Ministry of Education and Research does not have currently in place long-term plans until 2030. The preparation of the National Smart Specialisation Strategy for the programming period 2021-2027 is projected for the second quarter of 2020.

The national research and innovation targets are extracted from the National Research, Development and Innovation Strategy for 2014-2020.

Figure 3 - National research-development targets for the 2014-2020 timeframe



Source - The National Research, Development and Innovation Strategy for 2014-2020, as approved by Government Decision No 929/2014 of 21 October 2014, as amended by Government Decision No 81/2017

RO	***EN***
Creşterea competitivităţii economiei româneşti prin inovare	Enhancing the competitiveness of the Romanian economy by innovation
Creşterea contribuţiei româneşti la progresul cunoaşterii de frontieră	Increasing the Romanian contribution to the progress of border knowledge
Creşterea rolului ştiinţei în societate	Strengthening the role of science in the society
Crearea unui mediu stimulativ pentru iniţiativa sectorului privat	Creating a stimulating environment for the private sector initiative
Susţinerea specializării inteligente	Supporting smart specialisation
Concentrarea unei părţi importante a activităţilor CDI pe probleme societale	Focusing a significant part of the RDI activities on societal issues
Susţinerea aspiraţiei către excelenţă	Supporting aspiration to excellence
Atingerea masei critice de cercetători necesară	Reaching the necessary critical mass of researchers
Dezvoltarea unor organizaţii de cercetare	Developing performing research

performante	organisations

The Strategy targets were designed to reduce the gap between Romania and the existing potential and the EU average. They were premised on the fact that, by the end of 2020, public expenditure for research will increase to 1 % of the GDP according to the MEC strategy, in addition to the indirect aid granted to private companies. Nevertheless, the public funds allocation target in this sector will also be contingent upon the Governance Programme and the budget fiscal policy approved under the Budget Fiscal Strategy for the relevant period.

Table 15 - General targets of the Research-Development and Innovation Strategy for 2014-2020

Indicators	**Reference - 2011**	**Target for 2020**
Public expenditure for research-development (% GDP)	0.31	1
Number of Ph.D. degree holders (ISCED 6) in 1 000 inhabitants aged 25-34	1.4	1.5
Number of researchers in the public sector (full-time equivalent)	12 409	17 000
Scientific publications ranked among the 10 % publications in the world (% in total publications at country level)	3.8	7
International co-publications (number in 1 million inhabitants)	148	300
Risk capital (% of the GDP)	0.033	0.090
Research-development expenses in the business sector (% of the GDP)	0.17	1
Number of researchers in the private sector (full-time equivalent)	3 518	14 500
Public-private co-publications (number in one million inhabitants)	8.3	16
Share of innovative SMEs under cooperation (%)	2.93	6
Applications for patents at EPO (number per year)	40	120
Applications for patents at USPTO (number per year)	17	60
Applications for Community trademarks (number per one billion euros of the adjusted GDP to the purchasing power parity)	2.14	4

Indicators	Reference - 2011	Target for 2020
Booming innovative companies (No)	-	150
SMEs placing innovative products or services on the market (%)	13.17	20
Revenues from licences and patents abroad	0.13	0.17

Source - The National Research, Development and Innovation Strategy for 2014-2020, as approved by Government Decision No 929/2014 of 21 October 2014, as amended by Government Decision No 81/2017

Although the targets are not sized at sectoral level, the projected positive effects generated by the achievement of this strategy will also be reflected in the energy sector.

The research and innovation activity in the energy sector will also be supported by the strategic orientation of the transmission system operator. In the ETG Development Plan for 2018-2027, the operator established a preliminary list of specific research and innovation objectives, such as:

- innovation will be the driving force propelling the company to implement the "learning organisation" (Organizaţie care învaţă) concepts;
- innovation and research will support "Digitisation" as a major objective;
- research in the company will be focused on the development of national and international partnerships;
- enhancing "knowledge sharing" and learning from "best practices" at national and international level;
- streamlining the general and specific objectives with the methodology promoted under the ENTSO-E Strategy on research and innovation;
- the research and innovation works will be funded, as a priority, from own sources and from other sources, reaching the most consistent group of European network operators.

Starting from the general approach, the fragmentary trajectories have been clustered as follows:

Table 16 – Research and innovation objectives of the National Electricity Transmission Operator

Groups	Functional objectives	Comments
C1 – Modernisation of the energy system	T1 Optimal grid design	Planning, compatibility, tools
	T2 Smart asset management	Predictive maintenance and maintenance based on the technical condition of the equipment, CAPEX optimisation
	T3 New materials and technologies	New materials and construction and maintenance methods
	T4 Stakeholders and environmental challenges	Impact on the environment, public acceptance, participation of stakeholders
C2 – System security and stability	T5 Network observability	PMU, WAM, sensors, information exchange with DO
	T6 Controllability of the network	Stability of voltage and frequency, energy quality, synthetic inertia

Groups	Functional objectives	Comments
	T7 Expert systems and tools	Tools for decision-making support, automated control and expert systems
	T8 Reliability and elasticity	Protection and restauration plans, probabilistic approach, risk assessment, self-recovery
	T9 Consolidated auxiliary services	Consolidated auxiliary services for network operation, provision of cross-border services
C3 – Flexibility of the energy system	T10 Integration of storage solutions	Integration, definition and use of solutions, and their added value
	T11 Demand response	Demand response, tools used for the demand response, load profile, impact of electric vehicles
	T12 RES projection	Improvement of RES projections and optimal capacity operation
	T13 Flexible use of network	Dynamic assessment of equipment, power electronic equipment, use of interconnections
	T14 Interaction with the non-electrical energy grids	Interaction/coordination with other energy networks (gas, heat, transmission)
C4 – The cost-effectiveness and efficiency of the energy system	T15 Market-network integration	integrating the operation of the energy market with network operation in time
	T16 Business models	Areas such as energy storage, network extension, distributed generation for optimal network investments
	T17 Flexible market design	Flexible design for adequacy, flexible use, cross-border trade, rational use of RES, energy demand management
C5 – Information technology and telecommunications and digitisation of the energy system	T18 Data kept and processed in large amounts	Data management, extraction of data knowledge
	T19 Standardisation and data exchange	Standardisation, communication and data exchange protocols with distribution operators and other network operators
	T20 Internet of Things – using the Internet to connect various devices	New communication technologies to connect various devices
	T21 Cybersecurity	Cybersecurity

Source: Transelectrica ETG Development Plan for 2018-2027, Annexes

ii. Where available, national 2050 objectives related to the promotion of clean energy technologies and, where appropriate, national objectives, including long-term targets (2050) for deployment of low-carbon technologies, including for decarbonising energy and carbon-intensive industrial sectors and, where applicable, for related carbon transport and storage infrastructure

The main ministries involved in the transition process are currently preparing an assessment of the main decarbonisation vectors by 2050. In terms of renewable energy potential, Romania could opt for the use of hydrogen in industrial processes, considering that natural gas accounts for 34 % of the energy mix currently used in the industrial sector and its replacement with hydrogen from renewable sources or with a low carbon rate is a significant decarbonisation

method[24]. At the same time, the demand for heat at high temperatures constitutes almost 60 % of the industrial energy demand. Hydrogen is one of the energy carriers/low-carbon heat agents appropriate for generation of heat at high temperatures.

iii. Where applicable, national objectives with regard to competitiveness

The 2014-2020 National Competitiveness Strategy prepared by the Ministry of the Economy, Energy and the Business Environment sets forth five strategic priorities:

1. improving the regulatory environment;
2. partnership actions between the public and private environment;
3. support factors and services;
4. promoting the 10 future potential sectors;
5. preparing the 2050 Generation and societal challenges.

For the activities in the field of energy and research-development, the following are outlined:

Table 17 - Action plan and expected outcome in the framework of the National Competitiveness Strategy, which may be reflected in the energy sector, 2014 - 2020

Action lines	Expected outcome
2.1 Long-term institutionalisation of public-private industrial/technological/RDI foresight centres	○ Setting up regional competence centres to establish: the sectoral policy, the RDI agenda, support services for sectoral development depending on the relevant territorial specialisation
2.3 Consolidation and development of competitiveness clusters/poles	○ Contribution of clusters to total exports: 20 % in 2020
3.2 Research, development and innovation: Ensuring 1 % public funding which enables the triggering effect on the research demand in the private sector	○ Increasing the expenditure committed by the private environment for RDI to 1 % of the GDP by 2020 from the current 0.17 %
3.3 Supporting SMEs in order to launch innovative products or services through risk capital grants, collaborative projects	○ 20 % SMEs introducing innovative products and services in 2020 (from 13,17 % in 2011)
3.7 Reducing losses in the electricity distribution networks	○ Reducing primary energy consumption by 19 % in 2020 compared to 16.6 % in 2012
4.2 Enhancing the attractiveness of investments in the ten sectors with smart	○ Increasing the level of direct foreign investments in priority sectors by 5 % at aggregate level

[24] An assessment of the hydrogen use potential in Romania is described in the study "Opportunities arising from the inclusion of Hydrogen Energy Technologies in the National Energy and Climate Plans", prepared by Trinomics (2019) for the Commission

Action lines	Expected outcome
specialisation potential	

Source - The 2014-2020 National Competitiveness Strategy, Ministry of the Economy, Energy and the Business Environment

3. Policies and measures to achieve the proposed targets

In order to establish the policies and measures to achieve the proposed targets, account was taken of the main determinants for each dimension according to the table below.

Table 18 - Main determinants considered in the preparation of the policies and measures for each dimension

Dimension	Determinant in achieving targets
Decarbonisation - GHG emissions and removals	1. Reduction of GHG emissions with a focus on: • The energy sector • The transport sector • The residential sector • Industry • Agriculture and rural development • Urban development • Waste management • Tourism and recreational activities • Protection of air, soil, water and biodiversity quality • Public education and awareness raising 2. Increase in GHG removals in: • Forestry • Land use
Decarbonisation - renewable energy	1. Promoting the use of renewable energy in electricity production (RES-E) 2. Promoting the use of renewable energy in transport (RES-T) 3. Promoting the use of renewable energy in heating and cooling (RES-I&R)
Energy efficiency	Reduction of energy consumption in: 1. The energy sector 2. Industry 3. Residential 4. Transport 5. Tertiary sector
Energy security	1. Diversification of production sources and reduction of dependency on imports 2. Providing for the adequacy and flexibility of the energy system 3. Prevention and management of risks of disruption of energy supply
Internal energy market	1. Increasing the power transmission grids interconnection capacities 2. Liberalisation of energy markets 3. Regional integration of the internal energy market 4. Support measures for other dimensions
Research, innovation and competitiveness	1. Level of maturity[25] of technologies contributing to decarbonisation

Source: Deloitte analysis

[25] According to the classification described in Decision COM C(2014)4995

3.1. The decarbonisation dimension

3.1.1. GHG emissions and removals

i. Policies and measures to achieve the target set under Regulation (EU) 2018/842 as referred in point 2.1.1 and policies and measures to comply with Regulation (EU) 2018/841, covering all key emitting sectors and sectors for the enhancement of removals, with an outlook to the long-term vision and goal to become a low emission economy and achieving a balance between emissions and removals in accordance with the Paris Agreement

The national policies and action plans to reduce GHG emissions are a key element in the mitigation of effects of climate change on the environment, the economy and society. In order to support low-carbon green economic growth, EU has introduced ambitious climate and energy targets by 2030. The obligations of Romania as a Member State include participation in the EU-ETS emissions trading scheme. Moreover, emissions from non-ETS economic activities are regulated by Regulation (EU) 2018/842 and limited according to the values described in Chapter 2.1.1

On the other hand, Article 4 of Regulation (EU) 2018/841 provides that each Member State should ensure that emissions resulting from activities related to land use, change of destination of lands and forestry do not exceed removals. Implicitly, Romania will have to maintain balance between the use of forestry resources (which ensure removals) and extension of agricultural holdings, for example, to ensure food security.

The relevant policies and measures considered by Romania are described below and ordered by their interaction with other dimensions of the Plan: main vector in the trans-sectoral impact, secondary effect of measures pertaining to other dimensions and to the dimension concerned.

Trans-sectoral policies and measures

1) GHG emissions and removals - main dimension

- Promoting investments in new **low-carbon** power generation capacities

  The development of new electricity production capacities by 2030 is important, particularly considering that 80 % of the existing heat units are outdated[26] as well as the fact that, in 2017, the energy sector generated over 66 % of the GHG emissions[27] (excluding LULUCF), as accounted at national level. Romania thus plans to replace a significant capacity based on high-carbon sources[28] with new gas, nuclear energy and RES efficient low-carbon plants. This will be achieved also for heating in SACET district heating systems by transit of energy through NES and the use of heat pumps at source level, also relying on the electricity market mechanisms.

  In this context, the carbonisation plan proposed by CE Oltenia, which involves replacing and supplementing (by 2030) 1 260 MW in coal-based plants with 1 400 MW in natural gas plants and 300 MW of renewable energy (from solar energy) is also under

[26] The 2018 National Report, ANRE (31 July 2019), Chapter "Following up on the commissioning plan for new production capacities" (*Monitorizarea planificării punerii în funcțiune de noi capacități de producție*), pages 142/233
[27] The Fourth Biannual Report of Romania submitted under the UNFCCC (December 2019), page 9
[28] According to the 2018 National Report, "(…) Refurbishment and/or modernisation works were performed for heat unit from the NES, however not all of them are equipped with installations for reducing greenhouse gas emissions so as to enable compliance with the EU requirements on sulphur dioxide, nitrous oxide and emissions powders sourced in large burning installations", pages 142/233

debate)[29]. The implementation of this plan could generate a positive impact on CO_2 emissions in the production of electricity, considering that the emissions of natural gas plants are lower compared to those of coal-based heat plants[30]. Moreover, the refurbishment and construction of new nuclear units and the development of strategic projects by Hidroelectrica[31] (modernisation, refurbishment, and completion of main current investment objectives) will also contribute to the replacement of polluting capacities.

- Using the revenues from the **EU ETS Mechanisms and the Structural Funds** pertaining to the new Multiannual Financial Framework for 2021-2027 **for RES and energy efficiency projects at national and international level**

  Part of the revenues pertaining to the EU-ETS Mechanism (Modernisation Fund) and of the Structural Funds pertaining to the new 2021-2027 Multiannual Financial Framework, and those of the Just Transition mechanism will be committed to co-fund RES projects or to create financial instruments to guarantee loans used in the implementation of such projects, which will be conducive to the achievement of the 2030 target.

  Moreover, another part of the abovementioned revenues will be directed towards ensuring the resources required in energy efficiency projects and initiatives (example: establishing the National Energy Efficiency Fund).

- **Implementing the best available technologies (BAT)** in order to reduce greenhouse gas emissions and to increase energy efficiency in industrial processes

  The concept of best available techniques concerns the most efficient and advanced stage of development of activities and how to perform them, indicating particular techniques that may be used in order to mitigate emissions generated by these activities to the maximum extent possible (and thus these activities having a minimum impact on the environment).

- Romania aims at supporting the implementation of these techniques, including through the Innovation Fund, Horizon 2020 etc. with the direct effect of reducing emissions. This measure will also contribute to the increase in energy efficiency and will also be supported by research and development activities. For example, it involves supporting the private sector, SMEs, start-ups, research institutes, and universities to access Horizon Europe projects under the research, innovation and dissemination axes in order to implement pilot demonstration BAT projects with a high level of replicability; developing as a priority and fostering **the use of rail transport for passenger transport (to the detriment of road transport)** and its intermodal integration in other modes of transport. This is to be achieved by:
  - the implementation of the EU policy in the field of transport [document COM (2011) 144 - Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system], which concerns:
    - "30 % of road freight over 300 km should shift to other modes such as rail or waterborne transport by 2030, and more than 50 % by 2050 (...)"
    - "By 2050, complete a European high-speed rail network. Triple the length of the existing high-speed rail network by 2030"

[29] For more details on this project, see Section 3.3.i
[30] According to the latest available data (the ANRE Annual Report, 2017), the specific CO_2 emissions were 911.14 g/kWh for coal and 407.04 g/kWh for natural gas in 2017
[31] Annual Report of Hidroelectrica for 2018, Chapter 6.2 "Corporative Business Activity" *(Activitatea de afaceri corporative)*, page 56

  - "By 2050 the majority of medium-distance passenger transport should go by rail"
  - Achieving progress in the application of the "user pays" and "polluter pays" principles
- Enhancing **the quality of the underground transport service** by:
  - Purchasing new performing low-consumption and regenerative braking trains
  - Modernising the existing infrastructure (ventilation system in stations, the wheel tracks, electrical lines and lighting in stations, automation installations etc.)
  - Increasing the accessibility of metro stations (passage ways, access points, escalators, elevators)
  - Adapting traffic schedules by correlation with passenger traffic;
  - Integrating above-ground and underground public transport by implementing a charging system that is compatible with the other modes of public transport.
- **Developing/extending the metro network** in correlation with the mobility demand and the other modes of transport:
  - Improving access in Bucharest by public transport
  - Arranging park & ride places at entrances to Bucharest (at the ends of metro main routes) to take over passenger coming from neighbouring localities.

- Promoting **transition towards a circular economy by waste management policies and measures**[32]**:**

  - Identifying the administrative-territorial units which did not provide, in their sanitation contracts, for the separate collection of municipal waste in accordance with Article 17(1) of Law No 211/2011, as subsequently amended and supplemented, and informing the Ministry of the Environment thereof
  - Checking the implementation of the system of separate collection of municipal waste in administrative-territorial units where sanitation contracts including such obligation are in place
  - Using waste treatment installations built under the Integrated Waste Management System projects
  - Launching a public procurement procedure in order to develop information and awareness campaigns at national level on prevention, separate collection and recovery of municipal waste
  - Local treatment of waste throughout the county in which it was generated
  - Establishing centres to prepare municipal waste for reuse - at least one centre in each county/sector of Bucharest Municipality
  - Extending the system of separate collection of recyclable waste, biowaste, green waste
  - Extending sorting capacities
  - Building composting plants, anaerobic digestion plants for mechanical-biological treatment with bio-drying
  - Integrating existing waste treatment plants
  - Closing down all non-compliant landfills

[32] According to the presentation of the National Waste Management Plan and the National Programme for Prevention of Waste Production, February 2019, which is available at http://www.mmediu.ro/app/webroot/uploads/files/2019-03-14_SIPOCA%2021%20-%20Prezentare%20PNGD.pdf

- Building compliant landfills in the counties where the Integrated Waste Management System projects have not been implemented yet and extending the existing landfill capacities
- Improving the existing legislative framework in the field of waste management
- Enhancing the institutional capacity of the institutions in charge with the management and monitoring of waste management
- Monitoring and controlling the activities involving waste management
- Organising citizen information and awareness campaigns on the benefits of the recycling activity
- Fostering energy symbioses between SACETs and the proximity industry. Example: in Cluj-Napoca City, under a pilot demonstration project under the SPIRE axis of Horizon 2020 (circular economy) the residual heat (which is now discharged through the chimney of ovens) from a local factory (producing floor and wall tiles) will be recovered and introduced into the district heating system of the city to heat households, which results in substantial GHG savings.

2) GHG emissions and removals - secondary dimension

The reduction of GHG emissions/increase of GHG removals may be ensured by adopting measures aimed at achieving the targets set for the other dimensions. These are trans-sectoral measures and are detailed under the dimensions that concern them directly. Specifically, the measures described under other dimensions, which also contribute to the reduction of emissions/increase of removals of GHG by 2030, are set out below; details about them may be found in the section of policies and measures (Chapter 3) of the respective dimension.

- Decarbonisation - the renewable energy component
  - ✓ Promoting **electromobility in road transport** (light vehicles and urban public transport)

    Electromobility contributes to the reduction of GHG emissions, which is particularly important taking into account the fact that a significant share of GHG emissions (excluding LULUCF) generated in Romania (over 14 %) come from the transport sector (over 20 % of CO_2 emissions)

  - ✓ Promoting the use of **biofuels in transport** (further use of conventional fuels and introduction of advanced fuels in road transport)

    Similarly to electromobility, the use of biofuels has beneficial effects by reducing GHG emissions from the transport sector

- Energy Efficiency:
  - ✓ Implementing the draft **Long-term Renovation Strategy (LTRS)**

    The reduction in consumption of energy in the residential and tertiary sector (governmental buildings, public buildings, office buildings) will contribute to the reduction of GHG emissions in the same sectors.

  - ✓ Increasing **energy efficiency in the industrial sectors** regulated by **EU-ETS**

    The reduction in energy consumption in the industrial sector will contribute to the reduction of GHG emissions in the sector.

  - ✓ Developing and promoting **alternative mobility**

Reducing GHG emissions by developing and promoting alternative mobility methods (e.g. bicycles, scooters etc.) as these methods pollute significantly less than road transport (conventional fuels)

- ✓ **Renewing the vehicle stock**

  Reducing GHG emissions by maintaining a stock of efficient motor vehicles (Euro 6) or electrically-propelled vehicles and by the possibility of prohibiting registration of motor vehicles with Euro 3 and Euro 4 pollution standard

- Energy security:
  - ✓ **Implementation of the Decarbonisation Plan of CE Oltenia**

    The new solar energy capacities have a positive impact on the reduction of GHG emissions as these technologies are not operated on fossil fuels and, implicitly, do not produce GHG emissions (compared to the coal-based plants they replace). Moreover, replacement of coal-based capacities with gas capacities contributes to reduction in emissions in the transition period.

  - ✓ Developing **high-efficiency cogeneration** projects

    High-efficiency cogeneration is a method of production of electricity and heat which enables to reduce polluting emissions.

- Research, innovation and competitiveness
  - ✓ Adopting **advanced technologies** in the energy sector

    As regards reduction of GHG emissions, the adoption of advanced technologies may bring its contribution through the implementation of carbon sequestration solutions and the development of energy production capacities without emissions and of new storage capacities.

    The implementation of pilot and demonstration projects promoting use of hydrogen in the production of electricity and in the industrial sector will also be facilitated.

Other policies/measures pertaining to the dimension

The main objectives of Romania to achieve the GHG reduction target are: to reduce GHG and NOx emissions, to ensure the sustainable development of the national energy sector, with protection of air, water, soil and biodiversity quality, and to combat climate change. The policies and measures thus proposed for each sector in the Romanian economy, which lead to the achievement of the abovementioned priority objectives, are listed below:

The energy sector

The energy sector may contribute significantly to the decarbonisation of the Romanian economy. In this respect, the policies and measures currently proposed in this sector are:

- Applying **more restrictive conditions** for the conduct of business by companies in the energy sector

  The current activities and the projects of the companies in the energy sector must comply with the environmental law and apply the best international environmental protection practices.

- **Further reducing air, water and soil pollutants,** as established by the law applicable to the energy sector
- **Co-financing projects that concern decarbonisation technologies and processes**, which are funded under the new EU-ETS support mechanisms (e.g. the Innovation Fund).
- Preparing regulations to overcome the obstacles to the achievement of private investments

The transport sector

The policies and measures required to achieve the decarbonisation targets also concern the transport sector because it has a significant share in the total emissions (over 10 % of the total GHG emissions at national level are currently generated by this sector). The decarbonisation measures of the transport sector are thus:

- **Restricting traffic of conventionally fuelled vehicles in city centres in order to improve air quality**

  Adoption of measures to restrict the access of polluting vehicles to city centres. For example, a measure is likely to be introduced from 2022 onward to prohibit access to the capital centre for non-Euro, Euro 1 and Euro 2 vehicles, whereas the restriction for Euro 3 would be applicable from 2023 onward.

  Moreover, the annual fee for ownership of motor vehicles is likely to be revised upwards for non-euro, Euro 1 and Euro 2 motor vehicles or fees for electric vehicles are likely to be reduced/removed.

- Promoting **development of production and of the infrastructure required for penetration of alternative fuels, including LPG, CNG and LNG** through measures such as[33]:
  - Developing two LNG terminals in the Galati river port, which can provide for a large range of distribution: LNG bunkering for inland waterways and sea-going ships, the LNG supply for road transport and industries, and in the Constanta sea port, which includes a storage facility, charging units for sea-going ships and fuel supply to inland waterways ships
  - Revising, supplementing and streamlining the legislative framework designed for authorisation of LPG refuelling stations to provide for adequate environmental protection standards and to ensure adequate monitoring of the LPG supplied to conurbations
  - Establishing a more efficient monitoring system for vehicles equipped with LPG units after type approval
  - Assessing the opportunity to amend the legislative framework intended for the record-keeping of vehicles equipped with LPG systems
  - Revising, supplementing and streamlining the legislative framework designed for authorisation of CNG refuelling stations to provide for adequate environmental protection standards and to streamline rules on the road vehicle refuelling procedure
  - Revising, supplementing and streamlining the legislative framework intended for refuelling vehicles and ships using LNG under conditions of safety and environmental protection
  - Performing an assessment of the development of the LNG infrastructure, which will envisage economic feasibility and the proportionality of the costs with reference to benefits, including environmental ones

[33] According to the National policy framework for alternative fuels market development in the sector of transportation and the deployment of the relevant infrastructure in Romania

  - Assessing the opportunity to include vehicles using CNG and LNG in the *Programme for reducing greenhouse gas emissions in transport by promoting non-polluting and energy-efficient road transport vehicles*
  - Assessing the opportunity to establish financial instruments (such as guarantee funds, bonds, public-private partnerships) available to legal persons which intend to develop fuelling stations, and for purchase of vehicle stocks using alternative fuels

- Implementing standards for CO_2 emissions in light passenger transport: passenger cars (reduction by 37.5 % in 2030 compared to 2021) and utility vehicles (reduction by 31 % in 2030 compared to 2021) in accordance with Regulation (EU) 2019/631
- Implementing standards regarding CO_2 emissions in heavy transport under Regulation (EU) 2019/1242 - reducing emissions generated by the entire heavy vehicle stock by 15 % in 2020 and by 30 % in 2030, both compared to the EU average in the reference period (1 July 2019 - 30 June 2020)
- Introducing strong economic incentives for a green transport system through price instruments
- Extending the smart transport management systems in large cities
- Developing the cycling infrastructure
- Lowering the level of pollution, including sound pollution, in urban centres
- Establishing a route for crossing Romania, which has minimum impact on the environment
- Raising awareness of the benefits of environment-friendly transport

The residential sector

Decarbonisation of the residential sector will be achieved by:

- Developing **mandatory quality standards** for energy conservation and improved energy efficiency, including heat insulation, lighting, use of air conditioning etc.
- Attracting **investments in the network infrastructure** to encourage heating from electrical sources
- Preparing **information campaigns** to define the emissions caused by various types of equipment or properties
- Identifying specific actions **to encourage the use of LED/smart lights** instead of the conventional ones
- Imposing an obligation for new buildings in the property/administration of the public administration authorities, which are to be **subjected to the acceptance procedure under the construction permit issued after 31 December 2020, to be nearly zero-energy buildings**
- Implementing the draft law amending and supplementing Law No 372/2005 on the energy performance of buildings, which provides **for an increase in the obligation to cover consumption of primary energy from RES from 10 % to 30 %**
- Promoting **the use of electricity in heating**, in particular in households in the semi-urban and rural area, where the investment in high-efficiency air-soil heat pumps can be justified economically
- Further deploying the **Casa Verde Plus Programme**
- Promoting the use of renewable energy in the residential and tertiary sector by implementing the draft Long-term Renovation Strategy issued by MLPDA, including installation of heat and solar panels, as indicated in the abovementioned strategic document
- Promoting cooperation among the various stakeholders (municipalities, utilities companies, consumers etc.) to identify the adequate solutions and to streamline their objectives regarding decarbonisation of the residential sector

Industry

The measures in the industrial sector are:

- **Reducing the intensity** of carbon emissions in the industry
- Exploring the voluntary approaches, trading emissions and related taxes
- Organising **training courses** on the efficient use of resources and clean production
- **Financial incentives for the staff specialised in the efficient use of resources**
- Setting up/developing industrial parks operating under the principle of industrial symbiosis or fostering existing ones
- Developing regional clusters for sustainable energy planning and use of smart energy in SMEs
- Supporting green production processes and the efficient use of resources by SMEs;
- Rehabilitating contaminated industrial sites to protect the air, water, soil and biodiversity quality

Agriculture and rural development

In the agricultural and rural development sector, the below measures are purposed to reduce GHG and NOx emissions and to combat climate change:

- Supporting **investments for modernisation of holdings**
- Promoting **good agricultural practices**
- Promoting **carbon sequestration in agriculture**
- Rehabilitating and modernising the irrigation and draining infrastructure
- Adequately managing agricultural lands for adaptation to the effects of climate change

Urban development

- Promoting **more condensed development measures**, with combined utility, which are focused on transit activities as a mean to reduce distances covered by motor vehicles, to develop the infrastructure and to reduce maintenance costs
- Promoting the improvement of energy efficiency in buildings and in major urban infrastructure systems
- Promoting "**smart cities**" and "**green cities**"

Waste management

- Promoting **waste generation prevention**
- Increasing the rate of reuse or recycling of materials included in the waste flow, reducing the amount of material to be managed as waste by promoting industrial symbiosis processes, and applying the concept of efficient use of resources in sustainable waste management
- Separate collection of biodegradable waste and its composting
- Managing commercial, industrial and hazardous waste
- Managing domestic waste: measures for prevention, minimisation, sorting, recycling, biological-mechanic treatment, heat treatment
- Strengthening and extending integrated waste management systems, including recovery of energy from waste

Forestry

In the forestry sector, the below measures are purposed to reduce GHG and NOx emissions and to combat climate change:

- **Extending the forested areas** and other lands covered by forest vegetation by:

  - Identifying and including in the national forestry fund the forest vegetation that meets the classification requirements for forests, including by setting up owner co-interest mechanisms
  - Identifying lands that are unfit for agricultural use and their forestation
  - Establishing the national system of forest protection barriers
  - Providing for the forest reproductive material
  - Promoting measures for afforestation of degraded lands and for establishment of forest barriers

- **Harmonisation of the national system of indicators** for sustainable management of forests by:
  - Permanently updating the indicators for sustainable management of forests in the European and national context
  - Implementing the "National forest programme and its correlation with the indicators for sustainable management of forests"

- **Conservation and improvement of biodiversity** of forest ecosystems by:
  - Identifying and preserving primeval and quasi-primeval forests, riparian forests, forest habitats and rare endangered species
  - Protecting the biological diversity of the forest ecosystems and of forests with natural and quasi-natural structures
  - Ensuring the conservation of marginal habitats, of humid areas on lands covered by forest vegetation, and of protected or vulnerable species
  - Developing a compensation system for the restrictions imposed by the requirements of the Natura 2000 network to ensure sustainable management of forests in the nature protection areas.

- **Permanent adaptation of forests to climate change** by:
  - Adapting forest regeneration practices to the needs entailed by the climate change
  - Permanently adapting the forest management system in order to improve their capacity of adaptation to climate change
  - Maintaining and improving the system of monitoring and observation of the action of destabilising biotic and abiotic factors
  - Promoting natural regeneration by applying adequate intensive and semi-intensive treatments
  - Promoting diversified compositions, with a focus on conservation and recovery of genetic biodiversity of forest species with ecological requirements compatible with stational conditions
  - Recovering the de-structured forests from the effects of climate change
  - Selecting and promoting tree biotypes that are resistant/adapted to climate change and extending their use to forest regeneration works

- **Development of the national forest fund management system** by:
  - Increasing the rate of forest fund included in the forest arrangements
  - Promoting certification systems that are compatible with the management practices adopted at national level
  - Permanently monitoring the application of forest arrangement provisions

- **Assessment and monitoring of eco-systemic functions and services provided by forests and forest resources** by:
  - Establishing the national forest inventory
  - Preparing/improving the methodologies for quantification of the value of eco-systemic functions and services provided by the forest; designing a payment system for eco-systemic services

  - Increasing the capacity of forests to store carbon in the context of sustainable forest administration, creating the framework for recovery of carbon stocks

- **Extension** of the integrated system **arrangement of torrential hydrographic basins** by:
  - Creating an integral and integrated system of torrential hydrographic basins to mitigate the effects of natural calamities
  - Permanently monitoring the status of works for correcting torrents from the national forest fund

- **Increase in the accessibility of the national forest fund** by:
  - Increasing the thickness index for forest transport routes
  - Improving the accessibility of arboreta
  - Rehabilitating/recovering forest transport routes affected by natural calamities
  - Adapting the forest road network to the current technical characteristics of the forest means of transport
  - Promoting construction of ridge forest roads

- Development of the **integrated forestry information system** by:
  - Achieving the interoperability of the forestry information system
  - Optimising the SUMAL subsystem; establishing interconnection with users' information systems
  - Improving the subsystem of forestry statistical indicators

- Extension of technically, ecologically and economically performing **wood harvesting technologies** by:
  - Fostering acquisition and use of performing wood harvesting technologies that have a low impact on the environment
  - Restricting the use of environment-aggressive technologies

- Increasing **the contribution of the forest sector to rural development**
  - Using, as a priority, goods and services provided by the forest to the benefit of local communities
  - Involving local communities in forest decision-making and protection processes

Protection of air, soil, water and biodiversity quality

- Reducing the greenhouse gas emissions in the water supply and wastewater treatment sectors
- Waste water collection and treatment
- Air quality and noise reduction measures
- Rehabilitating the contaminated industrial sites
- Assessing the vulnerability of natural habitats and of protected flora and fauna species based on the conservation monitoring system
- Maintaining and increasing the resilience of ecosystems
- Increasing the biodiversity's capacity to adapt to climate change by promoting adaptive management
- Assessing the services provided by ecosystems and implementing the eco-systemic approach in the decision-making systems
- Improving/developing knowledge and understanding of the role and contribution of biodiversity to adaptation to climate change
- Protecting, restoring and ensuring sustainable use of Natura 2000 sites
- Protecting nature and biodiversity, and green infrastructure

Tourism and recreational activities

- Protecting and extending recreational natural areas in localities and to their outskirts
- Strategic planning for developing tourist destinations that are less dependent on climate change
- Long-term planning for seasonal green mountain resorts
- Adapting and protecting seaside tourism, in terms of infrastructure, from climate change
- Long-term development planning, policies and education for tourism to take into account the consequences of climate change
- Protecting, developing and promoting the natural heritage and eco-friendly tourism

Public health and emergency response services

- Developing the national capacity for surveillance of events caused by various factors, which have an impact on public health
- Using impact functions for the ongoing assessment of public health
- Protecting the citizens' health from the effects of calamities by strengthening the national emergency management system

Public education and awareness raising

- Increasing public information and awareness of the impact of climate change and of energy efficiency, and adapting to them by introducing courses in the educational curricula, which are designed to ensure the understanding of climate change, energy savings and related activities
- Improving the citizens' education on reduction of greenhouse gas emissions and adaptation to climate change
- Increasing investments in equipment and know-how to reduce single energy consumption
- Implementing an evaluation and monitoring system for the effects of social and economic development and coordinating measures to enhance bio-capacity, including for reducing the environmental footprint of Romania
- Implementing mobility schemes at macro-region level for good practices transfer, investment programmes for shared use of services (soft cooperation)

Insurance as a tool in adapting to climate change

- Increasing the use by and access of various vulnerable groups (natural persons in poverty, farmers, SMEs) to insurance products against extreme events
- Enhancing the institutional capacity of the insurance sector in order to develop insurance products destined for adaptation to climate change
- Measures for adaptation to climate change, climate-related risk prevention and management: floods, heavy rainfalls, fire and draught (including awareness raising, civil protection and disaster management systems and infrastructures) Preparing and updating risk maps for each case and strengthening the dedicated institutional capacity, for example the Meteorology Administration Authority (*Administrația de Meteorologie*), to obtain territorial data regarding temperatures, rainfall, water flow rate etc.
- Preventing and managing non-climate risks (e.g. earthquakes) and risks related to human activities (e.g. technological accidents), including awareness raising, civil protection and disaster management and infrastructure systems
- Ultraperipheral regions: support to offset the additional costs due to weather conditions and assistance difficulties

ii. Where relevant, regional cooperation in this area

In accordance with Article 5(4)-(7) of *Regulation 2018/842/EU*, Romania could transfer part of the annual emission allocation in the sectors outside the scope of ETS. Such transfers may be achieved under bidding procedures, by relying on market intermediaries acting as agents or under bilateral agreements.

iii. Without prejudice to the applicability of State aid rules, financing measures, including Union support and the use of Union funds, in this area at national level, where applicable

For a presentation of the financing sources for the proposed policies and measures, see Chapter 5.3.i.

3.1.2. Renewable energy

i. Policies and measures to achieve the national contribution to the binding 2030 Union target for renewable energy and trajectories as referred to in point (a)(2) Article 4, and, where applicable or available, the elements referred to in point 2.1.2, including sector- and technology-specific measures[34]

Having regard to the objectives proposed by Romania for 2030 (set out in Chapter 2) and to the current domestic background (including existing limitations), the priorities regarding the policies and measures promoting the use of renewable energy should aim at increasing the share of renewable energy in the production of electricity and in transport.

The main policies and measures targeted by Romania in order to achieve the renewable energy target in 2030 will be focused on adapting the primary and secondary legislative framework by compliance with the new relevant directives and regulations.

Trans-sectoral policies and measures

1) Renewable energy - main dimension

Policies and measures to promote the use of renewable energy in transport (RES-T)

Road transport

The promotion of **use of alternative fuels in road transport** will generate secondary effects, in addition to contribution to the achievement of the RES-T target set for 2030, namely reduction of GHG emissions in the transport sector and increased energy efficiency (by promoting electromobility as electric vehicles involve lower energy consumption compared to conventional sources). Specifically, the measures proposed by Romania in this sector are:

- **Promotion of electromobility** (light vehicles and urban public transport) by:
  - **Preparing a plan for the implementation of public charging networks** and fostering private infrastructure development investments through an incentive mechanism
  - **Deploying recharging stations for electric vehicles**

[34] When planning those measures, Member States shall take into account the end of life of existing installations and the potential for repowering.

A first measure in the promotion of electromobility in road transport, as proposed by Romania, is the long-term deployment of the electric vehicle charging infrastructure in parking areas and maintenance and coordination centres (MCCs) on the Sibiu-Pitesti Motorway.

Moreover, a need has been identified to initiate the procedures required for the conclusion of road area use contracts in order to deploy charging stations for electric vehicles on the sections Nădlac–Timișoara–Sibiu and Pitești–Bucharest on Motorway A1 and on the section Bucharest–Constanța on Motorway A2; the documentation of the public procurement action is currently under development. 20 locations are proposed for deployment of charging stations, which will comply with the rules of Annex 3 to Government Decision No 87/2018.

The financing sources identified for the implementation of these measures are the Environmental Fund, which is managed by AFM - financed programmes - Programme for reducing greenhouse gas emissions in transport by promoting the infrastructure for energetically non-polluting road transport vehicles: recharging stations for electrical and electrical hybrid plug-in vehicles and EU Funds: ERDF, CF under LIOP.

In the programmatic period 2014-2020, actions are funded through the Connecting Europe Facility - CEF, which concern the creation of sustainable alternative fuel networks, the implementation of the alternative fuel network on the main segments of the central TEN-T network being thus initiated at national level.

Moreover, Romania will implement the requirements of Directive (EU) 2018/844[35], which provides for measures to support the deployment of the recharging infrastructure, such as:

- Deploying at least one recharging point and the ducting infrastructure (conduits for electric cables) for at least one in every five parking spaces for all **non-residential buildings** with over twenty parking spaces (to enable the installation at a later stage of additional points) by 1 January 2025
- Deploying the conduits for electric cables for all new **residential buildings** and buildings undergoing major renovation, with more than ten parking spaces subject to the Directive requirements.

- Further applying **tax reductions and exemptions** for the purchase and use of electrical or hybrid vehicles, in particular for companies' fleets

For example, the Bucharest Municipality adopted in 2016 the exemption from the payment of the parking fee in public parking areas for electrical and hybrid vehicles registered in Bucharest. This specific measure may be also be adopted by other localities in Romania.

Moreover, the exemption from the payment of the ownership tax for electric vehicles will be further applied: 100 % exemption for fully electric vehicles and 50 % for hybrid vehicles.

[35] Directive (EU) 2018/844 of the European Parliament and of the Council of 30 May 2018 amending Directive 2010/31/EU on the energy performance of buildings and Directive 2012/27/EU on energy efficiency

- Further granting governmental subsidies for the purchase of electrical and hybrid vehicles

  An example in this respect is the continuation of the "RABLA Plus" Programme, according to which subsidies of RON 45 000 are granted for the purchase of fully electric vehicles and RON 20 000 for the purchase of hybrid vehicles with maximum emissions of 50 g of CO_2/km for persons domiciled and/or residing in Romania.

- **Preparing regulations to support stakeholders interested in investing in the electromobility infrastructure**
- Imposing an attractive tariff for new applications in the electricity area, such as electrical mobility, which reflects the current purchase cost and the system costs; it must deliver an attractive level of profitability and to guarantee economic sustainability
- **Introducing high and strict environmental fees to limit the purchase of used vehicles**
- **Introducing special traffic lanes for means of public transport and electric vehicles**
- Preparing municipal regulations to organise restricted access parking spaces, thus securing a charging space for owners of electric vehicles who do not have their own garage
- Preparing actions to promote the importance of electromobility, which are harmonised with the long-term decarbonisation objectives
- Fostering investments in the development of the processing industry, RES equipment, energy efficiency and electromobility by **establishing support measures** including research and common standards and by **developing the infrastructure required for electrical and hybrid vehicles**
- Extending and upgrading the urban public transport with eco-friendly means of transport such as trolleybuses, tramways, the metro and underground rail networks

- **Promotion of the use of biofuels** (increase in the share of first and second generation biofuels) by:
  - **Fostering investments in co-processing installations in refineries** (production of regenerable and sustainable Diesel in accordance with the RED II Directive and the EN 590 standard)
  - Fostering investments in **advanced ethanol production**
  - Fostering investments in co-processing installations in refineries (production of regenerable and sustainable Diesel in accordance with the RED II Directive and the EN 590 standard)

2) <u>Renewable energy - secondary dimension</u>

Long-term production of renewable energy may be secured by developing the infrastructure to increase the renewable energy production capacity, by developing feasible market mechanisms and by transforming transmission and distribution networks, taking into account modernisation and digitisation projects. These are trans-sectoral measures and are detailed under the dimensions that concern them directly. Specifically, the measures described under other dimensions, which also contribute to the achievement of the RES share by 2030 are set out below; details about them may be found in the section of policies and measures (Chapter 3) of the respective dimension.

- Decarbonisation - the GHG emissions and removals component:

- ✓ Promoting investments in **new low-carbon power generation capacities – RES-E**

  The replacement of existing capacities producing electricity from conventional resources with low-carbon capacities will also culminate with the promotion of renewable sources in the production of electricity (e.g. wind, solar resource).

- ✓ **The possibility of using the revenues from the EU ETS Mechanisms and the Structural Funds pertaining to the new Multiannual Financial Framework for 2021-2027 for RES** and energy efficiency projects at national and international level **– global RES**

  The revenues from the EU ETS Mechanisms and the Structural Funds pertaining to the new Multiannual Financial Framework for 2021-2027 may be used to fund RES projects.

- ✓ **Priority development and fostering the use of rail transport for transportation of passengers** (to the detriment of road transport) and its intermodal integration with other modes of transport **– RES-T**

  The fostering of rail transport to the detriment of road transport will contribute to the achievement of the RES-T target for 2030 due to the increased use of electricity in this mode of transport; this is particularly important considering the achievement of the RES-E target for 2030 (which entails a higher share of energy from renewable sources than the present one).

- Energy Efficiency:
  - ✓ Implementing the draft **Long-term Renovation Strategy (LTRS) – RES-E and RES-H&C;**

    The draft LTRS involves, in addition to renovation of buildings in order to increase energy efficiency, the adoption of RES technologies, such as installation of heat solar panels, photovoltaic panels and heat pumps, which will contribute to the achievement of the RES-E and RES-H&C targets for 2030.

    The measures related to the increase in the use of renewable energy for heating and cooling and in the production of electricity, which are set out in the LTRS, are detailed in Section "Other policies/measures pertaining to the dimension" of this Chapter[36].

  - ✓ **Increasing energy efficiency** in the industrial sectors regulated by EU-ETS **– RES-E**;

    The development of electricity production facilities by industrial consumers will contribute, in addition to the increase in energy efficiency, to the increase in the share of renewable energy.

- Energy security:
  - ✓ Fostering the development of **energy storage capacities – RES-E**

[36] Those regarding the RES increase in the production of electricity are found in Section "Policies and measures to promote the use of renewable energy in the production of electricity (RES-E)" - "b. Increase in RES-E in the residential sector and fostering prosumer development" and those regarding the RES increase in heating and cooling are included in Section "Policies and measures to promote the use of renewable energy in heating and cooling (RES-H&C)"

The development of energy storage capacities will contribute to the integration of RES in NES, considering their intermittent/variable nature. Specifically, the storage capacities will contribute to the reduction of gaps between the demand and offer of electricity.

- ✓ Implementing demand response measures **– RES-E**

  The implementation of demand response measures will contribute to the integration of RES into the NES by reducing/moving consumption at peak hours (towards no-load hours) and providing for the final consumer's possibility to participate (as a prosumer) in the electricity market.

- ✓ Implementation of the Decarbonisation Plan of CE Oltenia

  The development of the new solar energy capacities mentioned in the Decarbonisation Plan will contribute to the achievement of the RES-E target and will ensure diversification of energy sources. In addition, the change from coal plants into (transition fuel) gas plants will balance the system, which is necessary for the integration of RES into the NES.

- Internal energy market:
  - ✓ **Digitalisation** of the Romanian energy system **– RES-E**

    The development of smart meters and networks will also contribute to greater integration of RES in the NES.

    The development of smart meters and networks will also contribute to greater integration of RES in the NES.

    The benefits of smart meters will consist in identification of the final consumption profiles of final consumers and thus increase in the predictability of electricity sales.

    Moreover, digitalisation will be conducive to an increase in RES through the development of smart grids because they enable bidirectional communication; for example, the energy from renewable resources could be fostered by implementing Grid-to-Vehicle and Vehicle-to-Grid technologies (development of electromobility - RES-T).

    Furthermore, digitalisation of the energy system will be essential for the safe functioning of smart meters and grids, ensuring protection against cyberattacks.

  - ✓ Developing a support mechanism of the **Contracts for Differences (CfD)** type **– RES-E**

    The implementation of the "Contracts for Difference" mechanism will provide support to achieve the RES targets for 2030 by bringing about the security and stability of producers' revenues.

    The RES support scheme will only be applied in the context of procurement procedures organised in order to achieve the targets which Romania is to undertake under the INECP for 2030.

- ✓ **Concluding long-term power purchase agreements with clients (PPA)** outside centralised markets

  Enabling the conclusion of long-term contracts between project developers/electricity producers and consumers. Such type of contract contributes to an increase in the use of energy from renewable resources in the light of the fact that it secures the return on investment for developers/producers of renewable energy.

  Moreover, it provides the consumer with the opportunity of negotiating their contract directly with the electricity producer, at the same time being independent and secured against energy price fluctuations in cases of high demand.

- ✓ Bringing **the mechanisms/rules applicable to the electricity market** in line with the provisions of the "Clean energy for all Europeans" legislative package **– RES-E**

  The implementation of the "Clean energy for all Europeans" legislative package will result in the promotion of the use of energy from renewable resources as it entails adaptation of market conditions and removal of legislative barriers in order to facilitate integration of renewable energy in the NES.

- Research, innovation and competitiveness
  - ✓ Adopting **advanced technologies in the energy sector – RES-E, RES-T and RES-H&C**;

    The adoption of the advanced technologies will be conducive to the achievement of the RES target through: development of solar and wind power plants, development of storage capacities and digitalisation of the energy system.

  - ✓ Fostering investments in **the development of the RES equipment manufacturing industry and electromobility – RES-E, RES-T and RES-H&C**

    Scientific research in the RES area and the fostering of investments in the development of these solutions will contribute to the achievement of the target proposed for 2030 in this respect.

Other policies/measures pertaining to the dimension

Policies and measures to promote the use of renewable energy in electricity production (RES-E)

In order to promote the use of renewable energy in the production of electricity, the existing fossil fuel plants to be decommissioned will have to be replaced with other new renewable energy capacities. The development of these RES capacities will be based on a market design by implementing policies establishing a special regulatory framework and by opening up new outlooks for the prosumer.

a. Additional taxation on imports of electricity from non-EU countries

In order to foster the development of RES-E capacities and to ensure supply with green energy, a possibility is assessed at EU level to introduce additional taxes on the electricity imported from non-EU countries to EU Member States in order to create a barrier and not to

lead to price distortion and to unfair competition between the EU Member States, which have engaged in the reduction of greenhouse gas emissions (and which will have to substantially invest in this process), and non-EU countries which do not have the same obligations (including participation in the EU-ETS). These taxes may be used to develop RES capacities in EU Member States in order to contribute to the achievement of the proposed target by 2030.

b. Increase in the RES-E in the residential sector and fostering prosumers' development

The draft Long-term Renovation Strategy (LTRS), which was initiated by the Ministry of Public Works, Development and Administration (MLPDA), includes a series of policies and measures by 2050. The draft LTRS concerns rehabilitation and renovation of public, residential and commercial buildings. This draft strategy also provides for measures to increase the use of RES energy, which is produced in-situ or in the proximity, for types of buildings covered by the LTRS: under the optimum renovation scenario (scenario 2), the amount of RES energy is estimated to reach approximately 0.22 Mtoe by 2030. This scenario provides for an investment demand of EUR 2.94 billion in the period 2021-2030 for the installation of RES solutions.

In accordance with the scenario indicated in the draft LTRS, the measures set out in this document involve an increase in the consumption of energy from solar capacities on roofs by 2.5 TWh by 2030, accounting for 46.3 % of the total projected increase by 2030 for production of electricity from solar capacities. These measures are added to those set out in the draft law amending and supplementing Law No 372/2005 on the energy performance of buildings, which was initiated by MLPDA, according to which an obligation is imposed for new buildings to ensure, from 1 January 2021 onward, 30 % of the consumption of energy from renewable sources produced in-site or in the proximity.

Moreover, when it will prepare the methodology for determining the regulated prices and charges for natural gas, the regulatory authority will see to it that it contains elements to support, in the most cost-effective way, the development of secure, reliable and efficient non-discriminatory systems that are consumer oriented, in line with the overall policy objectives in the field of integration of large and small scale production of gas from renewable energy sources.

In accordance with the draft LTRS, it will also be necessary, in order to achieve the RES-E share, to encourage active consumers (prosumers) towards the measure involving implementation of smart metering solutions and smart networks, for which a clear calendar and adequate regulations should be put in place. The regulations should include recognition of investments in smart meters in the tariff and their recognition in the investment plans of distribution system operators or the prioritisation of these projects from the viewpoint of funding provided by the EU (including Structural Funds).

In addition, it will be necessary to use renewable energy systems in the renovation of public buildings and, where an optimal cost-benefit ratio can be achieved, systems will also be used in the renovation of residential buildings. One of the challenges is the difficulty encountered particularly by the tenants' associations in becoming electricity prosumers. The law on renewable energy prosumers should enable residential blocks and related tenants' associations to produce and to sell the excess solar and possibly wind energy in more flexible forms by creating net metering schemes, simplifying connection procedures and introducing incentives and financial support.

In this respect, Romania plans to encourage household, industrial and agricultural prosumers simultaneously with the development of the smart networks and meters. Moreover, the integration of distributed production systems and prosumers in the electricity system is also important. In the following years, photovoltaic capacities are foreseen to be developed in

Romania in the form of average capacity solar parks established on degraded or less productive lands and in the form of small scattered capacities developed by energy consumers who can achieve transition to the prosumer.

The adoption of Law No 184/2018 establishing the system for promoting production of renewable energy was a step forward in the regulation of prosumers' status in Romania. The new law provides for a series of advantages for prosumers, as follows:

- the scheme is applied to prosumers owning renewable energy production units with installed capacity of not more than 27 kW per consumption place in individual households, residential blocks, residential, commercial or industrial areas etc.;
- the electricity distribution operators must connect prosumers in accordance with the specific regulations issued by the regulatory authority in this respect;
- prosumers have the possibility of selling electricity to suppliers with whom they have concluded electricity supply contracts at a price equalling the weighted average price recorded on the day-ahead market in the previous year; suppliers having a contract with prosumers must take over the energy at the former's request;
- prosumers are exempted from the payment of excise duties for the amount of electricity produced from renewable sources for self-consumption, and the excess production sold to suppliers;
- prosumers as natural persons are exempted from the obligation of purchasing green certificates annually and quarterly for the electricity produced and used for own final consumption, other than own technological consumption of power plants;
- prosumers are provided with the service of regularisation between the value of electricity delivered and the value of electricity consumed in the grid by the electricity suppliers with whom they have concluded electricity supply contracts the service.

The aim of these measures is to increase the amount of electricity from renewable resources, which is produced by prosumers. Furthermore, the barriers to the development of this sector (administrative barriers as a priority) must be removed; a first step in this direction is the implementation of Directive (EU) 2018/2001.

Policies and measures to promote the use of renewable energy in transport (RES-T)

Romania plans to achieve its RES-T target by 2030 through the policies and measures proposed in order to foster use of rail transport (compared to road transport, considering a wider use of electricity in the rail transport) and to foster electromobility, at the same time further using traditional biofuels and introducing advanced biofuels in road transport.

a. Promoting the use of renewable energy in road transport

In order to achieve the target for the RES-T share by 2030, it is first of all necessary to implement measures regarding the promotion of electromobility and the development of biofuels, as presented above (in the Section "Trans-sectoral policies and measures"). In addition, Romania will adopt the following:

- Preparing a **regulation** to establish **the obligations regarding the vehicle stocks of public institutions.** The regulation will seek:
  - to establish a minimum number/rate of vehicles using alternative fuels;
  - to establish rules for the joint procurement of motor vehicles on alternative fuels.

b. Promoting the use of renewable energy in rail transport

METROREX

The specific measures and funding sources (national, EU funds etc.), which are required to achieve the renewable energy (RES) targets in the field of transport:

- **Introducing** in the Specification, which is prepared for purchase of electricity for each year separately, the **award criterion of "Share of electricity obtained from renewable energy sources** - P % (RES-E) in the total amount of electricity to be bid/supplied", more specifically the quality component from the viewpoint of the advantage for environmental protection, which represents the share of electricity from renewable energy sources (RES-E) - % in the total amount of electricity to be bid/supplied.

Other type of rail transport

Moreover, one of guidelines of the EU policy in the transport sector concerns the priority development of rail transport and its intermodal integration in other modes of transport and, in order to achieve this aim, the EU policy in the transport sector [document COM(2011) 144 "White Paper - Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system"] proposes a series of strategic objectives such as:

- the implementation of "A fully functional and EU-wide multimodal TEN-T 'core network' by 2030, with a high quality and capacity network by 2050 and a corresponding set of information services";
- "By 2050, connect all core network airports to the rail network, preferably high-speed; ensure that all core seaports are sufficiently connected to the rail freight (...)".

c. Other policies and measures

In addition, strategies/plans are currently under preparation, providing for measures that will contribute to the achievement of the RES-T target by 2030. It is noteworthy that **most of them do not concern biofuels and/or bioliquids, but the use of electricity from renewable sources in transport.**

Table 19 - List of strategies and/or plans under preparation

Name	Reference document
Enhancing the efficiency of electricity distribution management	The 2019-2023 Rail Infrastructure Development Strategy
Study on the introduction of electricity systems capable of **returning the electricity generated by regenerative braking**	General Transport Master Plan
Electrification and modernisation of the Bucharest-Giurgiu Railway	The 2019-2023 Rail Infrastructure Development Strategy General Transport Master Plan
Electrification and modernisation of the Craiova-Calafat Railway	The 2019-2023 Rail Infrastructure Development Strategy General Transport Master Plan
Electrification and modernisation of the Constanta-Mangalia Railway	The 2019-2023 Rail Infrastructure Development Strategy General Transport Master Plan
Electrification and modernisation of the Cluj-Oradea Railway	The 2019-2023 Rail Infrastructure Development Strategy General Transport Master Plan

Source: Information submitted by the INECP Interinstitutional Working Group

Policies and measures to promote the use of renewable energy in heating and cooling (RES-H&C)

Law No 372/2005 on the energy performance of buildings, as republished, includes the obligation for new buildings in the property/administration of the public administration authorities, which are to be subjected to the acceptance procedure under the construction permit issued after 31 December 2020, to be nearly zero-energy buildings.

In the draft law amending and supplementing Law No 372/2005 on the energy performance of buildings, which was initiated by MLPDA and which is purposed to transpose Directive (EU) 2018/844 by amending the definition of "nearly zero-energy building", the value for covering consumption of primary energy from RES has been increased from 10 % to 30 %.

Moreover, a growing number of households, in particular new residences, will adopt efficient biomass heating installations with full combustion and zero pollutants. This transition towards more efficient and greener biomass forms of heating will be experienced intensively over the following years as well as after 2030.

Predominantly electricity-based heating in Romania will also contribute to the achievement of the RES-H&C target for 2030. In this respect, the highest potential is encountered in individual households in the semi-urban and rural area, where the investment in high-efficiency air-soil heat pumps can be justified economically. Accompanied by heat accumulators, heating through heat pumps could be feasible by using the electricity produced in the night standstill period, which is also a form of storage of electricity.

The further long-term implementation of the "Casa Verde Plus" Programme could foster development of a national heat pump market and could provide for the heat demand by the use of heat solar panels.

The draft Long-term Renovation Strategy (LTRS), which was initiated by the Ministry of Public Works, Development and Administration (MLPDA), also includes a series of policies and measures to increase the use of renewable energy in heating and cooling by 2050. According to this draft, renovation packages will include RES technologies such as installation of solar panels, photovoltaic panels and heat pumps. Their elaboration and impact will be included in an updated version of INECP as MLPDA confirms the choice of scenario 2 as the optimal scenario. The INECP will need to be updated depending on the final version of the LTRS and the solution adopted by MLPDA. MLPDA has currently proposed scenario 2 for approval and the draft Government Decision approving the National Strategy for Renovation of Buildings has been under public debate since 20 January 2020.

ii. Where relevant, specific measures for regional cooperation, as well as, as an option, the estimated excess production of energy from renewable sources which could be transferred to other Member States in order to achieve the national contribution and trajectories referred to in point 2.1.2

Statistical renewable energy transfers

The statistical transfer mechanism provides for the excess RES produced in an EU Member State to be transferred to other Member States. This mechanism enables more flexibility, in view of achieving the shares established at Member State level, by providing them with an instrument to develop the RES potential in a mutually advantageous manner. In this way, countries with high RES potential may support other Member States in achieving their individual targets. This method of cooperation among Member States was introduced with the adoption of Directive 2009/28/EC on the promotion of the use of energy from renewable sources and the continuation of this mechanism is provided in the "Clean Energy Package" as a legislative package.

In this context, the instruments provided by this cooperation mechanism (statistical transfer or co-financing of RES production projects by two or more Member States) may constitute an opportunity to increase the installed RES capacity in Romania provided that the respective static transfer is not achieved to the detriment of the achievement of the national RES targets and with a negative impact on the operation of the NES under conditions of safety.

iii. Specific measures on financial support, where applicable, including Union support and the use of Union funds, for the promotion of the production and use of energy from renewable sources in electricity, heating and cooling, and transport

See Chapter 5.3.i.

iv. Specific measures to introduce one or more contact points, streamline administrative procedures, provide information and training, and facilitate the uptake of power purchase agreements

The adaptation of the legislative framework will be a priority and will envisage administrative aspects (regarding simplification of permit procurement procedures and, implicitly, of their release period) and aspects related to the operation of the electricity market in the sense of facilitating integration of renewable energy sources.

The regulatory framework providing for transparency in connection to the power plant grids is mainly established by Order No 72 of ANRE of 2 August 2017 approving the Technical rule regarding the technical requirements for connection of synchronous generator units to the electricity grids of public interest. This Order lays down the minimum technical requirements for connection of synchronous generator groups to electricity grids of public interest.

Moreover, Romania sets forth measures to cut red tape through enhanced transparency, digitalisation and introduction of the "one-stop shop".

In addition, Romania must adopt Directive (EU) 2018/2001 regarding the procedure of connection to the grid for large power plants and prosumers' plants.

v. Assessment of the necessity to build new infrastructure for district heating and cooling produced from renewable sources

No clear set of policies and measures are in place for these elements on the date of preparation of this document.

vi. Where applicable, specific measures on the promotion of the use of energy from biomass, especially for new biomass mobilisation taking into account:

- sustainable biomass availability, both domestic potential and imports from third countries
- other biomass uses by other sectors (agriculture and forest-based sectors); as well as measures for the sustainability of biomass production and use

To encourage production of electricity from renewable resources, Order No 46 of 5 March 2012 of the Minister for Agriculture and Rural development established, from 2012 onward, the procedure for the release of the certificate of origin for the biomass sourced in agriculture and related industries, which is used as fuel or feedstock for production of electricity. For the purposes of this procedure, the biomass sourced in agriculture and related industries, which is used as fuel or feedstock for the production of electricity, means the biodegradable fraction obtained from:

a) agricultural and non-agricultural energy plant crops destined for biomass production, which is used to produce electricity, as per the list in Annex 1 to Order No 46 of 5 March 2012 of the Minister for Agriculture and Rural Development;
b) waste from agriculture, horticulture, aquaculture, fishing and from food preparation and processing, as per the list in Annex 2 to Order No 46 of 5 March 2012 of the Minister for Agriculture and Rural Development
Certificates of origin for the biomass sourced in agriculture and related industries, which is used as fuel or feedstock for production of electricity, as provided for in Article 3(9) of Law No 220/2008, are issued by the Ministry of Agriculture and Rural Development through the county and Bucharest agricultural directorates.
c) Moreover, the procedure for the release of certificates of origin for the biomass sourced in forestry and related industries, which is used in the production of electricity from renewable energy sources (as approved by Ministerial Order No 1534/2016), was introduced in 2016. For the purposes of this procedure, the biomass sourced in forestry and related industries, for which certificates of origin are released, means:

    I. the biodegradable fraction of products resulting from the primary and secondary processing within Romania of wood - bark, sawdust, chips from processing, edges, chips from profiling lines, wood residues from the processing or recycling of wood and/or wood products, including from import, which are not classified as wood in accordance with the legal rules in force, and wood downgraded on own premises following the technological processing of wood
    II. wood chips only from the categories listed under point (a).

In addition, the forestry legislation in force currently provides for the sustainable management of forests and one of the main criteria of forest management plans is precisely to ensure uninterrupted wood production.

Moreover, please see the measures listed in Section "Forestry" of Chapter 3.1.1.i.

3.1.3. Other elements of the dimension

i. Where applicable, national policies and measures affecting the EU ETS sector and assessment of the complementarity and impacts on the EU ETS

See point 3.1.1.

ii. Policies and measures to achieve other national targets, where applicable

Not applicable.

iii. Policies and measures to achieve low emission mobility (including electrification of transport)

See point 3.1.2

iv. Where applicable, national policies, timelines and measures planned to phase out energy subsidies, in particular for fossil fuels

See point 4.5.iv.

3.2. Dimension Energy efficiency

Planned policies, measures and programmes to achieve the indicative national energy efficiency contributions for 2030 as well as other objectives referred to in point 2.2 in the Energy Union Regulation, including planned measures and instruments (also of a financial

nature) to promote the energy performance of buildings, in particular with regard to the following:

i. Energy efficiency obligation schemes and alternative policy measures under Articles 7a and 7b of Directive 2012/27/EU and to be prepared in accordance with Annex II

Under Article 7(10) of Directive (EU) 2018/2002, Member States may achieve the required cumulative end-use energy savings by:

- establishing an energy efficiency obligation scheme;
- adopting alternative policy measures or
- a combination of these.

The National Energy Efficiency Action Plan (NEEAP IV) revealed that the introduction of an obligations scheme under Article 7 of Directive 2012/27/EU for Romania is not optimal because it does not comply with the requirements to enable the application of such scheme, more specifically compliance with the requirements of certification of achieved energy savings and the economic justification of the requirements. This is the reason why, in order to comply with the Directive provisions, Romania has opted for introducing "alternative" measures and policies in order to achieve the target under Article 7b.

In order to support Member States in this respect, the European Commission proposes, in its Recommendation C(2019) 6621 final, potential alternative policy measures that may be taken into account in order to meet the obligations in Directive (EU) 2018/2002 of the European Parliament and of the Council of 11 December 2018 amending Directive 2012/27/EU on energy efficiency, which Romania will consider. These measures and policies are detailed below and also presented in Annex III.

ii. Long-term renovation strategy to support the renovation of the national stock of residential and non-residential buildings, both public and private[37], including policies, measures and actions to stimulate cost-effective deep renovation and policies and actions to target the worst performing segments of the national building stock, in accordance with Article 2a of Directive 2010/31/EU, as amended by Directive (EU) 2018/844

The relevant policies and measures considered by Romania are described below and ordered by their interaction with other dimensions of the Plan: main vector in the trans-sectoral impact, secondary effect of measures pertaining to other dimensions and to the dimension concerned.

Trans-sectoral policies and measures

1) Energy efficiency - main dimension

Residential and tertiary sector

The draft Long-term Renovation Strategy (LTRS), which is a binding requirement stipulated in the Directive on the energy performance of buildings, contributes to the achievement of the targets committed to by Romania in this Plan. Although the main benefits indicated in the strategy concern the energy efficiency dimension, the measures indicated therein also impacts other dimensions (Decarbonisation - renewable energy and GHG emissions and removals).

[37] In accordance with Article 2a of Directive 2010/31/EU

The LTRS thus proposes a series of measures to turn the existing stock of buildings into an energy efficient low-carbon stock:

- making an inventory of the stock of residential buildings and assessing the energy efficiency improvement potential, priority being given to buildings with the highest improvement potential and with the largest number of beneficiaries, in order to generate the highest impact;
- creating, maintaining and updating a database listing the buildings in the national stock, with details pertaining to the type, renovation and modernisation work performed throughout the useful life, to the safety and structural integrity, energy consumption etc.;
- thermally insulating the stock of buildings in the public administration sector, the residential blocks and single-family residences, educational establishments, public hospitals and commercial buildings;
- implementing solutions to provide for the required heat comfort, at the same time using renewable energy sources (ventilation solutions, heat recovery units, heat pumps etc.) where the cost-benefit ratio is optimal;
- supporting and developing prosumers;
- training and upskilling programmes for key professions and matters in the renovation and rehabilitation of buildings (e.g. energy auditors) and introducing certification with regular renewal;
- supporting and fostering research and development projects and demonstration projects related to new technologies and techniques of extended renovation;
- introducing and applying restrictions to the sale or rental of buildings in the lower energy performance categories;
- establishing performance standards for the renovation of envelope elements of buildings and of HVAC (Heating, Ventilation and Air Conditioning) systems.

According to the scenario recommended in the draft LTRS - Scenario 2, the main benefit regarding the energy efficiency dimension by 2030 will be the achievement of equivalent savings of 0.83 Mtoe.
Moreover, in the decarbonisation dimension - GHG emissions and removals by reducing consumption of energy in the residential and tertiary sector (governmental buildings, public buildings, office buildings), the contribution to reduction of GHG emissions (effects cumulated in the period 2021-2030) amounts to 2.34 million tonnes of CO_2.
The draft LTRS involves, in addition to renovation of buildings in order to increase energy efficiency, the adoption of RES technologies, such as installation of heat solar panels, photovoltaic panels and heat pumps, which will support the achievement of the RES-E and RES-H&C targets for 2030, ensuring the increase by over 0.2 Mtoe in the production of energy from renewable sources.

2) <u>Energy efficiency - secondary dimension</u>

Energy efficiency in the residential and tertiary sectors is also influenced by other two main measures under the internal energy market dimension (see point 3.4.1):

- Digitalisation of the Romanian energy system: smart monitoring systems (SMS) play an important role in the observation of consumers' features, thus having a decisive contribution to the identification and prioritisation of their needs for implementation of energy efficiency measures. SMS also enable to significantly reduce commercial losses in distribution networks.
- Implementation of the demand-response measures: this measure entails the implementation of dynamic prices (price increase concomitantly with demand increase and vice versa). The consumer's behaviour will thus change by moving consumption at

load peak hours towards no-load hours and/or reducing consumption at peak hours (without the concomitant increase of consumption at no-load hours).

iii. Description of policy and measures to promote energy services in the public sector and measures to remove regulatory and non-regulatory barriers that impede the uptake of energy performance contracting and other energy efficiency service models[38]

In May 2018, the Energy Efficiency department (DEE) of ANRE initiated the consultation process at the working group level (GL ESCO) in order to disseminate certain aspects regarding the clarification of the legislative framework required for the operation of ESCO type companies in Romania by identifying the main legislative/administrative barriers to the **application of the energy performance contract (EPC) in the public sector** and establishing certain legal solutions to remove them[39].
The barriers identified in the implementation of EPC, which have been debated by GL ESCO, were the following:

- ✓ The legislative framework, including the public procurement rules
- ✓ Low and fluctuating energy prices
- ✓ Difficulty in accessing funding
- ✓ Technical risks perceived as high risks
- ✓ Overall mistrust based on the absence of standardisation (e.g. non-standardized measurements and checks)
- ✓ Market and partnership related issues

Considering the international experience with the successful implementation of energy performance contracting, with public lighting as a priority, the high energy saving potential (>40 %) and the fact that the contributions of Administrative Territorial Units (ATUs) are not always necessary or they are low (<10 %), WG decided the initial approach to the EPC model for the rehabilitation of the public lighting systems and, based on the experience gained, the model energy performance contracting is to be extrapolated to public buildings.

iv. Other planned policies, measures and programmes to achieve the indicative national energy efficiency contributions for 2030 as well as other objectives referred to in point 2.2 (for example measures to promote the exemplary role of public buildings and energy-efficient public procurement, measures to promote energy audits and energy management systems[40], consumer information and training measures[41], and other measures to promote energy efficiency[42])

The relevant policies and measures considered by Romania are described below and ordered by their interaction with other dimensions of the Plan: main vector in the trans-sectoral impact, secondary effect of measures pertaining to other dimensions and to the dimension concerned.

Trans-sectoral policies and measures

1) Energy efficiency - main dimension

[38] In accordance with Article 18 of Directive 2012/27/EU
[39] "Conclusions of the activity of the Working Group dedicated to ESCO", presentation by ANRE at the Second National Round Table for funding energy efficiency in Romania (June 2019)
[40] In accordance with Article 8 of Directive 2012/27/EU
[41] In accordance with Articles 12 and 17 of Directive 2012/27/EU
[42] In accordance with Article 19 of Directive 2012/27/EU

The industry sector

The industrial sector is complex, including large energy consumer industries with high energy intensity (the metallurgical, construction materials, chemical industries), and small energy consumer industries, but with high energy intensities (food, beverages, tobacco, wood processing, paper manufacturing and paper products industries etc.).

Having regard to the significant share in energy consumption by the industrial sector and to the wear and tear of used equipment, this sector has a significant potential of applying energy efficiency measures in the period 2021-2030.

A series of large industrial consumers in Romania will continue to invest until 2024 in energy efficiency measures by virtue of their obligations following the energy audits conducted under Government Decision No 495/2014[43].

An increase in the share of energy from renewable sources is envisaged for the Decarbonisation - renewable energy dimension with the development of electricity production facilities by industrial consumers.

Moreover, the reduction in energy consumption in the industrial sector will contribute to a reduction in the GHG emissions under the Decarbonisation - emissions and removals dimension.

Transport sector

Against the background of previous effects, the main measures regarding energy efficiency increase in transport remain:

Against the background of previous effects, the main measures regarding energy efficiency increase in transport remain

- Renewing the national vehicle stock by replacing the old passenger cars with high emission levels and high specific consumption rates

The measure has been supported by the "Rabla" Programme, which supports renewal of the national vehicle stock by providing grants in the form of a discarding bonus to purchase new less polluting motor vehicles in exchange for delivery of used motor vehicles for discarding purposes. The programme has undergone various changes to this date and the most significant change was made in 2018 with the introduction of the "Rabla Plus" Programme. Eco-tickets of RON 45 000 are granted under this programme for the purchase of a new electric vehicle and RON 20 000 for the purchase of a new electrical hybrid vehicle with external supply source.

- Developing and promoting alternative mobility

This measure considers fostering alternative forms of transport (cycling, car-pooling, car-sharing etc.) by urban planning and developing an adequate cycling infrastructure (bicycle tracks, special compartments for bicycles in the underground and in trains etc.) and extending the pedestrian walkways, especially in large conurbations.

These two main energy efficiency measures in the transport sector also bring about considerable benefits to the Decarbonisation - GHG emissions and removals dimension. A significant reduction in GHG emissions is achieved by developing and promoting alternative

[43] Establishing a State aid scheme for exempting certain categories of final consumers from the application of Law No 220/2008 establishing a system to promote production of energy from renewable sources

mobility methods (mopeds and bicycles, scooters etc.) and by maintaining a vehicle stock with modern vehicles. Motor vehicles should be equipped with efficient engines (complying with the Euro 6 emissions standard) or hybrid propulsion, electrical or natural gas-fired (CNG/LNG) vehicles. In addition, the possibility of prohibiting registration of motor vehicles under the Euro 3 and Euro 4 emissions standards would contribute to an improvement in air quality.

2) Energy efficiency - secondary dimension

The industry sector

Energy efficiency in the industrial sector is also influenced by other main policies and measures under other dimensions:

- Implementing the best available technologies (BAT) in order to reduce greenhouse gas emissions and to increase energy efficiency in the industrial sector The best available techniques will be adopted in the industrial sector in order to reduce energy intensity and the level of emissions concomitantly in the industrial sectors regulated by the EU ETS (see point 3.1.1. GHG Emissions and Removals)
- The promotion of transition to circular economy (recycling) contributes to achieving the energy efficiency target by reducing consumption of energy used in the industry in the processing of raw materials (see point 3.1.1. GHG Emissions and Removals)
- The Decarbonisation Plan proposed by CE Oltenia entails energy efficiency improvement works to units that will remain in operation until 2030 by upgrading the automated distributed control system, the mills and the coal dust preparation system and by improving the performances of the steam turbine (see 3.3.i. Energy Security Dimension)
- Adopting advanced technologies in the energy sector In order to maximise the effects, the implementation of the storage solutions will be completed by the quantification of smart meters, thus contributing to optimised energy consumption (see point 3.5.i. Research, innovation and competitiveness)

Transport sector

Energy efficiency in the transport sector is also influenced by the promotion of electromobility in road transport (light vehicles and urban public transport), which has a significant impact in the sense of an increase in energy efficiency, considering the lower consumption of energy with electric vehicles, this measure being also described under the Decarbonisation - GHG Emissions and Removals dimension. (see point 3.1.1 GHG Emissions and Removals)

Reduction in the energy poverty rate and protection of vulnerable consumer

In order to establish prioritisation to generate the maximum benefits, considering the limited time and resources (reduction in final consumption, with a positive impact on energy costs), the policy regulating and defining the vulnerable consumer and its funding method, which is the main policy under the Internal Energy Market dimension, also plays a significant role in the achievement of energy efficiency. (see point 3.4.4 Internal Energy Market)

Other policies/measures pertaining to the dimension

Other policies and measures proposed for each sector in the economy, which will contribute to the achievement of the energy efficiency target, are listed below:

- Increasing public information and awareness of the impact of climate change and of energy efficiency, and adapting to them by introducing courses in the educational curricula, which are designed to ensure the understanding of climate change, energy savings and related activities

- Combining the outlooks of NGOs and of other government and private entities regarding the future of progress in energy efficiency, with focus on the visible policies and measures, increasing the importance of the individual role in the transition in the energy sector, including the role of government leaders and leaders of private organisations, and the role of individual consumers
- Providing more reliable and more transparent measurements on energy savings, together with asset labelling mechanisms, so as to further contribute to the increase in the energy efficiency funding rate
- Strengthening efforts to increase the sustainable crediting branch, enabling bank offers, including mortgage loans, for energy efficiency
- Preparing regulations to consider the improvement in the flexibility of energy efficiency measures (flexefficiency)

The industry sector

The following measures are also provided for in the industrial sector to achieve the energy efficiency target:

- Measures to incentivise relevant economic operators conducting energy audits and implementing the resulting measures, which maintain and improve an energy management system (EnMS) in accordance with the SR EN ISO 50001 standard
- Minimum performance standards and regulations for industrial processes, where they are lacking
- Digitalisation of industrial processes for large energy consumers

The transport sector

The measures for energy efficiency increase in transport will count:

- Developing the alternative fuels infrastructure
- Projects for upgrading railways
- Developing sustainable and climate change resilient, smart, secure and intermodal TEN-T rail transport networks
- Developing smart digital systems for road and rail traffic management as well as for urban transport management
- Upgrading ports and locks, improving the safety of waterborne transport by purchasing multifunctional technical ships and specific equipment
- Optimising and reducing energy consumption in transport by supporting the development of multimodal transport (including TEN-T), national inland waterways and ports
- Increasing the public transport usage rate by optimising public means of transport (buses, trolleybuses, tramways) and the necessary infrastructure for their good operation
- Purchasing energy efficient electrical metro trains, with the possibility of recovering energy on braking (e.g. Metrorex plans to purchase 77 electrical metro trains in the period 2021-2030)
- The modernisation of electrical locomotives of 5 100 kW by using alternative current transmission will enable to use electrical regenerative braking (on braking, the locomotive enters the generator mode with injection of the electricity thus generated into the National Energy System)

Tertiary sector

- Using energy efficiency criteria on public procurement
- Energy-auditing programme for SMEs

- Introducing digital platforms or performing systems to monitor, to assess and to control energy consumption, in particular for non-residential buildings

Reduction in the energy poverty rate and protection of vulnerable consumer

- Developing public heat insulation programmes for buildings in communities affected by energy poverty in order to reduce energy losses and heat costs
- Training and education programmes, including energy advisory programmes

Also see point 3.4.4.

v. Where applicable, a description of policies and measures to promote the role of local renewable energy communities in contributing to the implementation of policies and measures in points i, ii, iii and iv

Currently not applicable.

vi. Description of measures to develop measures to utilise energy efficiency potentials of gas and electricity infrastructure[44]

- Reducing losses in the electricity distribution networks
- Smart medium and low voltage energy distribution systems (including smart networks and ICT systems) and related storage.

vii. Regional cooperation in this area, where applicable

ANRE has participated as a co-beneficiary in the ENSMOV project (Enhancing the Implementation and Monitoring and Verification practices of Energy Saving Policies under Article 7 of the Energy Efficiency Directive - https: //ensmov.eu/) and another competent institution is to join the 14 European organisations under this project.

The project is funded by the European Commission under the Horizon 2020 Programme and seeks to provide support to Member States and stakeholders for the implementation of energy efficiency policies. More specifically, in the following three years, it will help Member States monitor, revise, improve and implement the energy efficiency policies by developing the existing resources (projects), with focus on the practical and strategic aspects arising from Article 7 of the Energy Efficiency Directive (EED). The project is coordinated by the Institute For European Energy And Climate Policy (IEECP) and will be implemented in the period June 2019-May 2022 (36 months).

The main objectives of the ENSMOV project are:

- to facilitate and to extend knowledge and experience exchange among Member States (MS) for the implementation of the policies provided for by Article 7 of EED;
- to develop a series of resources and instruments adapted for the implementation of Article 7 of EED in order to respond to the specific needs of Member States;
- to assist the national authorities in the implementation of internal monitoring, reporting and verification (MRV) systems in order to ensure sound data and information which enables to (re)design policies towards 2030.

[44] In accordance with Article 15(2) of Directive 2012/27/EU

viii. Financing measures, including Union support and the use of Union funds, in the area at national level

The National Energy Efficiency Fund is planned to be created as a single publicly administered fund for financing investments in energy efficiency improvement measures, this measure and good practice also being adopted in other European countries. Moreover, the need to centralise the various financing mechanisms for energy efficiency measures has also been identified in the Long-term Renovation Strategy by the consultants of the World Bank.

The centralisation of the public financing mechanisms for energy efficiency investments in a single mechanism will simplify, facilitate and speed up the fund accessing process, will enable better tracking of the implementation of funded projects and will facilitate the assessment of the effects produced through scale savings to be achieved.

It will be supplied with private funds, structural funds and possibly funds from the State budget. Moreover, financing from funds obtained under the GHG emissions taxation mechanisms will also be envisaged. As regards the supply of this fund, see Chapter 5.3.i. (point 6 – State Budget).

The possibility of promoting financing instruments that ensure a counter-guarantee for the loans or subsidisation of interests in loans granted to legal and natural persons supporting energy efficiency measures (Green Mortgages/Green Loans) is also under consideration.

The granted loans could thus target mainly investments in energy efficiency, the technologies producing energy from renewable sources, and the implementation of measures protecting the environment. The purchase, construction or rehabilitation of "green" and energy efficient houses, as certified by the Romanian Council for Green Buildings (*Consiliul Român pentru Clădiri Verzi* - RoGBC) are also targeted. Such investments will bring benefits such as: significant savings by lower costs paid for energy and repairs; high quality of buildings, high comfort rate; the maintained market value of the building in time, a "green" home preserving its value for a longer time compared to a non-certified home; a preferential interest compared to the standard real estate loan.

In order to fund energy efficiency projects, the financing sources detailed in point 5.3.i will be considered.

3.3. Dimension energy security[45]

i. Policies and measures related to the elements set out in point 2.3[46]

The relevant policies and measures considered by Romania are described below and ordered by their interaction with other dimensions of the Plan: main vector in the trans-sectoral impact, secondary effect of measures pertaining to other dimensions and to the dimension concerned.

Trans-sectoral policies and measures

1) Energy security - main dimension

- **The 2020-2030 Development and Decarbonisation Plan of CE Oltenia**

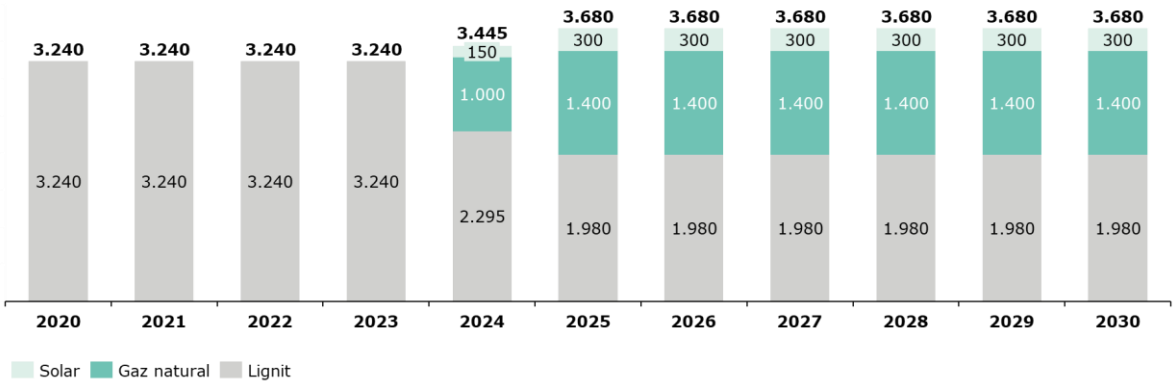
[45] Policies and measures shall reflect the energy efficiency first principle.
[46]Consistency shall be ensured with the preventive action and emergency plans under Regulation (EU) 2017/1938 of the European Parliament and of the Council of 25 October 2017 concerning measures to safeguard the security of gas supply and repealing Regulation (EU) No 994/2010 (OJ L 280, 28.10.2017, p. 1) as well as the risk preparedness plans under Regulation (EU) 2018/2001 [as proposed by COM(2016) 862 on risk-preparedness in the electricity sector and repealing Directive 2005/89/EC].

In the context of current European decarbonisation policies, which culminate with using less and less fossil fuels and, in particular, coal, CE Oltenia envisages implementing a development and decarbonisation plan which enables them a realistic and sustainable transition, as much as possible, towards production of low-carbon electricity; in this respect, the following actions are considered, with the possibility of being implemented by 2030:

- The construction of three photovoltaic parks with a total installed capacity of approximately 300 MW on the closed sludge and ash landfills (pertaining to the Rovinari, Turceni and Ișalnița heat power plants). Works will begin in 2023 and commissioning will be achieved in 2024 (150 MW) and in 2025 (150 MW more)
- Construction of a new energy cogeneration unit of 200 MW on natural gas at SE Craiova, which will replace the current 2x150 MW lignite-based capacities from 2024
- Construction of a power unit of 400 MW on natural gas at SE Turceni, which will replace the current 330 MW lignite-based capacity from 2026
- Construction of two gas-fired power units of 400 MW (additional total installed capacity of 800 MW) at SE Isalnita, which will replace the lignite-based unit 8 of 315 MW from 2024 and the lignite-based unit 7 of 315 MW from 2025.

In this respect, the trend in the production capacities of CE Oltenia until 2030 is set out in the chart below.

Chart 12 - Trend in the power available at CE Oltenia [MW]



Source: The 2020-2030 Development and Decarbonisation Plan of CE Oltenia

RO	***EN***
Solar	Solar
Gaz natural	Natural gas
Lignit	Lignite

Sustainable transition is projected from 2024 onward by developing new gas-fired capacities with total installed capacity of 1 400 MW. This fuel has the advantage of enabling flexible operation, which will make it possible to integrate more RES into the national energy system because natural gas can balance the system, taking into account the intermittent nature of RES.

- **Maintaining the mandatory crude oil and natural gas stocks, increasing the natural gas storage capacity**

  The minimum stocks of crude oil and petroleum products are established under Law No 85/2018, which transposes Directive 2009/119/EC. The stocks established in 2019, which must be maintained in 2020, amount to 1 402 801 tonnes of crude oil equivalent.

  ANRE has established so far, on an annual basis, the minimum stock of natural gas, which every holder of the natural gas supply licence must establish in the underground storage facilities and the total stored amounts exceeded the minimum stock every year. In 2019, the total stored amount was 3.056 billion cubic meters, whereas the minimum stock was 2.18 billion cubic meters.

  For security in the supply with natural gas and crude oil, Romania also considers the following measures:

  - fostering initiatives involving modernisation of the existing gas storage capacities in order to enhance flexibility by using the storage capacities in a multi-cycle mode[47];
  - increasing the natural gas storage capacity by promoting the respective projects as projects of common interest;
  - increasing the underground natural gas storage capacity in the Sărmășel storage facility (cluster 6.20.6);
  - The modernisation of the Depomureș natural gas storage facility (cluster 6.20.4)

- **Development of high-efficiency cogeneration capacities/integration of RES in the production of heat for centralised heating systems**

  The following projects provide for the deployment of cogeneration units or for the rehabilitation of existing ones, their development being a priority for a series of local communities in Romania:

  - the implementation of combined cycle cogeneration units at CTE Grozăvești, which entails developing a new high-efficiency cogeneration unit for production of energy in a combined gas-fired gas-steam cycle technology;
  - the implementation of a combined cycle cogeneration unit at CTE Bucharest South, which entails developing a new high-efficiency cogeneration unit (gas-steam combined cycle) of approximately 200 MWe and 200 MWt;
  - the implementation of a gas-fired new high-efficiency cogeneration capacity for production of energy at CTE Progresu;
  - the rehabilitation of the combined cycle of CTE Bucharest West in order to extend its lifespan/implementation of a new combined cycle unit of approximately 186 MWe and 170 Gcal/h;
  - the construction of a gas-fired cogeneration (CHP) plant at CET Govora;
  - the development of a new cogeneration unit at Midia (approximately 70 MW);

  Cogeneration units will contribute to security in energy supply, in particular at local level, reducing the risk of disruptions in power and heat supply.

[47] Development Plan for the National Natural Gas Transmission System for 2019-2028 (NNGTS) - Transgaz SA -

Another potential advantage of the cogeneration production is that it entails a lower fuel demand compared to other technologies, which can have a positive effect on the reduction of dependency on imports.

However, the abovementioned capacities are not the only ones to be developed and we are to assess in the forthcoming period the opportunity of developing new cogeneration capacities in various localities depending on the interest and involvement of local authorities.

- **Encouraging the development of energy storage capacities**

The development of energy storage capacities is a solution for securing the energy supply. In order to achieve this, Romania plans the following measures:

  - to clearly define the concept of energy storage in the primary law;
  - to lay down the conditions for release of energy storage licences and for connection to the network;
  - to define standards for deployment and use of various storage technologies;
  - to develop a market design which facilitates integration of storage capacities in the electricity market (e.g. enabling and facilitating access to storage contracts on various markets - for example, the intra-day market, the day-ahead market, the balancing market, laying down conditions for access to these markets, calculating system tariffs so as to reflect costs etc.).

The opportunities identified to date are related to the conclusions of the NES adequacy study developed by Transelectrica, which mentions storage of energy in the NES through the Battery Energy Storage System (BESS). This system may constitute a valuable resource for remedying situations where the load curve is not covered and the impact of BESS integration in the ETN has an overall positive impact by improving adequacy (at least 10 %).

According to the same study, BESS is dual: it acts as a production source when unloading and as additional consumption/load when loading. From the temporal viewpoint, the optimum operation scheme entails loading BESS at no-load hours and unloading at peak load hours. In this respect, it is recommended to integrate battery energy storage systems (BESS) in the NES for capacity of at least 400 MW, in particular in order to flatten the load curve and to secure an additional reserve for exploitation in the form of technological system services (TSS) - swift secondary and tertiary control. Romania will support the development of these technologies in order to ensure the adequacy of the NES.

- **Promotion of demand response**

Article 114(2) of Order No 169/18 September 2018 of ANRE approving the Methodology for determining the tariffs for the electricity distribution service provides that the distribution system operator must offer dynamic distribution tariffs at the request of users or their suppliers from 2020 onward. This is a first step in the promotion of demand response, which is likely to bring about multiple benefits in the light of the fact that this will enable the final consumer to voluntarily adjust their demand. If this leads to a reduction in demand, final users thus contribute to the offer and demand balancing and to security in the supply. Moreover, the final consumer (household or non-household) will be able to ensure the cost-effectiveness of energy.

Support measures under the internal energy market dimension will be required to promote and develop demand response, which are focused on market organisation and

introduction of networks and smart meters, and on access of aggregators to the market. These measures are detailed in Chapter 3.4.3.

The implementation of demand response implies explicitly providing consumers (either directly, or through aggregators) with the possibility of participating in the wholesale and balancing markets.

2) Energy security - secondary dimension

- Dimension "Decarbonisation" - the GHG emissions and removals component
  - Promoting **investments in new low-carbon power generation capacities**

    The development of new capacities will contribute to the establishment of the NES, considering that, by the end of 2030, certain coal-based plants having reached the end of their life cycle, the upgrading of which is not warranted, will be decommissioned; the development of new production capacities will thus contribute to the diversification of energy supply sources.

- Dimension "Internal Market":
  - **Developing the power transmission grid**, thus reaching an interconnectivity level of at least 15.4 % in 2030

    The increase in interconnectedness plays a pivotal role in the security of electricity supply as it will facilitate cross-border trade, in particular in emergency cases.

  - **Digitalisation of the Romanian energy system**

    The digitalisation of the Romanian energy system will be conducive to its functioning under safety conditions following the improvement in the capacity of response to cyberattacks.

  - **Implementing a deregulation calendar for the electricity and gas market**, which entails full liberalisation of markets as of 2020-2021

    Market liberalisation and development of a legislative framework that is favourable for investments are likely to contribute to energy security because they will enable to develop new capacities, also enhancing the flexibility of the national energy system.

  - **Integrating Romanian energy markets into the European single energy market**

    The integration of Romanian energy markets into the European single market aims at adapting market conditions so that they ensure better supply with electricity.

  - **Developing a support mechanism of the Contracts for Differences (CfD) type**

    A mechanism that fosters investments in order to facilitate the development of new low-carbon electricity production capacities (e.g. nuclear power, RES etc.), thus ensuring diversification of energy sources and the flexibility of the national system.

Other policies/measures pertaining to the dimension

System adequacy and flexibility

A study was conducted in 2017 on the adequacy of the National Energy System (NES) on the medium and long term, which was purposed to present the status of the NES at that time in terms of energy production sources (dispatchable or non-dispatchable) and of the available control reserves and to determine the adequacy of NES on the medium and long term (2020 and 2025).

The analysis on the NES adequacy by 2025, which was based on various scenarios, has revealed following main conclusions:

1. if new capacities are not commissioned, the system adequacy will erode in time against the background of projected increase in consumption and in the exporting net balance;
2. the additional capacity required by 2025 to include the estimated loss of load expectation (LOLE) in the 3-8 hours interval is approximately 600-700 MW.

In order to assess the adequacy indicators, the NES behaviour by 2025 was examined assuming the existence of an additional production capacity.

In order to determine the demand for additional capacity, account was taken of the recommendations on the adequacy level that must be reached by transmission system operators under the ENTSO-E [the LOLE (loss of load expectation) value is between 3 and 8 hours].

In order to ensure compliance within the interval recommended by ENTSO-E for LOLE (3.8 hours) for the time horizon 2025, the assessment has revealed the need for an additional available capacity of at least 570 MW (the conservative scenario) and of 670 MW (the baseline scenario).

In conclusion, for the time horizon 2025, new electricity production capacities with a total installed capacity of 600-700 MW need to be built at NES level. The new capacities producing electricity from classical sources will be envisaged with additional technical capabilities compared to the current ones: short start-up time (one hour till synchronisation with the NES is advisable), high loading/unloading speed, high flexibility (to have the possibility of power variation at least in the range 55 ÷ 100 % of the rated power).

3. In the event of failure to supply natural gas to the gas plants connected to the NES, the mean load loss reaches 1 700 MW by 2025 - high values requiring disruption of consumption.

Moreover, a risk assessment was carried out with the purpose of simulating the limit case where, in the absence of fuel during the winter season, most of the gas-fired central heating plants are not operational. In this context, the shutdown of several dispatchable plants was simulated. Account was taken of the winter regimes considered to be critical in the analysis of the baseline scenario - winter evening peak (WEP) and the heat minimum (HM).

The analysis revealed that, for the two critical regimes, mean load loss reaches 1 500 MW (WEP) and 1 700 MW (HM). Disruption of consumption is required at these imbalance values.

The increase in the natural gas storage capacity and in the connectivity of natural gas networks will be envisaged in order to mitigate this risk.

4. Consideration of support in failure cases when simulating the functioning of the NES leads to an improvement in the adequacy indicators. The optimal solution to increase system safety consists in implementing the capacity market.

In this respect, the Ministry of the Economy, Energy and Business Environment intends to develop a capacity mechanism that is adapted to the specific conditions of Romania in order to secure electricity supply, under any circumstances, including in extreme cases (weather and/or operational conditions). Therefore, the mechanism is purposed to provide for additional production capacities alongside the active capacities on the electricity market, which are required in order to maintain balance between generation and consumption of electricity in extraordinary unpredictable cases, having regard to the particularities of the energy market in Romania. The capacity mechanism thus intervenes to secure supply when the offer on the electricity market becomes scarce in order to enable balance between offer and demand.

In order to secure production that meets the consumption demands domestically, thus enhancing energy security and the flexibility of the energy system, Romania's priority is also to initiate the investment for the development of a new gas-fired mixed cycle energy capacity in the North-West area (Mintia) with an installed capacity of 400 MW.

Diversification of energy sources and reduction of dependency on third countries

Fostering exploitation of resources in the Black Sea

The tapping of natural gas resources in the Black Sea is an essential element in securing energy independence. The Romanian Government has thus proposed to develop an investment climate which fosters complex infrastructure projects in the upstream sector.

In this context, a draft act amending the law in force was submitted, namely the draft Law amending and supplementing Law No 256/2018 regarding certain measures needed for the implementation of petroleum operations by petroleum agreement holders regarding offshore oil perimeters and Law No 238/2004 on petroleum, which enables to attract investors with technical expertise and to make investments for an extended time horizon. The draft law submitted to public debate entailed amendments regarding:

- removing the additional taxation of revenues for prices generating no excess profit for investors;
- increasing the maximum threshold for deduction of investments on the upstream segment for determination of the additional offshore tax in order to maintain the competitiveness of the offshore sector in Romania and to ensure uniform taxation for all business sectors;
- removing the trading obligations on the centralised markets in Romania on the medium and long term;
- removing the use of the reference price in determining the calculation base for the tax on additional revenues in order to bring the Offshore Law in line with the Romanian taxation principles and with the international practice regarding the determination of upstream taxes based on established prices.

Projects related to electricity and natural gas transmission

In the electricity transmission sector, the priority investment projects, apart from the declared projects of common interest (PCI), concern closing the 400 kV ring in Romania, i.e. OPL 400 kV Nădab - Oradea Sud, and the 400 kV ring of Bucharest Municipality towards the east by deploying an electrical line of 400 kV from the electricity transmission station in Bucharest South to that of Brazi West, including the installation of a new transmission station in the North-East area of the capital city (Bucharest Municipality and Ilfov County).

The following PCIs are also a priority in terms of energy security for Romania:

- 400 kV OPL in double circuit (equipped circuit) Smârdan – Gutinaș;
- 400 kV OPL in double circuit Cernavodă – Gura Ialomiței – Stâlpu, in accordance with the project for transition to 400 kV voltage for existing 220 kV lines Brazi West - Teleajen – Stâlpu, including the Teleajen and Stâlpu stations;
- Upgrading the network corridor Iron Gates - Reșița - Timișoara - Săcălaz - Arad from 220 kV to 400 kV, developing the following projects (stages):
    - 400 kV OPL Iron Gates - Reșița and extension of the 220/110 kV Reșița Station by building a new 400 kV station;
    - 400 kV OPL in double circuit Reșița - Timișoara and Reșița - Săcălaz, including construction of the 400 kV Timișoara station;
    - 400 kV d.c. OPL Timișoara – Arad and Săcălaz - Arad, including the construction of the 400 kV Săcălaz station and extension of the 400 kV Arad station.

Romania will maintain and extend the "Black Sea Corridor" and the "Mid Continental East Corridor" included in the priority corridor No 3 "Interconnections North-South for electricity in Central Europe and South-Eastern Europe". These projects are meant to integrate production from renewable sources from Member States (Bulgaria, the Czech Republic, Hungary, Poland, Slovakia) and third countries (Serbia). Furthermore, the connection with Ukraine (Roșiori-Mukacevo) will remain functional and in use.

On the other hand, the BRHA corridor concerns the development of natural gas transmission capacities between the interconnections in the Romanian transmission system and the similar systems in Bulgaria and Hungary.[48] The southern transmission corridor, although it lies within the national territory, is also of regional strategic relevance, being designed to facilitate transmission of future output from the depths of the Black Sea plateau to the European gas pipelines.

At the same time, the existing interconnection pipeline between Romania and the Republic of Moldova (Iasi-Ungheni) requires further developing the Romanian natural gas transmission system in the area. Consequently, four subprojects meeting this requirement were initiated, more specifically two new transmission pipelines (Onești – Gherăești and Gherăești - Lețcani) and two new compression stations (Onești and Gherăești) were installed.

See also Chapters 3.4.1 and 3.4.2 for more details regarding the interconnection rate and the relevant projects.

Nuclear energy

The nuclear energy is an important element for the energy security of Romania. In order to ensure supply with feedstock, as required for the production of the nuclear fuel used in the NPP Cernavoda reactors, SN Nuclearelectrica has established contractual relations with two qualified suppliers: the Canadian supplier Cameco Inc and the domestic supplier the National Uranium Company (*Compania Națională a Uraniului - CNU*).

In order to enhance the security in supply with the feedstock needed to produce the nuclear fuel and to reduce SN Nuclearelectrica's dependency on import on the nuclear fuel production chain, SN Nuclearelectrica considers diversifying the uranium supply sources in the form of uranium octoxide (a product for which there is a market/competition) and purchasing the

[48] Development Plan for the National Natural Gas Transmission System for 2019-2028 (NNGTS) prepared by Transgaz SA

Feldioara plant of CNU in order to insource the processing services and to improve the cost-effectiveness of the feedstock required to produce the nuclear fuel for NPP Cernavoda.

Refurbishment of nuclear units in NPP Cernavoda

Unit 1 has been in operation since 1996. The refurbishment of Unit 1 is three-phased and the actual shutdown of Unit 1 is to take place between December 2026 and December 2028.

Phase 1 (2018-2022) includes activities related to project organisation, preparation of the nuclear security documentation required to ensure the operation of Unit 1 for another 30-year cycle by extending the number of operation hours based on a study conducted by Candu Energy, and the completion of the feasibility study required to develop the refurbishment project. Phase 2 (2022-2026) of the project includes activities related to the preparation of works in the Refurbishment Project, provision of financial resources and procurement of all approvals and endorsements required. Phase 3 (2027-2028) of the project consists in shutting down Unit 1 and in the actual performance of the works in the Refurbishment Project to the unit installations.

For Unit 2, which started its commercial exploitation in 2007, the refurbishment will be initiated after 2037.

The lifespan of new and existing nuclear reactors, their impact on the energy mix and the interconnections, and export of electricity

The extension of the operating period of Units 1 and 2 of NPP Cernavoda is an efficient solution considering that extension by another lifecycle costs approximately 40 % of the value of a new equivalent capacity, enabling to secure electricity supply without greenhouse gas emissions, with a low impact on the environment, and at competitive costs, thus sustainably contributing to the decarbonisation of the energy sector and to the achievement of the energy and environment targets by Romania by 2030 in line with the objectives undertaken at European level and even globally (the Paris Agreement).

Considering that the construction/operation of future nuclear units at NPP Cernavoda (U3 is commissioned at the end of 2030 and U4 in 2031) overlaps the decommissioning of several power production capacities the lifespan of which ends, the commissioning of the new nuclear units is not projected to have a significant impact on the existing interconnections and/or the export of electricity.

Risk prevention and management

In order to protect the critical infrastructure against physical and computer attacks, and against calamities, Romania envisages the following policies and measures:

- implementing measures for the physical security of the critical infrastructure against potential terrorist acts;
- the computer security of electricity grid control systems by strengthening the protection barriers, and by international cooperation;
- ensuring maintenance and modernisation works to the overall energy system in order to keep the critical facilities at the required security standards (lakes, dikes, dams etc.);
- operationalising population warning/alarm systems and practising civil protection drills.

Specifically, the implementation of the Transelectrica projects on standardisation of communication protocols with network operators and the strengthening of efforts to prevent cyberattacks will contribute to the management of such risks. On the other hand, collaboration

partnerships between specialised cyber security centres [e.g. CERT-RO (Romanian National Computer Security Incident Response Team)] and private energy operators and support will be provided for projects involving new testing centres for industrial control equipment in terms of cyber security.

Moreover, in the framework of Regulation (EU) 2019/941 of the European Parliament and of the Council of 5 June 2019 on risk-preparedness in the electricity sector, the establishment of a competent authority at MEEMA level is envisaged and it will have the following objectives:

- to identify the national electricity crisis scenarios;
- to prepare and to adopt the risk-preparedness plans (until 5 January 2022);
- to test regularly the efficacy of the procedures developed in the risk-preparedness plans for the prevention of electricity crises, including the information exchange and cooperation mechanisms, and to run electricity crisis drills once every two years;
- to update the plans every four years, except for where circumstances justify more frequent updates;
- to issue early alerts;
- to declare the electricity crisis if the authority faces such a situation.

In regard to combating climate change, Romania will seek to implement the following policies and measures:

- reducing the risk of water deficit;
- reducing the risk of flooding;
- increasing the safety of dams and dykes;
- improving the water infrastructure;
- adjusting the existing codes and rules in the field of constructions or other codes and rules in this field in order to ensure consistency with the weather conditions and extreme events;
- adapting analysis and risk coverage plans and defence plans to emergency cases related to climate change;
- strengthening the local capacity;
- increasing the usage rate of preventive measures and good preparedness for emergency situations related to climate in key industries;
- enhancing the awareness of private owners of industrial undertakings of adaptation to climate change;
- supporting the wider use of insurance against industrial loss caused by weather conditions.

ii. Regional cooperation in this area

Romania will seek to proactively participate in the European energy diplomacy initiatives[49], as follows:

- Romania's participation in the design of the solidarity mechanisms for energy security in energy supply crisis situations;
- participation in the Central and South Eastern Europe energy connectivity (CESEC) initiative in the natural gas and electricity fields;
- securing gas supply by ensuring the correct and ongoing operation of the internal natural gas market;
- enabling the application of exceptional measures when the market is unable to supply the required gas quantities, including a solidarity measure of last resort;

[49] See CESEC 11742/2017 and Regulation (EU) 2017/1938

- establishing clear definition and allocation of responsibilities between the enterprises in the natural gas sector, Member States and the Union as regards preventive actions and the reaction to actual supply disturbances;
- establishing transparent mechanisms for coordinating the planning of measures and reactions for certain emergency situations at national, region and Union level.

iii. Where applicable, financing measures in this area at national level, including Union support and the use of Union funds

As a priority, Romania will facilitate the funding of the following capacities to ensure a diversified and balanced energy mix with the purpose of securing energy supply by 2030:

Type of source	New production capacities (2021-2030)	Capacity (Production of electricity MWe/ Production of heat MWt)	SACET (MWe) (MWt)	Industrial clients (MWe) (MWt)
Nuclear energy	CANDU	675		
Natural gas	CCGT	1 600/ -		
Natural gas	CHP	1 302 /1 214	952/914	350/300
Hydro (watercourse/reservoir)	Units > 10 MW	1 088		
RES	Wind	2 302		
SRE	Photovoltaic	3 692		

Source: Deloitte calculation based on the information submitted by the INECP Interinstitutional Working Group and of the Commission's recommendations

- the construction of a new 200 MW gas-fired block with flexible operation in SE Craiova, which entails the construction of a gas-fired high-efficiency cogeneration unit to supply heat to Craiova Municipality and the economic operators (Ford etc.), which will replace the current lignite-fired energy capacities of 2 x 150 MW;
- the construction of a new 400 MW unit with CCGT technology in SE Turceni, which entails the construction of a high-efficiency energy unit with flexible operation (2 gas turbines and one recovery tank + steam turbine), which will replace a current 300 MW lignite-fired capacity in SE Turceni;
- the construction of two 400 MW units with CCGT technology in SE Işalnița, which entails the construction of high-efficiency energy units with flexible operation, which will replace units 7 and 8 having a current lignite-fired capacity of 2 x 315 MW in SE Işalnița;
- speeding up the initiation of the investment for developing a new mixed cycle gas-fired energy capacity in the North-West area (Mintia);
- the construction of a new unit of approximately 70 MW in Midia;
- the implementation of combined cycle cogeneration units at CTE Grozăvești, which entails developing a new high-efficiency cogeneration unit for production of energy in a combined gas-fired gas-steam cycle technology;
- the implementation of a combined cycle cogeneration unit at CTE Bucharest South, which entails developing a new high-efficiency cogeneration unit (gas-steam combined cycle) of approximately 200 MWe and 200 MWt;

- the implementation of a gas-fired new high-efficiency cogeneration capacity for production of energy at CTE Progresu;
- the rehabilitation of the combined cycle of CTE Bucharest West in order to extend its lifespan/implementation of a new combined cycle unit of approximately 186 MWe and 170 Gcal/h;

At the same time, having regard to the RES indicative trajectory that must be reached for the time horizon 2022, 2025 and 2027, the RES-E projects will be considered equally a priority and the aim is to deploy an additional wind energy capacity of 2 302 MW and a solar energy capacity of 3 692 MW.

By their participation in the achievement of the targets committed to in this Plan, the projects classified as "priority" projects will be taken into account in the determination of criteria for access to the funds offered through the Modernisation Fund and the Just Transition Fund in a transparent and non-discriminatory manner.

3.4. Dimension internal energy market

3.4.1. Electricity infrastructure

i. Policies and measures to achieve the targeted level of interconnectivity as set out in point (d) of Article 4

A target of at least 15 % by 2030 was established at EU level for the level of interconnectivity of electricity grids. Through the measures and policies defined in order to develop the electricity infrastructure, Romania thus undertakes to achieve an interconnection rate of at least 15.4 % in 2030.

The relevant policies and measures considered by Romania are described below and ordered by their interaction with other dimensions of the Plan: main vector in the trans-sectoral impact, secondary effect of measures pertaining to other dimensions and to the dimension concerned.

<u>The internal energy market (electricity infrastructure) - main dimension</u>

The development of these projects will also improve the energy security of Romania, considering the facilitation of cross-border trade, in particular in emergency cases.

Developing the electricity infrastructure, thus reaching an interconnectivity rate of at least 15.4 %

In order to reach the interconnectivity rate, the ETG Development Plan includes the following projects:

- ✓ the 400 kV OPL Nădab – Oradea South;
- ✓ the 400 kV OPL Iron Gates - Reșița and extension of the 220/110 kV Reșița Station by building a new 400 kV station;
- ✓ the 400 kV OPL in double circuit Cernavodă – Stâlpu, with an entry/exit circuit in Gura Ialomiţei station;
- ✓ the 400 kV OPL in double circuit Reșița - Timișoara - Săcălaz, including construction of the 400 kV Timișoara station;
- ✓ the 400 kV OPL in double circuit (equipped circuit) Smârdan – Gutinaș;
- ✓ the 400 kV OPL in double circuit Timișoara – Săcălaz - Arad, including the construction of the 400 kV Săcălaz station and extension of the 400 kV Arad station.

The above projects are a priority in the achievement of the objectives stipulated in the EU directives/regulations on the interconnectivity rate of electricity grids in 2030 (15 % of the total installed capacity in 2030).

The minimum available capacity for cross-border trade

Preparing a methodology/list of projects in the first half of 2020, which includes long-term solutions to enable Transelectrica to meet the obligation under Article 16(8) of Regulation (EU) 2019/943 - "Transmission system operators shall not limit the volume of interconnection capacity to be made available to market participants as a means of solving congestion inside their own bidding zone or as a means of managing flows resulting from transactions internal to bidding zones" and "(...) following minimum levels of available capacity for cross-zonal trade are reached: (a) for borders using a coordinated net transmission capacity approach, the minimum capacity shall be 70 % of the transmission capacity respecting operational security limits after deduction of contingencies, as determined in accordance with the capacity allocation and congestion management guideline adopted on the basis of Article 18(5) of Regulation (EC) No 714/2009".

Other policies/measures pertaining to the dimension

In order to achieve the abovementioned investments/objectives, the following will also be considered:

- implementing Law No 120/2019 on certain measures required to perform the works and to implement projects of national importance regarding the electricity transmission grid, whereby "the competent authority" (the authority designated at national level to be responsible for facilitating and coordinating the authorisation process for projects of national importance regarding electricity transmission is the Ministry of Energy, Economy and the Business Environment in accordance with the legal rules on authorisation of construction works) issues construction permits;
- supporting projects involving the deployment of electricity transmission lines at central and local authority level. Therefore, project inter-cooperation methods must be established with these central and local authorities, such as setting up working groups designated at central and local level per county for the settlement of aspects/issues/delivery of opinions/etc. in connection with the development of projects;
- setting up a one-stop shop for infrastructure projects (construction of electricity transmission lines) for the delivery of opinions needed in order to issue construction permits;
- (sequence) expropriation of the entire safety corridor of an OPL.

ii. Regional cooperation in this area[50]

Not applicable

iii. Where applicable, financing measures in this area at national level, including Union support and the use of Union funds

- Projects may be funded from external non-reimbursable funds and from the own funds of the transmission system operator (e.g. electricity transmission tariff and/or other revenues - ETG connection charge, procurement procedures for interconnection capacities etc.).

[50] Other than the PCI Regional Groups established under Regulation (EU) No 347/2013

See also Chapter 5.3.

3.4.2. The power transmission infrastructure

i. Policies and measures related to the elements set out in point 2.4.2, including, where applicable, specific measures to enable the delivery of Projects of Common Interest (PCIs) and other key infrastructure projects

According to the competences and duties established under the Law on electricity and natural gas and the Specific Licensing Conditions, Transelectrica plans to develop the ETG taking into account the current stage and the projected trend in consumption, the production park and the electricity exchanges, and prepares a development plan every two years for the following successive ten years, which is submitted to ANRE for approval and to the grid owner (the Romanian Government).

Considering that the Development Plan is based on the strategies and policies of the Romanian Government, and on the objectives of the new Union policy on energy and climate change, the Plan sets out the measures required to develop the projects deemed essential for the electricity transmission infrastructure.

Similarly, having regard to compliance with Article 22 of Directive 2009/73/EC and to the duties established under the Law on electricity and natural gas, Transgaz prepares a development plan annually for a period of ten years, which is submitted to ANRE for approval and to the grid owner (the Romanian Government). In the preparation of the latest edition (2019-2028), Transgaz also considered including an elaboration of the measures regarding the funding of the major projects referred to in the Plan (estimated at EUR 1.25 billion, of which 65 % is estimated to be covered from attracted sources).

Moreover, in order to facilitate decarbonisation, decentralisation of production and digitalisation of the energy sector in order to have more connected, efficient and sustainable energy systems, an assessment is needed in regard to the current technical condition of the electrical equipment and installations of electricity transmission and distribution grids, and to the costs of investments required for the efficient management of the grid.

ii. Regional cooperation in this area[51]

The Government of the Republic of Moldova and the Romanian Government signed a Memorandum of Understanding in 2015 for the development of projects required for the interconnection of natural gas and electricity networks between the Republic of Moldova and Romania.

In this respect, the asynchronous interconnection of the electricity systems of the Republic of Moldova with those of Romania is planned through the implementation of the project involving construction of the Back-to-Back station Vulcăneşti + 400 kV OPL Isaccea-Vulcăneşti-Chişinău.

The interconnection works within the territory of the Republic of Moldova are funded under the Loan Agreements signed with the European Bank for Reconstruction and Development and the European Investment Bank. Within the territory of Romania, Transelectrica will perform the required works to Vulcănești station and on the Isaccea – Vulcănești line[52].

[51] Other than the PCI Regional Groups established under Regulation (EU) No 347/2013
[52] Extract from the Protocol of the Nineth Session of the Mixed Intergovernmental Commission for Economic Collaboration between the Republic of Moldova and Romania, Chișinău (November 2018)

iii. Where applicable, financing measures in this area at national level, including Union support and the use of Union funds

Romania will use the EU funds to strengthen the administrative and institutional capacity and for technical assistance in the development of strategic infrastructure projects.

See also paragraph 5.3 herein above.

3.4.3. Market integration

i. Policies and measures related to the elements set out in point 2.4.3

The relevant policies and measures considered by Romania are described below and ordered by their interaction with other dimensions of the Plan: main vector in the trans-sectoral impact, secondary effect of measures pertaining to other dimensions and to the dimension concerned.

Trans-sectoral policies and measures

1) Internal market - main dimension

Liberalisation of energy markets

Romania aims at de-regulating the internal energy and gas markets in order to ensure harmonisation with the Community acquis. The deregulation calendar targets the staged liberalisation to ensure that the impact of transition on the consumer is low, as much as possible. Moreover, the liberalisation measures are purposed to develop a legislative framework that is favourable for investments that may contribute to energy security, also enhancing the flexibility of the national energy system. In this respect, the main measures are:

- Implementation of a deregulation calendar – **electricity**

  Having regard to Regulation (EU) 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity, the Regulatory Authority approved the rules for removing and/or mitigating the impact of certain measures or policies that are likely to contribute to pricing restriction on the electricity market. This order also provides for the deregulation calendar with the following characteristics:
  - ✓ producers holding/commercially operating dispatchable nuclear and hydro power units/plants must supply to suppliers of last resort the quantity of electricity required to secure the consumption of household consumers under conditions regulated by ANRE only until 31 December 2020;
  - ✓ ANRE will approve the prices charged by suppliers of last resort to household consumers only until 31 December 2020;
  - ✓ from 1 January 2020 onward, competitive prices will be charged to non-household consumers as beneficiaries of the universal service and to non-household consumers who had not been entitled to eligibility.

  Therefore, from 1 January 2021 onward, the energy market will be fully liberalised and the consumption demand of household consumers will be covered exclusively by competitive transactions, the price for the electricity supplied to household consumers being determined by suppliers.

- Implementation of a deregulation calendar – **natural gas**

  In accordance with Government Emergency Order No 1/2020 regarding certain fiscal-budgetary measures and amending and supplementing certain legislative acts, producers, including their subsidiaries and/or affiliates belonging to the same group of

economic interest engaged in natural gas extraction and sale of gas extracted within the territory of Romania, must sell the quantities of natural gas from the current domestic production to suppliers of household consumers and to heat producers at the price of RON 68/MWh **by 30 June 2020**.

Moreover, the draft law provides for limited supply of natural gas at the regulated price and under the framework contracts **by 30 June 2020** for household consumers.

In conclusion, full liberalisation of the natural gas market starts on **1 July 2020**.

- The right of production operators, energy storage operators and supply operators to enter and exit the energy market based on the assessment of the economic and financial viability of the business

- The conduct of transactions in electricity (subject to compliance with competition rules) on the electricity markets, including non-regulated markets and electricity stock markets, markets for trade in electricity, capacities, balancing services and system services within all the time intervals, including futures markets, day-ahead markets and intra-day markets

  In the light of Article 10 of Regulation (EU) 2019/943, Romania already submitted a report to the Commission regarding the identification of inconsistencies that would not allow the application of the Regulation provisions and which are likely to have direct and/or indirect implications for pricing on the wholesale electricity market, presenting legislative acts already issued in order to remove these inconsistencies and measures envisaged in order to further remove them.

Regional integration of the internal energy market

The Romanian authorities, together with the participants in the internal energy market (e.g. OPCOM, Transelectrica etc.), are engaged in the initiatives meant to facilitate the integration of the electricity market at regional level.

- The participation of OPCOM and Transelectrica in any initiative meant to facilitate the integration of the electricity market in Romania in the internal energy market

  OPCOM is engaged in the implementation of Commission Regulation (EU) 2015/1222 establishing a guideline on capacity allocation and congestion management in the context of creating and achieving the Single Day-Ahead Coupling (SDAC) and the Single Intra-Day Coupling (SIDC), involving the corresponding contractual framework.

  With regard to OPCOM's participation in the European **SDAC** implementation, development and operation process, the following actions were carried out:
  - ✓ OPCOM is part of the operational contractual framework for cooperation of TSOs and DEMOs pertaining to the creation, development and operation of SDAC. In this respect, OPCOM participates directly in the SDAC creation and operation activities, including as regards performance of joint activities, participation in the development process (including the development of the coupling infrastructure, PCR), implementation.
  - ✓ The day-ahead market in Romania, which is administered by OPCOM, has been functioning since 19 November 2014 under a coupled regime with the markets in the Czech Republic, Slovakia and Hungary ("4M MC") based on the PCR (Price Coupling of Regions) solution, which is the coupling solution for SDAC.
  - ✓ The national regulatory authorities in Austria, Germany and Poland, together with the 4M MC countries (the Czech Republic, Hungary, Romania and Slovakia)

initiated together an interim NTC-based market coupling project. OPCOM and Transelectrica participate in the development and implementation of the DE-AT-PL-4M MC ("Interim Coupling"). This project aims at achieving coupling between 4M MC and Poland and the Multi-Regional Coupling (MRC) by the implementation of the NTC-based implicit allocation for related borders and the single coupling of day-ahead markets (SDAC). Operation is estimated to start in the third quarter of 2020.

- ✓ National authorities, transmission system operators and DEMOs in Romania and Bulgaria have initiated a NTC-based project of day-ahead markets coupling between the two countries. The project is estimated to be completed in December 2020; OPCOM and Transelectrica are part of the Core Flow-Based Market Coupling Project, which is purposed to achieve the development and implementation of a flow-based day-ahead market coupling throughout the Core region (Austria, Belgium, Croatia, the Czech Republic, France, Germany, Hungary, Luxembourg, the Netherlands, Poland, Romania, Slovakia and Slovenia) under the single day-ahead market coupling (SDAC) project. Operation is estimated by the parties to the Core Flow-Based Market Coupling Project to start in 2021 and the exact time will be confirmed depending on the progress of the project development activities and on the decisions of ACER and the European Commission, where applicable

Following the approval by the national regulatory authorities in the two countries, the TSOs and market operators in Romania and Bulgaria decided, at the end of November 2019, to initiate a project for the implementation of day-ahead electricity markets coupling by rendering them operational under a coupled regime and by integrating them in the SDAC single coupling also, at the same time taking into account the progress of the coupling projects already under implementation. The aim of the project for the implementation of the coupling of market zones in Romania and Bulgaria (BG-RO MC Project) was to implement the implicit NTC-based allocation on this border by applying the PCR coupling solution and the SDAC operational rules and procedures. The project activities started with a general implementation calendar agreed upon and the cooperation reference terms, which were sustained by the national regulatory authorities in the two countries. According to current estimations, operation is due to start in December 2020.

With regard to OPCOM's participation in the European **SIDC** implementation, development and operation process, the following actions were carried out:

- ✓ OPCOM is part of the operational contractual framework for cooperation of TSOs and DEMOs pertaining to the creation, development and operation of SIDC. In this respect, OPCOM participates directly in the SIDC creation and operation activities, including as regards performance of joint activities, participation in the development process (including the development of the coupling infrastructure, XBID), implementation.

The second XBID operationalisation wave was launched on 19 November 2019 and it concerned the integration of the borders pertaining to the integration of the bidding zones in Bulgaria, Croatia, the Czech Republic, Hungary, Poland, Romania and Slovenia in the already coupled area (the first coupling wave included Belgium, Denmark, Germany, Estonia, Finland, France, Latvia, Lithuania, Norway, The Netherlands, Austria, Portugal, Sweden, and Spain). In 2019, the President of ANRE approved Order No 202/2019 amending the Regulation for scheduling production units and dispatchable consumers, as approved by Order No 32/2013 of the National Energy Regulatory Authority, and repealing the Rules of organisation and functioning of the intra-day electricity market approved by Order No 73/2013 of the President of the National Energy Regulatory Authority and endorsed the Procedure for the functioning of the intra-day electricity market, which was prepared by Opcom SA, under Opinion No 89/2019. Both documents were required to launch, on 19 November 2019, the second wave of coupling of the intra-day electricity markets by local projects; Romania has

thus adopted the single European solution of intra-day markets coupling in accordance with Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management and with its subsequent documents approved by all the regulatory authorities in the EU Member States or by ACER.

By extending the operation of the intra-day market to the regional level and adopting a single European solution, the liquidity of the intra-day market is expected to increase, ensuring a reduction in the share of the balancing market and more accurate balancing of participants, the better use of the production capacity and resources, the optimal use of the cross-border transmission capacity and, last but not least, as a direct consequence, the enhanced security of supply for consumers in Romania.

The preparation of a common capacity calculation methodology in the SEE region (Romania, Bulgaria and Greece) and participation in the regional operational security coordination (RSC) centre in the SEE regions (Romania, Bulgaria, Greece) and GRIT (Greece, Italy).

- ✓ The development of a common capacity calculation methodology in the SEE CCR capacity calculation region comprising Bulgaria, Romania and Greece as Member States. The project concerns the preparation of a common capacity calculation methodology, which is harmonised at SEE CCR level, including EU Member States, i.e. Romania, Bulgaria and Greece, more specifically the Romania-Bulgaria and Bulgaria-Greece borders. The daily and intra-day capacity calculation methodology within the SEE CCR was prepared by the Transmission System Operators in Romania, Bulgaria and Greece and was approved by the national energy regulatory authorities in Romania, Bulgaria and Greece, as EU Member States, on 10 April 2019. Insofar as they are ready, the WB6 countries (the six countries in the Western Balkans), for which the capacity calculation methodology was prepared by the Energy Community, will also adhere to the project. The methodology is pending approval and implementation under a project administered by the Energy Community.

The EU energy law [the Third Energy Package under Commission Regulation (EU) 2017/1485 and Commission Regulation (EU) 2015/1222] imposes on Member States and, in particular, on electricity transmission system operators, the obligation to develop and strengthen cooperation at regional level for the coordinated operation of power systems.

Through the energy borders with its neighbouring countries that are EU Member States (Hungary and Bulgaria), Romania is part of two cross-border transfer capacity coordinated calculation regions:

- ✓ By the Romania-Hungary border, Romania is part of the "Core" cross-border transfer capacity coordinated calculation region. In terms of regional operational security coordination services, this region is served by the regional operational security coordination centre TSCNET Services GmbH (registered in Germany). Transelectrica is a shareholder of TSCNET Services GmbH since 2018.

- ✓ By the Romania-Bulgaria border, Romania is part of the South-East Europe (SEE) cross-border transfer capacity coordinated calculation region.

In terms of regional operational security coordination services, this region will be served by a self-standing legal entity exercising the role of regional operational security coordination centre (hereafter SEE RSC).

Transelectrica will participate in the establishment of the regional operational security coordination centre (RSC), which will take place in Thessaloniki, Greece and will serve the SEE cross-border transmission capacity coordinated calculation regions (Bulgaria, Greece, Romania) and GRIT (Greece, Italy).

Implementing a capacity mechanism

The implementation of a capacity mechanism will lead to the improvement of the **energy security** parameters. The mechanism is purposed to provide for additional production capacities alongside the active capacities on the electricity market, which are required in order to maintain balance between generation and consumption of electricity in extraordinary unpredictable cases, having regard to the particularities of the energy market in Romania. The capacity mechanism thus intervenes to secure supply when the offer on the electricity market becomes scarce, despite the free prices, in order to enable balance between offer and demand.

At a first stage, the Ministry of the Economy, Energy and the Business Environment intends to conduct a study on the development of a capacity mechanism adapted to the specific conditions of Romania. The study outputs will inform the discussions with the European Commission in the context of the implementation of such mechanism.

Developing a support mechanism of the Contracts for Differences (CfD) type

The CfD instrument constitutes a transparent and non-discriminatory mechanism addressed to all investments in the production of low-carbon electricity. Its characteristics are a key element with integrated effects for the **Decarbonisation** (energy from RES) and **Energy Security** Dimensions.

In the context of the targets undertaken in this plan for 2030 as regards the share of energy produced from renewable sources, the mechanism will provide adequate support in order to achieve these targets. Unlike the current support mechanism for renewable energy sources regarding the green certificates market, the implementation of a CfD mechanism may provide additional benefits and an attractive and predictable environment for investors, such as:

- ✓ bringing about enhanced safety and stability of revenues by removing exposal to the volatile prices on the wholesale market;
- ✓ avoiding overcompensation of producers when the electricity price rises above the strike price;
- ✓ protecting producers from price fluctuations on the market;
- ✓ protecting consumers from the payment of the support when the price on the electricity market rises;
- ✓ safeguarding a contractual agreement under the law for a predetermined period, which provides reasonable flexibility for project developers and protection against unexpected changes;
- ✓ providing enhanced safety for investors: once the contract has been signed, investors are capable of implementing projects without being affected by the political risk or by the fact that the market trend is likely to affect the return on the projects to a significant extent;
- ✓ in order to support the necessary investments, the CfD mechanism must provide for a clear and transparent framework that addresses the risks to which long-term investments are exposed, and be reliable and predictable to investors;
- ✓ in correlation with the trend in the decommissioning of certain capacities and against the background of the additional capacity needs (determined by the increase in the demand), new production units could benefit from the CfD mechanism under bidding procedures in the sense that support would be geared by the lowest price offered by an investor/developer;
- ✓ Transition from fixed subsidies for RES to their determination under a competition is an advantageous mechanism, particularly in terms of costs, because it leads to a more efficiency allocation of capital expenses in the context of building the RES production units.

The technologies considered as potential beneficiaries of a CfD scheme are:

- ✓ technology for use of renewable sources;
- ✓ nuclear technology;
- ✓ storage of electricity.

The implementation of a CfD mechanism for low-carbon technologies requires a complementary legislative and regulatory framework which elaborates on the implementation elements.

Long-term power purchase agreements with clients (PPA)

This type of contract supports consumers who wish to purchase solely renewable energy, generating a positive impact under the **Decarbonisation** dimension (RES). Typically, a PPA is a long-term energy supply bilateral contract concluded between the client (buyer) and the energy producer (seller).

The contract provides for the supply of an hourly quantity of electricity (with related guarantees of origin) depending on the consumption profile of the final consumer. Moreover, it provides the consumer with the opportunity of negotiating their contract directly with the electricity producer, at the same time being independent and secured against energy price fluctuations in cases of high demand.

Other policies/measures pertaining to the dimension

Amending the primary and secondary law in order to remove any inconsistencies that would not allow for the application of Regulations (EU) 2019/943 and 2019/941 and Directive (EU) 2019/944 on common rules for the internal market for electricity

Moreover, as a horizontal measure, which spreads through any initiative of the public sector, the quality of the administrative act in the energy sector will be improved by:

- cutting red tape through enhanced transparency, digitalisation and introduction of the one-stop shop;
- introducing the best practices on transparency and responsibility in the interaction between the user and the administrative system;
- developing institutional mechanisms (such as whistle blowers);
- removing the conflict of interests between public institutions and State-owned energy companies.

ii. Measures to increase the flexibility of the energy system with regard to renewable energy production such as smart grids, aggregation, demand response, storage, distributed generation, mechanisms for dispatching, re-dispatching and curtailment, real-time price signals, including the roll-out of intraday market coupling and cross-border balancing markets

The improvements to the internal market will generate multiplied effects and support under all the dimensions prioritised in the INECP, being a key factor in:

Digitalisation of the Romanian energy system (smart grids)

The digitisation of the Romanian energy system, including transmission and distribution grids (smart grids), plays an essential role in increasing production of energy from renewable sources and in turning the Romanian energy market into a "fit-for-RES" market, and in increasing integration of RES. In order to achieve this objective, Romania seeks to introduce smart meters and grids in the energy systems.

- The introduction of smart meters in the energy systems must constitute a national priority as a first step in the digitisation of the infrastructure. Smart metering is recognised for its benefits for final consumers, utilities companies and the whole energy system, including benefits for the environment, by enhancing energy efficiency and the RES integration in the NES. Smart grids will also integrate grid-to-vehicle (G2V) and vehicle-to-grid (V2G) solutions, which enable the staged introduction of RES projects and the enhanced reliability of the energy system.
  The National Energy Regulatory Authority (ANRE) thus approved in 2019 the "Calendar of implementation of electricity smart measurement systems (SMS) at national level for the period 2019-2028". The mounting of smart measurement systems is free of charge for final consumers and distribution system operators are to recover their costs through the distribution tariff.

Table 20 – calendar of implementation of electricity smart measurement systems

Year	Annual number of users newly integrated in SMS
2019	220 901
2020	394 472
2021	418 786
2022	414 942
2023	403 061
2024	442 537
2025	430 945
2026	427 160
2027	448 116
2028	433 510
Total	**4 034 430**

Source: Decision No 778/8 May 2019 of ANRE approving the Calendar of implementation of electricity smart measurement systems (SMS) at national level for the period 2019-2028

- digitalisation, which will enable "smart" buildings, vehicles and industrial installations to supply new flexible energy system loading sources, which can support prosumer communities;
- correlation of the three objectives that will dominate this field, not only conceptually, namely decentralisation, development, digitalisation;
- digitalisation of energy efficiency from a holistic viewpoint, at system level, which includes both traditional efficiency in final use, and the flexibility on the demand side.

Coupling cross-border balancing markets

Transelectrica participates in the European process of implementation, development and operation of joint platforms on which balancing energy stocks will be traded, in this respect taking the following actions:

Transelectrica acts as an observer in the TERRE project and participated in the preparation of the implementation framework for the LIBRA platform and in the completion of the design elements for this platform. For the time being, Transelectrica will keep its position of observer because it is an isolated TSO on the list of transmission system operators using replacement reserves in Eastern Europe. However, the provisions of Regulation (EU) 2017/2195 will be complied with by remodelling the platform of the balancing market at national level and by

using this type of reserve with the same characteristics, bidding method, and selection of bids so that, whenever one of the neighbouring TSOs requests entry to this regional balancing energy market, Romania is ready for coupling.

The extension of the balancing market at regional level starts in 2020, with the launching of the LIBRA information platform, where replacement reserves will be traded in accordance with Article 19 of Regulation (EU) 2017/2195 and in 2022, the operation of the balancing market is to be extended to the European level for frequency restoration reserves, which are traded on other two dedicated platforms under Articles 20 and 21 of the same Regulation.

Balancing energy reserves will be thus traded on three market platforms designed and developed by transmission system operators under the projects:

- ✓ TERRE (Trans European Replacement Reserve Exchange) concerns design, development and operation of the replacement reserve (RR) trading platform;

- ✓ MARI (Manually Activated Reserves Initiative) concerns the design, development and operation of the manual frequency restoration reserve (mFRR) trading platform;

- ✓ PICASSO (Platform for the International Coordination of Automated Frequency Restoration and Stable System Operation) concerns the design, development and operation of the automated frequency restoration reserve (aFRR) trading platform.

Transelectrica is a member in the MARI and PICASSO projects, having a contribution, alongside the other member TSOs, to all the stages of design, development and operation of the mRRF and aRRF trading platforms.

All the transmission system operators carrying out the automated frequency restoration process (aRRF) in accordance with Article 22 of Regulation (EU) 2017/2195 and under Part IV of Regulation (EU) 2017/1485 must put into service and use the European platform for the imbalance netting process. The ENTSO-E Market Committee chose the existing IGCC (International Grid Control Cooperation) project to become the future European imbalance netting platform. The main benefit of using the imbalance netting platform is the reduction in the quantity of aRRF activated balancing energy, with direct consequences for the costs on this market, possibly in the sense of their reduction. CNTEE Transelectrica SA is a member in the IGCC platform extension project, contributing to the modernisation and adaptation solutions for this platform in line with Regulation (EU) 2017/2195. At the same time, it conducts the operations involving the upgrading of the local equipment in order to be able to actively participate in the IGCC platform starting with the third quarter of 2020.

Harmonisation of the imbalance netting interval every 15 minutes at European level is requested from the beginning of 2021, which is an obligation imposed on all transmission system operators in accordance with Article 53 of Commission Regulation (EU) 2017/2195 and with Article 8(4) of Regulation (EU) No 2019/943. The objectives of this action are: to promote intra-day trading and to develop commercial products with the same supply intervals in order to provide market participants with the possibility of balancing themselves as close as possible with the actual time.

Transelectrica, as a national coordinator and responsible authority for this action, collaborates with distribution system operators, relevant associations/organisations (RWEA, ACUE, COGEN, PATRES), OPEE and PRE in the process of adaptation of the measurement equipment and modernisation of data aggregation and processing platforms. Transelectrica prepared a proposal for a programme of implementation of the measures needed to provide for the settlement conditions on the wholesale electricity market at 15 minutes by the deadline of 1 January 2021, as required by Regulation (EU) 2019/943. The OMEPA Measurement Directorate

of Transelectrica updated the existing platform as a temporary solution to provide for the implementation of settlement at 15 minutes and initiated data exchange tests with distribution system operators. Moreover, the settlement operator will implement, by 1 January 2021, the changes required for transition to settlement on the wholesale electricity market at 15 minutes.

Connection of renewable energy sources

The connection of renewable energy sources to the electricity grids requires special measures at system level in order to maintain the security in the operation of energy systems and the increase in the number of producers with uncontrollable output leads to an increase in the frequency of occurrence of network congestions. In this respect, the transmission system operator included investment measures in the ten-year ETG Development Plan, which provide the necessary support to discharge, without major restrictions, the electricity produced by wind power plants in the Dobrogea and Moldova areas as well as in Banat and Southern Muntenia.

2) Internal market - secondary dimension

- Fostering the development of the energy storage capacities is one of the key factors under the Energy Security dimension, which impacts the Internal Market. The implementation of these initiatives will lead to an increase in the competitiveness of the internal energy market, having a positive impact on the prices in the energy supplied to final consumers. The specific measures and policies are reflected in Section 3.3.
- Supporting research-innovation initiatives and gradually adopting technologies with proved functionality and benefits in areas such as the Internet of Things, decentralised storage, blockchain and smart applications by strengthening the public-private partnership
- Implementing demand response measures

  The implementation of demand response measures entails adaptation of prices in order to trigger a change in the consumers' behaviour from load peak hours to no-load hours. This will contribute to the increase in the competitiveness of electricity producers.

- Aggregation

  Final consumers may participate in organised electricity markets either directly or by aggregation if they have power above 500 kW approved in the connection certificate. If they have such approved power up to 500 kW inclusive, final consumers may participate in organised electricity markets excluding aggregation.

iii) Where applicable, measures to ensure the non-discriminatory participation of renewable energy, demand response and storage, including via aggregation, in all energy markets

Currently not applicable.

iv) Policies and measures to protect consumers, especially vulnerable and, where applicable, energy poor consumers, and to improve the competitiveness and contestability of the retail energy market

See point 3.4.4.

v. Description of measures to enable and develop demand response, including those addressing tariffs to support dynamic pricing[53]

See Chapter 2.4.3

3.4.4. Energy poverty

i. Policies and measures related to the elements set out in point 2.4.4

Romania intends to prepare and to implement a series of measures and policies designed to reduce energy poverty. Moreover, energy efficiency measures dedicated to vulnerable consumers are envisaged in order to reduce final consumption, which impact electricity and heat costs positively.

The relevant policies and measures considered by Romania are described below and ordered by their interaction with other dimensions of the Plan: main vector in the trans-sectoral impact, secondary effect of measures pertaining to other dimensions and to the dimension concerned.

Trans-sectoral policies and measures

1) Internal market - main dimension

- Regulating and defining the vulnerable consumer and means for their financing

  In accordance with Government Emergency Order No 1/2020 regarding certain fiscal-budgetary measures and amending and supplementing certain legislative acts, the Romanian Government will regulate, by 31 December 2020, on the initiative of the relevant ministry, the legal status and regime of the vulnerable consumer and the means for their financing.

  Moreover, at the end of 2020, ANRE approved Order No 235/2019 approving the Regulation for supply of electricity to final consumers. In accordance with the regulation, the vulnerable consumer is considered to be the person with low income and/or with health conditions, electricity suppliers having a series of obligations in relation to the respective persons - securing the supply of electricity as a priority, limiting planned interruptions and prohibiting disconnection from the electricity grid in electricity crisis situations.

Other policies/measures pertaining to the dimension

The Ministry of the Economy, Energy and the Business Environment collaborates with the Ministry of Labour and Social Protection, which is responsible for preparing the national action plan for energy poverty cases, which defines the critical situations and the consumers who cannot be disconnected in such situations, and specifies the recovery of related costs by operators under a specific procedure approved under a Government decision on a proposal from ANRE.

According to the National Strategy for Social Inclusion and Reduction of Energy for 2015-2020 and to the Strategic Action Plan for 2015-2020, policies aim directly at reducing poverty and enhancing social inclusion in several key fields: social assistance and social security rights, energy poverty, employment, education, health, social participation and social services.

[53] In accordance with Article 15(8) of Directive 2012/27/EU

The social protection measures in the Strategic Action Plan also include improving the performance of the social assistance system to protect low-income persons and one of the specific objectives is to protect low-income and vulnerable consumers against the shocks generated by an increase in energy prices. The responsibility for the achievement of these objectives lies with the Ministry of Labour and Social Protection.

- providing for non-financial support for vulnerable low-income consumers by providing for the possibility of payment rescheduling (staggered payment of the electricity bill);
- implementing the National Social Assistance Computer System;
- Romania grants aids for home heating in accordance with Government Emergency Order No 70/2011, as repealed and replaced by Law No 196/2016, which should produce effects as of 1 April 2021.

  In order to ensure the fair granting of heat subsidies, the development of the national social assistance computer system is a prerequisite for building the capacity of the local public administration authorities. They will ensure the computer processing of data on the applicants and verification of the eligibility criteria for the categories of vulnerable consumers. The subsidy, which is currently applicable to all heat consumers, will be granted only to vulnerable consumers who have been identified as such by the responsible authorities in accordance with Law No 196/2016.

  Law No 123/2012 on electricity and natural gas, as subsequently amended, currently provides for the possibility of establishing a solidarity fund to financially support the vulnerable consumer.

  Another important element in the achievement of the energy poverty objectives is ensuring just transition, in terms of social and economic impact, for the mono-industrial regions (e.g. Valea Jiului or other areas which are dependent on the coal industry or on other energy intensive sectors). The following initiatives have been thus put in place:

  - ✓ Valea Jiului is included on the European Commission's Platform for Coal Regions in Transition. In this context, the Romanian State obtained support from the Commission to fund the study on the preparation of a transition strategy for Valea Jiului through the Structural Reform Support Service (SRSS) Programme. This programme will be coordinated by the Ministry of European Funds and will be initiated in 2020, being planned to be completed within 9 to 12 months from the commencement date.
  - ✓ It has been envisaged, for the financial year 2021-2027, to consider this region for Integrated Territorial Investment allocations. Such an initiative would replicate the good practices derived from the actions carried out to develop the Danube Delta, with the advantage of programmes designed according to the specificity and needs of the territory - demographic structure, migration intensity, number and specificity of jobs, and the potential that may be tapped.
  - ✓ On the initiative of the private sector, the Ministry of the economy, Energy and the Business Environment will support the project for the retraining/training centre in Valea Jiului. Its objective involves reallocation, reskilling and improvement in the workers' competences, education, initiatives related to job searching and start-ups in dialogue with social partners. The retraining possibility will also be considered for business sectors with significant labour shortage, such as constructions or the rail and road infrastructure. The aim will be to obtain funds from the Modernisation Fund under the ETS Mechanism, Phase 4 (2021-2030). Moreover, the Ministry of European Funds launched the Human Capital Operational Programme with a budget of EUR 2 million at the beginning of 2020, which involves the improvement of professional competences and the increase in the employment rate for the

unemployed and inactive people in Valea Jiului. The maximum value of a project that may be submitted is EUR 400 000, each project supporting at least 100 persons. Future projects will be implemented in the Petroșani, Vulcan, Petrila, Aninoasa, Lupeni and Uricani localities.

3.5. Dimension research, innovation and competitiveness

i. Policies and measures related to the elements set out in point 2.5

The programmes fostering research/innovation (R-I) activities, which are clustered around the relevant ministry, are designed under a generalised framework, fundamental research being considered the priority activity for any field, including the energy sector. Considering the current constraints, the development of this sector must rest upon the need to prioritize projects, thus making better use of the existing research infrastructures in Romania.

The relevant policies and measures considered by Romania are described below and ordered by their interaction with other dimensions of the Plan: main vector in the trans-sectoral impact, secondary effect of measures pertaining to other dimensions and to the dimension concerned.

Trans-sectoral policies and measures

1) R-I main dimension

The adoption of advanced technologies in the energy sector is the main action line from the viewpoint of the research, innovation and competitiveness dimension. Moreover, this action line is purposed to support and to propagate beneficial effects through the research-innovation modules and the other INECP dimensions.

From the viewpoint of **decarbonisation** and reduction of GHG emissions, the adoption of new technologies will be speeded up by strengthening a legal framework dedicated to the research-innovation activities, developing educational resources at all levels, increasing the number of research-innovation projects within State-owned companies, and tactical actions for specific initiatives, such as projects for promoting the use of hydrogen.

The organised efforts for the legal framework for granting tax facilities will thus be enhanced mainly by strengthening the following measures:

- the additional deduction of research-development costs on calculation of the income tax;
- the full exemption from the payment of the income tax for a period of ten years for companies carrying out solely research-development activities;
- exemption from the payment of the income tax for the remuneration costs of persons included in the research-development and innovation projects;
- the projects regarding intellectual property rights would require designing a favourable legal framework. From this viewpoint, measures may be provided for the investment effort at the stage of research or for the operating period. A good practice example consists in levying a low tax for profits gained from the use of intellectual property rights;
- the selection of priority areas and the tactical initiatives presented in the INECP must be completed by streamlined public procurement procedures. Considering the current situation and the incipient context, this support must be allocated specifically for projects targeting research/development or the implementation of pilot projects for the areas covered by INECP.

In the same context of interaction with the decarbonisation objectives, incipient segments such as contribution of alternative fuels (e.g. hydrogen) may be accelerated by dedicated measures

by fostering research and demonstration projects (the sustainable development of hydrogen production from renewable sources within the territory of Romania to the extent possible). Romania could thus provide support for research projects targeting hydrogen and facilitate the implementation of pilot and demonstration projects that are likely to contribute significantly to the achievement of the decarbonisation objectives by promoting the use of renewable and low-carbon hydrogen. The following main strategic areas are targeted:

- Flexibility of the energy system. There is a significant opportunity of tapping the excess potential in generation of electricity from renewable sources to produce hydrogen by electrolysis;
- Power transmission infrastructure. Romania may consider using the existing methane infrastructure for hydrogen transmission and distribution by injecting hydrogen into the public natural gas network on the short term (2025-2030) and the medium term (2030-2040) and by increasing hydrogen contribution to the long-term transmission and distribution network (>2040).

Moreover, Romania plans to carry out an assessment in the period 2021-2022 regarding the possibility of injecting hydrogen in the form of synthesis gas from RES (after it has been brought to the standard of methane by reaction with CO_2) in the natural gas transmission/distribution systems. The excess electricity from variable renewable sources, which is thus converted, could be transported on long distances and/or stored. In this way, transmission/distribution systems could be used at the optimum capacity for the entire technical lifetime without limitation to the period of extraction of gases from the internal onshore/offshore perimeters.

The review and then implementation of this alternative is likely to bring benefits to the economic development of Romania consistently with the European decarbonisation policies by increasing the use of RES in final consumption.

The natural interaction of the R-I pillar with the decarbonisation objectives will be strengthened by adopting advanced technologies through specific initiatives for the RES components. The main measures will be the following:

- developing solar power plants - supporting new research initiatives (e.g. start-up projects to enhance efficiency in the capturing of solar energy in thermally insulated panels) and supporting the marketing and quantification of potential prototypes;
- developing projects on wind power plants - supporting local competence centres (e.g. the COMOTI National Research and Development Institute for Turbo Engines in Bucharest) to extend international collaboration, strengthening public-private partnerships, achieving know-how transfer to economic operators;
- the development of storage capacities, as described in the paragraph applicable to energy security, will bring about additional benefits for the quantification of RES solutions at the energy system level, thus enhancing the decarbonisation phenomenon;
- developing research and development of technologies for production of biofuels (e.g. production of advanced biofuels and coprocessing of oils) and biogas within the territory of Romania;
- digitalisation of the energy system by developing Smart Grid projects and supporting the initiatives of Transelectrica/distribution operators.

Moreover, the adoption of advanced technologies will constitute the main connection for the interaction with the objectives of the **energy efficiency** dimension. In order to quantify the beneficial effects, the implementation of storage solutions will be thus completed by the extended implementation of smart meters in order to improve energy consumption (details on measures and policies in Section 3.2.).

The implementation of these advanced technologies requires strengthening a vertical ecosystem on the value chain. Another core element in achieving the decarbonisation targets consists in **fostering investments in the development of the RES equipment manufacturing industry and electromobility.** The contribution of the policies pertaining to this key factor will be reflected in the positive impact on the RES and RES-T **decarbonisation** targets through the policies described in Section 3.1., with support through the following complementary actions:

- supporting the scientific research for energy transition - RES, energy efficiency and electromobility technologies - by extending partnerships with private operators to sectors other than the energy sector, extending "Digital Romania" projects, active participation in the current European initiatives;
- adopting support measures including research, establishing common standards and developing the necessary infrastructure for electrical and hybrid vehicles.

In regard to the **internal market**, research-innovation initiatives will be mainly supported by strengthening the public-private partnerships in order to achieve the gradual adoption of functional technologies and proven benefits in areas such as the Internet of Things, decentralised storage, blockchain and smart applications.

2) R-I - secondary dimension

Having the role of support, the integration of R-I initiatives translates into the following:
Decarbonisation – reduction of GHG emissions

- Operational strengthening to ensure compliance with the environmental law and application of best international environmental protection practices by energy companies in the current activities and projects
- Introduction of highly impactful economic incentives through price instruments for a green transport system
- Support for investments in modernisation of holdings
- Promotion of **more condensed development measures**, with combined utility, which are focused on transit activities as a mean to reduce distances covered by motor vehicles, to develop the infrastructure and to reduce maintenance costs

Decarbonisation - pertaining to the industrial sector, through the implementation of best available technologies (BAT) in order to reduce greenhouse gas emissions and to increase energy efficiency in the industrial sector. The main goal will be to attract new funding sources and to implement modern hydrogen type technologies in the industrial processes. The measures are described in Section 3.1.

Energy security

- The flexibility of the energy system by fostering development of the storage capacities - measures and policies described in the "Energy Security" Dimension
    - ✓ Efforts will be strengthened to attract funding sources such as Horizon Europe or the ETS Mechanisms - Innovation Fund pertaining to storage of energy in the electricity grid or low-carbon mobility. Moreover, the aim will be to ensure active participation in the European Battery Alliance for local research centres with relevant business scope (e.g. research centres for cryogenic and isotopic technologies and for alternative propulsion systems). On the short term, the Romanian State will provide for regulation for the purpose of quantifying the existing local projects (two objectives in the Constanta area), which are developed with the support of private operators, and inclusion of this topic among the strategic research and development priorities.

- In addition, by developing intermittent capacities and mechanisms for integration of RES into the NES, in electrical accumulator systems, including small storage capacities at the prosumer's location

Other policies/measures pertaining to the dimension

Additional measures pertaining to the research, innovation, and competitiveness dimension in the energy sector, apart from the abovementioned interactions, are presented below:

- Supporting education and promoting scientific research, security and health at work
  - ✓ Developing higher education in the field of energy and harmonising it with the energy sector needs Establishing partnerships with the energy industry for education and vocational training, fostering gender equality
  - ✓ Supporting vocational secondary education in the field of energy by fostering gender equality
  - ✓ Supporting fundamental and applied scientific research in the field of energy; developing partnerships with the energy industry
  - ✓ Developing the capacity for attracting European and international funding sources for scientific research by participation of research-development-innovation institutes in international consortiums
  - ✓ Continuing vocational training programmes for administrative specialists in the energy sector
  - ✓ Continuing training for prevention of occupational risks, protection of health and security of workers, removing the risk and accident factors
  - ✓ Increasing the number and quality of human resources in R&D activities in priority fields by incentivising young independent teams, scholarships for junior researchers, international mobility projects and projects for reintegration of researchers in the diaspora
  - ✓ Building on the high level of specialisation reached in nuclear research by developing technologies for advanced generation IV reactors and developing the infrastructure for lead-cooled fast reactors under a European and international partnership
  - ✓ Conceptual development, construction and operation of research infrastructures described in the national roadmap seeking streamlining with the ESFRI infrastructures and the SET plan (e.g. ALFRED or CCAP) by providing for investment funds and supporting the development of human resources
  - ✓ Preparing specialists according to the new relevant requirements
  - ✓ Developing research partnerships to improve the quality of life
  - ✓ Fostering research, development and innovation activities in the transport sector
  - ✓ Creating new jobs, professional qualifications and opportunities for SMEs in the transport and energy efficiency sector

In addition, the 2014-2020 National Strategy for Research, Development and Innovation includes general measures that are also applicable to the energy sector. Therein the field of energy is mainly approached from the viewpoint of the measures fostering smart specialisation. They are expressed by permanently building on the high level reached in nuclear research by developing technologies for advanced generation IV reactors and developing the research infrastructures for lead-cooled fast reactors under a European and international partnership. Moreover, the aim is to ensure enhanced tapping of fossil fuels, diversification of national sources, multifunctional transport (smart grids), enhanced energy efficiency at the consumer and quantification of the smart city concept.

Romania plans to achieve tangible progress with the implementation of the projects described in the national roadmap by ensuring the staggered funding of research infrastructures and of

existing maintenance and operation costs, building new infrastructures to meet specific demands and meeting the previously made European commitments. The projects for the development of the research infrastructure in the field of energy are listed in Section 4.6.

ii. Where applicable, cooperation with other Member States in this area, including, where appropriate, information on how the SET Plan objectives and policies are being translated to a national context

Cooperation with other states is described according to applicability from the viewpoint of the projects on the roadmap - Section 4.6.i.

iii. Where applicable, financing measures in this area at national level, including Union support and the use of Union funds

Romania must draw on the major opportunity provided by the new Horizon Europe Programme that will mobilise funds worth over EUR 100 billion for research and innovation in the period 2021-2027 (of which EUR 2,4 billion for the Euratom Programme). Horizon Europe will be a continuation of the Horizon 2020 Programme, which funded over 18 000 projects with over EUR 31 billion, which makes it the most ambitious innovation programme ever[54].

Romania plans to identify solutions that are applicable to Horizon Europe so as to enable the balancing of RDI capacities. Moreover, Romania's priorities under the current Horizon 2020 Framework Programme, such as extension of participation, streamlining of procedures or a non-discriminatory remuneration policy for all participants in FP9 should be furthered in the new Framework Programme.

The opportunity of allocating a share in the public companies' profit to research and innovation projects will be reviewed in the light of new funding sources.

In order to fund research, innovation and competitiveness projects, the financing sources detailed in point 5.3.i will also be considered.

[54] Source: European Commission, EU Budget for Research and Innovation, which is available at: https://ec.europa.eu/commission/sites/beta-political/files/budget-proposals-research-innovation-may2018_en.pdf

B. Analytical basis[55]

4. Current situation and projections with existing policies and measures

4.1. Projected evolution of main exogenous factors influencing energy system and GHG emission developments

i. Macroeconomic forecasts (GDP and population growth)

The forecast of 2016 regarding the trajectory of the economic growth in Romania in the period 2020-2030 is presented in the table below:

Table 21 - Trend in the economic growth in Romania in the context of current policies

Indicator	2020-2025	2025-2030
Annual economic growth (%)	2.7 %	2.0 %

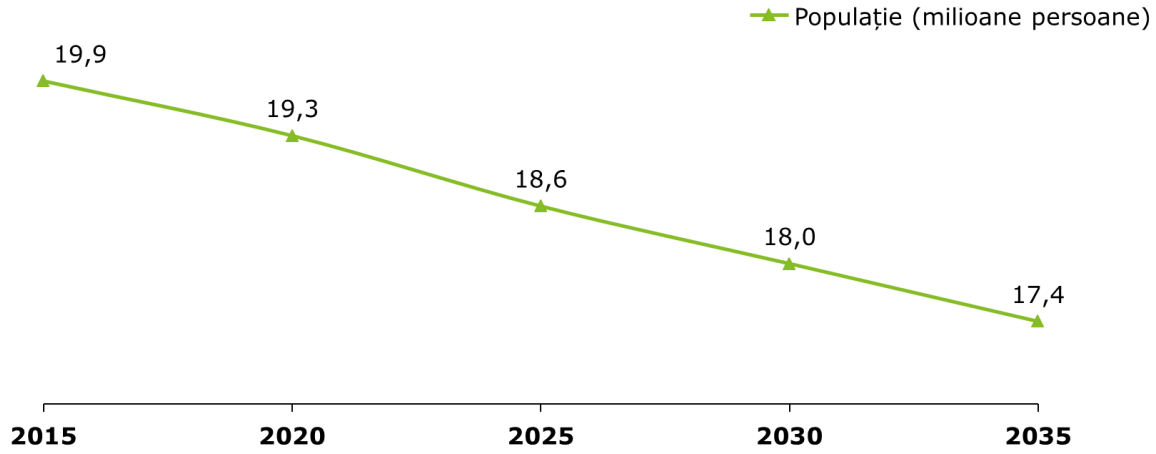
Source: PRIMES 2016 Scenario prepared for the Ministry of Energy (the current MEEMA)[56]

This trend was predicted in the context of existing policies and measures on the date when that scenario was prepared. Additional measures are currently planned to be implemented in order to speed up economic growth.

As regards the trend in the population, a decrease by over 12 % is expected in the period 2015-2035, with the population amounting to approximately 17.4 million persons in 2035 according to the PRIMES modelling performed by the Ministry of Energy (the current MEEMA) in 2016 under the baseline scenario (the scenario in the context of existing policies and measures).

[55] See Part 2 for a detailed list of parameters and variables to be reported in Section B of the Plan
[56] All the references regarding PRIMES as a source of presented projections under the existing measures and policies are references to the 2016 Baseline Scenario ("RM: Reference Scenario") prepared by the Ministry of the Economy, Energy and the Business Environment in 2016

Chart 13 - Trend in the population in Romania in the period 2015-2035



Source: The 2016 PRIMES Scenario prepared by the Ministry of the Economy, Energy and the Business Environment

RO	***EN***
Populaţie (milioane persoane)	Population (millions of persons)

ii. Sectoral changes expected to impact the energy system and GHG emissions

The Ministry of the Environment, Waters and Forestry presented the trends in the sectors with the most significant contribution to GHG emissions in the "National strategy for climate change and low-carbon economic growth for 2016-2030". These are:

1. **Energy**
2. **Transport**
3. **Industry**
4. **Agriculture and rural development**
5. **Urban Development**
6. **Waste management**
7. **Water and water resources**
8. **Forestry**

1. **Energy**

The energy sector is currently the most significant contributor to carbon emissions in Romania. GHG emissions in this sector account for approximately 55 % of the total emissions (excluding LULUCF), excluding the transport sector, in 2016.

The sectoral changes are projected in the context of the current situation and of the projections regarding the main energy indicators. The development demand for this sector thus entails, first of all, transition towards gas-fired operation and refurbishment of electricity distribution grids because many of them are outdated. The development/modernisation of gas plants is also necessary considering that wind and solar energy is a variable source and does not cover the energy demand so they cannot be taken into account as unique sources of electricity, particularly in extreme weather conditions.

Moreover, MDRAP (the current MLPDA) is currently implementing the "District Heating" Programme targeted to district heating systems for localities. The outputs of this programme were reflected, among others, in the improved energy efficiency through the improvement of production, transport and distribution of thermal energy.

For the forthcoming period, the development of the energy system will concern the following aspects:

- Adopting certain measures to improve energy efficiency and, implicitly, to reduce energy demand
- Making considerable investments in the production and distribution of electricity in order to meet the demand, particularly in the context of the emerging ever stricter requirements for reduction of GHG emissions

In this respect, the national strategy for climate change and low-carbon economic growth for the period 2016-2030 provides for strategic objectives in this sector for the reduction of GHG emissions:

a) Reducing the intensity of CO_2 emissions pertaining to energy activities; the achievement of this objective entails investments for the following purposes:
   - ✓ to supply renewable energy;
   - ✓ to strengthen the energy transmission, distribution and storage infrastructure.

b) Increasing energy efficiency at final consumers, in particular in residential buildings and in industrial sectors; the achievement of this objective requires the following:
   - ✓ implementing national programmes for wide-scale support for the thermal rehabilitation of buildings;
   - ✓ implementing a pricing system in the district heating system, which reflects the natural gas and heat production costs.

c) Ensuring accessibility of economically vulnerable groups to energy; given the implementation of a pricing system reflecting the production cost of various energy sources, the provision of financial support needs to be envisaged to ensure the accessibility of vulnerable consumer groups to energy

2. Transport

The transport industry, although not representing the main sector in terms of share in the GHG emissions in Romania, shows an upward trend for the past years (a 29.3 % increase in the period 1990-2015 according to EEA), which is caused by an increase in road transport. However, road transport is the main source of GHG emissions in the transport sector at national and European level. Moreover, the number of passenger car owners is still low in Romania with reference to the EU average (261 vehicles/1 000 inhabitants in 2015 in Romania, compared to the EU average of 476 vehicles/1 000 inhabitants)[57]). In this respect, the number of passenger cars is expected to increase in Romania in the future so this indicator tends towards the EU average.

This projected increase in road transport, alongside the falling trend in the number of passengers in the rail transport against the background of the decaying Romanian infrastructure, is likely to lead to an increase in GHG emissions on the medium and long term. Measures are thus required to counteract this effect in order to slow down the GHG emissions increasing rate in the transport sector compared to the economy. This is achievable by reducing the passenger car demand or by nurturing the use of low-carbon transport alternative. Although the technology has evolved and will evolve to a significant extent, helping

[57] Source: Eurostat, indicator: road_eqs_carhab

to slow down the increase in emissions, this is not enough, additional measures being required to foster a change in the transport behaviour and people's options.

In order to ensure the reduction of GHG emissions in this sector, the national strategy on climate change and low-carbon economic growth for the period 2016-2030 provides for the following strategic objectives:

a) Using price instruments designed to incentivise green transport This objective may be achieved by fostering purchase of environmentally friendly vehicles, use of eco-fuels and reduction in the use of motor vehicles. The specific instruments already implemented to achieve these objectives are:
   - ✓ exemption from the payment of the excise duty for the use of biofuels obtained from biomass (and not mixed with traditional fuels);
   - ✓ the application of tax reductions for environmentally friendly vehicles (e.g. hydrogen-based, methane-based, electric vehicles etc.);
   - ✓ determination of parking tariffs to deter the use of motor vehicles.

b) Improving the efficiency of urban transport; the following are required to achieve this objective:
   - ✓ the implementation of sustainable urban mobility plans (SUMP) - e.g. investments in the cycling and pedestrian walkway infrastructure, development of metro networks etc.;
   - ✓ efficient demand management.

c) Reversing the falling trend of rail transport and including projects for intermodal terminal development - restructuring and upgrading of the rail system.

3. Industry

GHG emissions from industrial processes in Romania are relatively high even if they dropped by 64 % in the period 1989-2011 due to a reduction in the industrial activity after the Communist period. In this sector there is thus potential to improve energy efficiency by: reducing pollutants, reusing and recycling production materials, promoting the use of clean technologies etc.

In order to ensure the increase in energy efficiency and the reduction of GHG emissions in this sector, the national strategy on climate change and low-carbon economic growth for the period 2016-2030 provides for the following strategic objectives:

a) Reducing the intensity of carbon emissions in the industry - in particular in heavy industries: steel, non-ferrous metals, mineral products, and chemical products through refurbishment
b) Implementing the best available techniques in terms of GHG emissions - adopting the techniques applied throughout the EU
c) Building on voluntary approaches, trading in emissions and related taxes - voluntary agreements to improve industrial processes, implementing emissions trading schemes etc.

4. Agriculture and rural development

In this sector, GHG emissions in Romania were on a falling trend (until 2016). Although the contribution of the sector to the total share of GHG emissions is approximately 16 %, it is not intensive, most emissions being caused by the use of energy in this sector.

The future trends in this sector entail increasing agricultural productivity and decreasing the number of small farms by unifying them, which is likely to influence the level of GHG emissions. One of the objectives in this sector is to keep a low level of GHG emissions from the

agricultural sector. In order to achieve this objective, the following specific objectives are indicated in the National strategy on climate change and low-carbon economic growth for the period 2016-2030:

a) Promoting transfer of know-how and consulting services regarding the climate change aspects among farmers:
   - ✓ providing such services to farmers in order to raise their awareness of how to reduce the concentration of GHG emissions from the key activities (animal breeding and use of fertilizers);
   - ✓ promoting technologies and practices for carbon sequestration, enveloping buildings, using renewable energy.

b) Supporting investments for modernisation of farms, which may be achieved by:
   - ✓ fostering investments to create facilities and to purchase performing equipment for the storage and use of manure;
   - ✓ fostering investments to increase the energy efficiency of farm buildings;
   - ✓ fostering production and the use of renewable energy (on a small scale).

c) Promoting good agricultural practices:
   - ✓ avoiding the use of mechanised equipment;
   - ✓ prohibiting/limiting the use of chemical and organic fertilizers;
   - ✓ reducing the number of animals on grasslands;
   - ✓ using crops with a high capacity of fixing nitrogen into the soil;
   - ✓ nurturing organic farming.

d) Promoting carbon sequestration in agriculture:
   - ✓ integrating the plant mass into the soil on agricultural lands where green crops are established.

5. Urban Development

Several local authorities in Romania have expressed their interest in taking action to reduce GHG emissions. Several municipalities chose to participate in the EU Programme "Convention of Municipalities" which encourages production and use of sustainable energy. The developed plans envisage mainly improving energy efficiency in buildings and identifying solutions to improve the local transport system.

The trends in this sector project the suburbanisation of the population by a decrease in the population density despite the increase in the built area. This leads to an increase in the number of kilometres covered by motor vehicles and in the demand for utilities (supply of water, energy etc.) and for the street infrastructure. This tendency may entail an increase in GHG emissions. In order to counteract this effect and to ensure the reduction of GHG emissions in this sector, the national strategy on climate change and low-carbon economic growth for the period 2016-2030 provides for the following strategic objectives:

a) Promoting more condensed development measures, with combined utility, which are focused on transit activities as a mean to reduce distances covered by motor vehicles, to develop the infrastructure and to reduce maintenance costs:
   - ✓ adopting land management policies;
   - ✓ providing incentives for the development of deserted areas;
   - ✓ limiting the maximum size of allocated land;
   - ✓ increasing the development rate allowed for a certain parcel.

b) Promoting the improvement of energy efficiency in buildings and in major urban infrastructure systems:
   - ✓ applying economic incentives for the rehabilitation of existing buildings;
   - ✓ fostering the purchase of dwellings in recently erected more energy efficient buildings;
   - ✓ increasing efficiency in district heating systems;

- ✓ upgrading the water supply, sewage and solid waste collection systems.

6. Waste management

GHG emissions in Romania are currently associated with the fact that waste management at national level is based on its disposal and decomposition of organic waste generates methane. Moreover, the waste collection rate in Romania is low. In this respect, measures are required to foster efficient waste management in order to contribute to the reduction of GHG emissions.

In order to ensure the increase in energy efficiency and the reduction of GHG emissions in this sector, the national strategy on climate change and low-carbon economic growth for the period 2016-2030 provides for the following strategic objectives:

a) Promoting waste generation prevention:
   - ✓ Generating a smaller quantity of waste by:
     - o raising awareness of the effects of waste;
     - o nurturing environmentally friendly production;
     - o nurturing change in the consumers' behaviour;
     - o providing financial incentives to decrease the volume of waste.

b) Increasing the rate of reuse or recycling of materials included in the waste flow, reducing the amount of material to be managed as waste by promoting industrial symbiosis processes, and applying the concept of efficient use of resources in sustainable waste management:
   - ✓ Developing disposal and collection facilities
   - ✓ Implementing submission/repurchase programmes

c) Separate collection of biodegradable waste and its composting:
   - ✓ Selective waste collection.

d) Production of energy from waste - co-incineration.

7. Water and water resources

The measures for reducing GHG emissions in this sector must take account of the current background. However, although water supply and wastewater treatment operations in this sector generate significant GHG emissions, their reduction must be achieved, for instance, in the context of the need to address shortage of water in agriculture. In this respect, the national strategy for climate change and low-carbon economic growth for the period 2016-2030 provides for the following strategic objectives in order to reduce GHG emissions:

a) Reducing GHG in the water supply and wastewater treatment sector in the context of a need to extend the availability of water supply and sewage services:
   - ✓ capturing methane;
   - ✓ using energy-efficient pumping and blowing systems.

b) Increasing the energy efficiency of pumps in large water supply systems.

8. Forestry

The main activity in this sector, which triggers a reduction in GHG, is afforestation. Romania has high potential in terms of lands appropriate for afforestation from the technical viewpoint, in particular in the southern area of the country. In order to mitigate climate change and to reduce GHG emissions through this sector, the national strategy on climate change and low-

carbon economic growth for the period 2016-2030 provides for the following strategic objectives:

a) Management of existing forests for carbon storage in the context of sustainable forest administration:
   - ✓ ensuring the natural regeneration of arboreta;
   - ✓ combating pests;
   - ✓ preventing forest degradation;
   - ✓ increasing the accessibility of the forest stock.

   This may be achieved with the implementation of measures for:

   - ✓ adapting the forest technical rules to the climate change management requirements based on the research conducted for this purpose;
   - ✓ financing programmes in this respect.

b) Extension of woodland areas:
   - ✓ afforesting degraded lands, which are unfit for agricultural crops;
   - ✓ creating forest barriers.

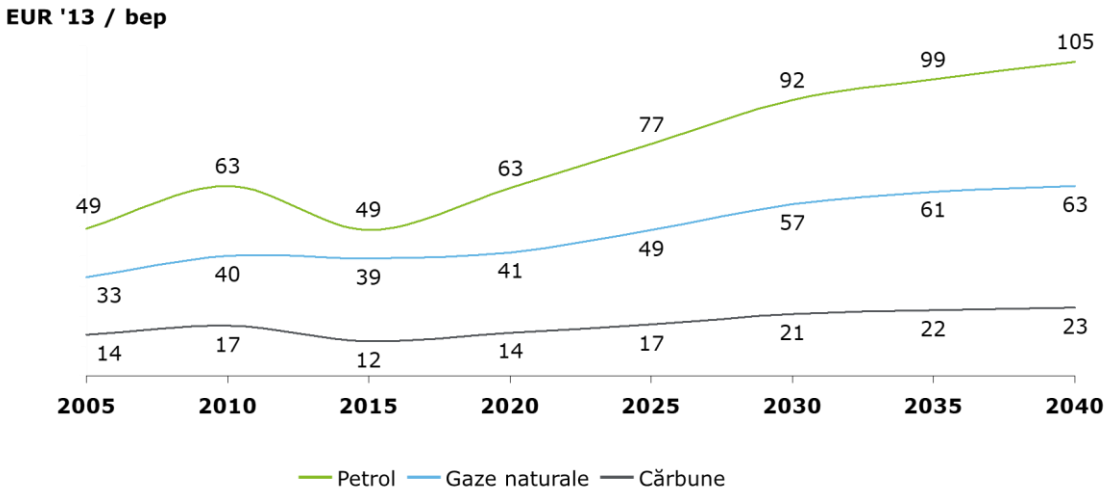
c) Nurturing sustainable management of privately-owned forests:
   - ✓ providing guidance for sustainable forest management;
   - ✓ streamlining forest administration requirements;
   - ✓ providing technical support for the introduction of innovative technologies in forest management and timber harvesting;
   - ✓ granting compensatory payments to forest owners for losses of revenues due to exploitation restrictions for forests included in protected areas or falling within various protection requirements;
   - ✓ improving and extending the accessibility of the forest stock.

d) Realisation of carbon stock management opportunities for forests from protected areas.

iii. Global energy trends, international fossil fuel prices, EU ETS carbon price

The projected trend in import prices for fossil fuels at international level is shown in the chart below:

Chart 14 - Projected trend in prices for fossil fuels at international level



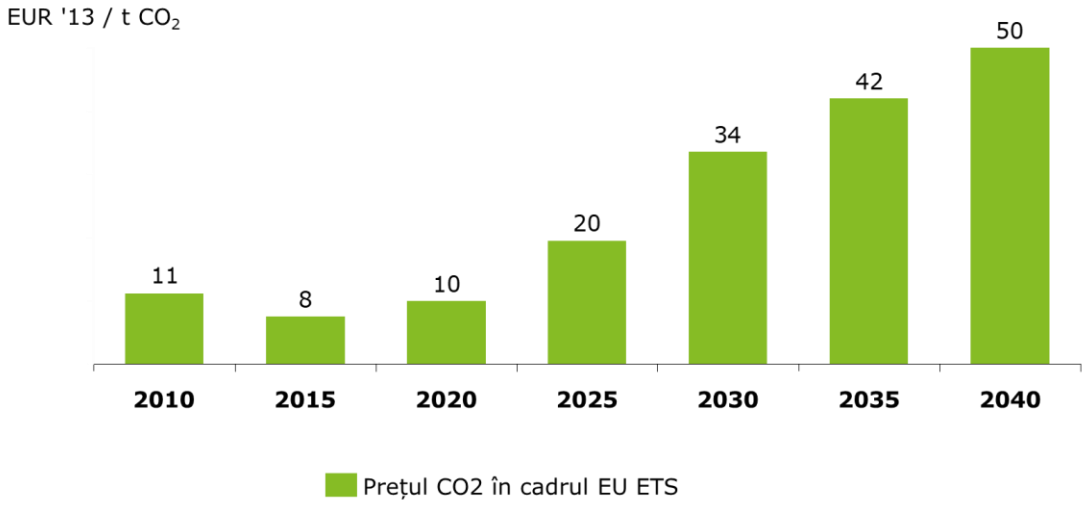
Source: The 2016 PRIMES Scenario prepared by the Ministry of the Economy, Energy and the Business Environment

RO	***EN***
Petrol	Oil
Gaze naturale	Natural gas
Cărbune	Coal

A projected price increase is noticeable in this chart for all types of fossil fuels, the highest increase being projected for petroleum.

The EU ETS carbon price was projected according to the PRIMES model and it is similar to the projections of the European Commission.

Chart 15 - Trend in the EU ETS carbon price



Source: The 2016 PRIMES Scenario prepared by the Ministry of the Economy, Energy and the Business Environment

RO	***EN***
Preţul C02 în cadrul EU ETS	Price of CO_2 under the EU ETS

However, this trend for the carbon price was disproved by the current situation as the price of CO_2 certificates have currently exceeded by far the projected value.

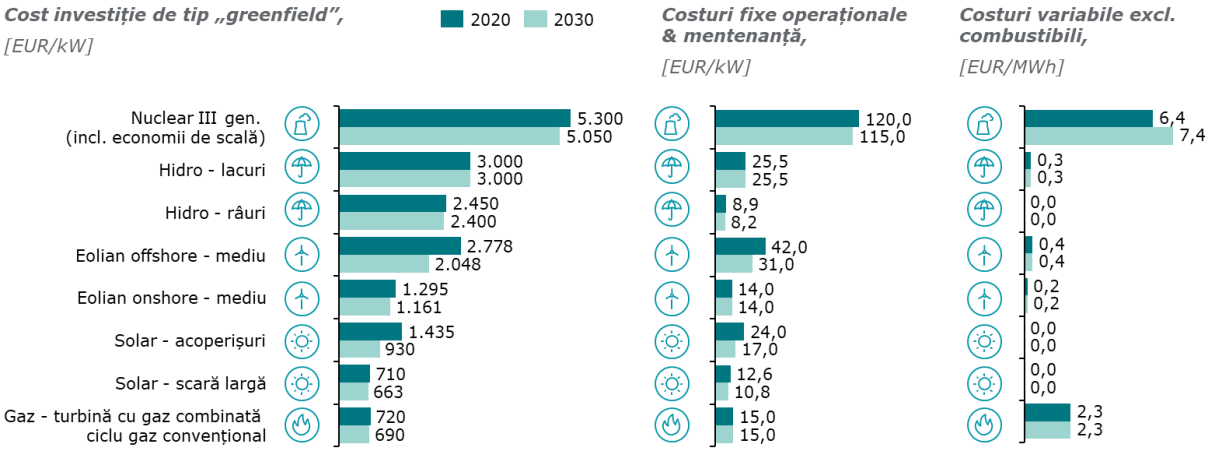
iv. Technology cost developments

The cost of technologies is expected to generate significant changes, in principle for renewable energy, where drops are expected due to the development of such technologies. The main trends in the costs of the main technologies are presented below:

- solar energy – the development of technologies for this resource will lead to a fall in the production costs for the energy produced from it;
- onshore wind energy – the costs are influenced by the trend in the metal price; the trend in the costs for this technology is also falling;

- offshore wind energy – the costs for this technology are still rather high; decreases in the costs for this technology are expected on the long term (around 2030);
- costs for production of electricity from biomass – the costs are relatively high because of environmental restrictions and the efficiency of this technology; the trend in these costs depends very much on the trend in the feedstock price;
- nuclear energy – the costs for the implementation of nuclear projects are rising due to the need to apply security systems and procedures.

Figure 4 - Projected trend in the costs of main technologies - selection



Notă: Costurile cu investițiile de tip „greenfield” exclud cheltuielile financiare de pe parcursul perioadei de construcție

Source: “Technology pathways to Decarbonisation scenarios” Study (2018), E3Modelling

RO	***EN***
Cost investiţie de tip „greenfield”,	Greenfield investment cost,
Costuri fixe operaţionale & mentenanţă,	Fixed operational and maintenance costs,
Costuri variabile, excl. combustibili,	Variable costs, excluding fuels,
Nuclear III gen. (incl. economii de scală)	Nuclear III gen. (including scale economies)
Hidro - lacuri	Hydro - lakes
Hidro - râuri	Hydro - rivers
Eolian offshore - mediu	Wind offshore - environment
Eolian onshore - mediu	Wind onshore - environment
Solar - acoperişuri	Solar - roof tops
Solar - scară largă	Solar - large scale
Gaz - turbină cu gaz combinată ciclu gaz convenţional	Gas - conventional combined cycle gas turbine
Notă: Costurile cu investiţiile de tip „greenfield” exclud cheltuielile financiare de pe parcursul perioadei de construcţie	Note: Costs with greenfield investments exclude financial expenses in the construction period

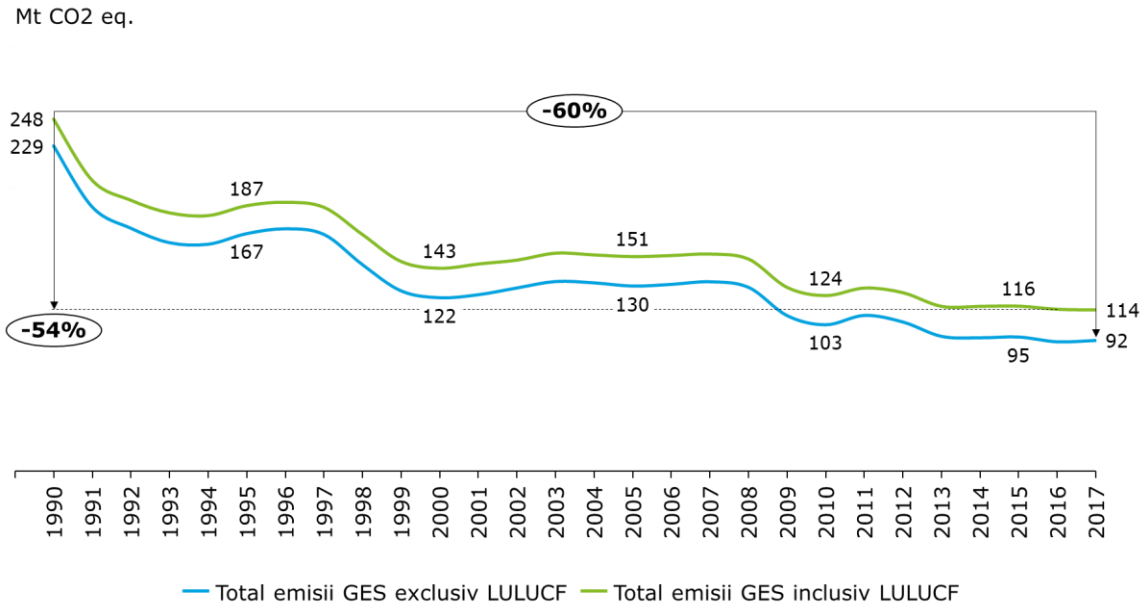
4.2. The "Decarbonisation" dimension

4.2.1. GHG emissions and removals

i. Trends in current GHG emissions and removals in the EU ETS, effort sharing and LULUCF sectors and different energy sectors

The trend in the greenhouse gas emissions in Romania (excluding LULUCF) is falling, the most significant reduction being recorded in 1991, i.e. 19 % compared to 1990. In principle, this is due to the 27 % decrease in the industrial activity in the same year. GHG emissions of 92 million tonnes of CO_2 equivalent were recorded in 2017, which equates to a 60 % decrease (including LULUCF) compared to emissions recorded in 1990 (229 Mt of CO_2 equivalent) and to a 54 % decrease excluding LULUCF. Romania is currently contributing with approximately 2.5 % of the total share of GHG emissions at EU level, excluding LULUCF, which is falling compared to 1990, when contribution was over 4 %[58].

Chart 16 - Trend in the greenhouse gas emissions between 1990 and 2017



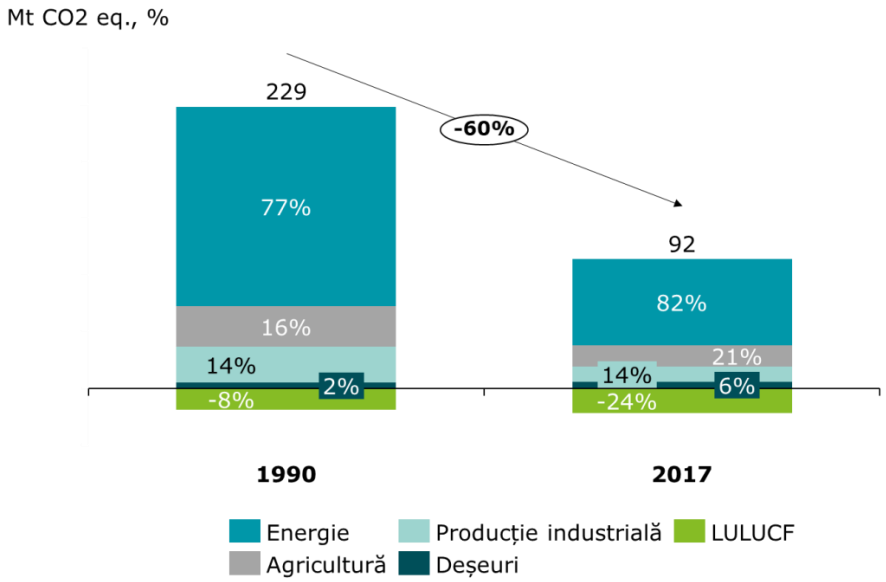
Source: Ministry of the Environment, Waters and Forests, National Inventory of Greenhouse Gas Emissions, 2018

RO	***EN***
Total emisii GES exclusiv LULUCF	Total GHG emissions, excluding LULUCF
Total emisii GES inclusiv LULUCF	Total GHG emissions, including LULUCF

The largest share in these emissions is accounted for by emissions from the energy sector. Even if, also for this sector, a significant reduction was recorded, it was below the reduction in total GHG emissions in the period 1990-2017 so, today, this sector (also including the transport sector) accounts for 82 % of the total GHG emissions, including LULUCF, and for 66 % of the total emissions, excluding LULUCF. Moreover, a reduction in the GHG emissions was also caused by an increase in the reduction of emissions due to LULUCF.

[58] According to the EU emissions data from Eurostat, indicator env_ac_io10

Chart 17 - Trend in the structure of GHG emissions by sector between 1990 and 2017, including LULUCF

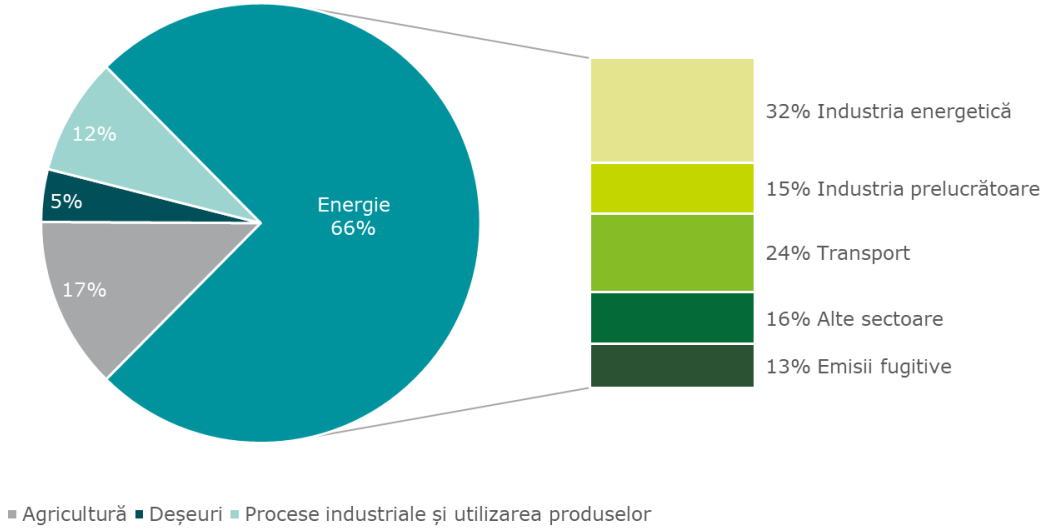


Source: Ministry of the Environment, Waters and Forests, National Inventory of Greenhouse Gas Emissions, 2018

RO	***EN***
Energie	Energy
Producţie industrială	Industrial production
LULUCF	LULUCF
Agricultură	Agriculture
Deşeuri	Waste

As regards emissions in 2017, excluding LULUCF, the energy sector accounted for 66 % of the total emissions in 2017, the energy industry representing the main source (33 % of the total emissions from the entire energy sector, i.e. a quarter of the total GHG emissions recorded in 2017), followed by agriculture (17 %) and industrial production (12 %).

Chart 18 - Structure of GHG emissions by sector in 2017, **EXCLUDING LULUCF**

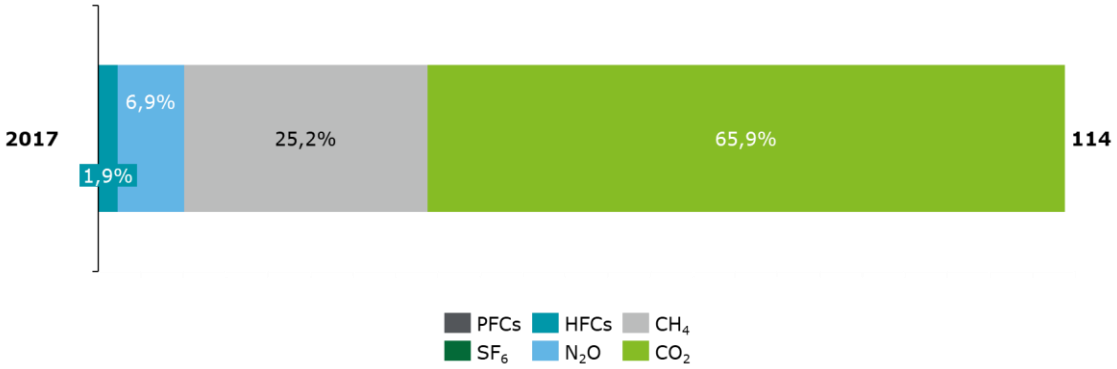


Source: Ministry of the Environment, Waters and Forests, National Inventory of Greenhouse Gas Emissions, 2018

RO	***EN***
Industria energetică	Energy industries
Industria prelucrătoare	Manufacturing industry
Transport	Transport
Alte sectoare	Other sectors
Emisii fugitive	Fugitive emissions
Agricultură	Agriculture
Deşeuri	Waste
Energie	Energy
Procese industriale şi utilizarea produselor	Industrial processes and use of products

The structure of GHG emissions in terms of types of pollutants is shown in the following chart. It was created for 2017 taking into account the total emissions excluding LULUCF. It is thus noticeable that most of the GHG emissions (65.9 %) are CO_2 emissions, followed by CH_4 emissions with 25.2 % of the total emissions, whereas SF_6 and PFC_s emissions account for less than 1 % of the total emissions.

Chart 19 - Structure of GHG emissions (excluding LULUCF) for 2017 by types of pollutants

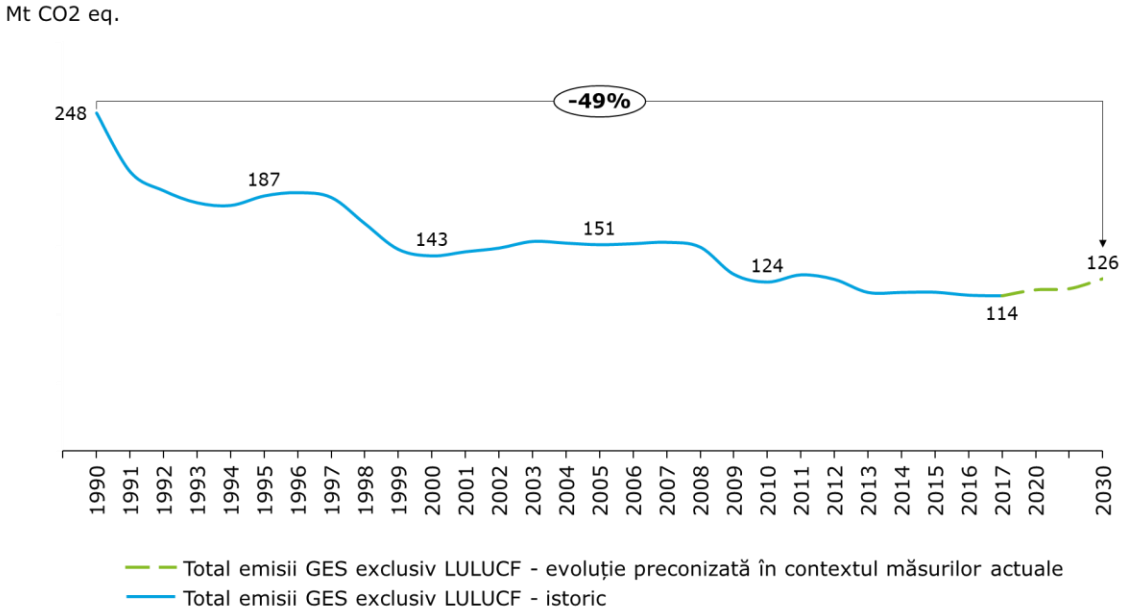


Source: Ministry of the Environment, Waters and Forests, National Inventory of Greenhouse Gas Emissions, 2018

ii. Projections of sectoral developments with existing national and Union policies and measures at least until 2040 (including for the year 2030)

Considering the existing measures, the trend in GHG emissions (excluding LULUCF) is projected in the following chart. In this context, the historical trend in the reduction of emissions is likely to be maintained in the future as well, reaching an emissions reduction rate of 49 % in 2030 compared to 1990, such decrease being expected to continue also after this reference year.

Chart 20 - Projected trend in GHG emissions (excluding LULUCF) in the context of current measures



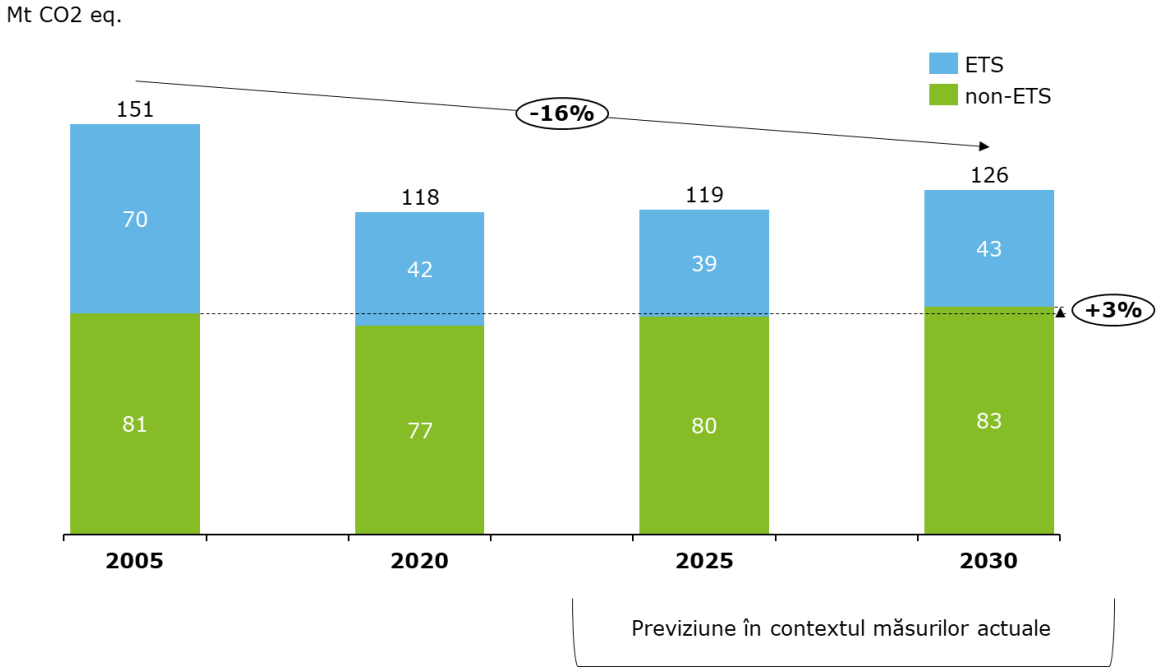
Source: Ministry of the Environment, Waters and Forests, Romania's Report in accordance with Commission Implementing Regulation (EU) No 749/2014

RO	***EN***
Total emisii GES exclusiv LULUCF - evoluţie preconizată în contextul măsurilor	Total GHG emissions, excluding LULUCF - projected trend in the context of current

actuale	measures
Total emisii GES exclusiv LULUCF - istoric	Total GHG emissions, excluding LULUCF - summary

Following the historical trend, the main source of a reduction in GHG emissions (excluding LULUCF) will be the reduction in the ETS sector. As for the non-ETS sector, an increase of approximately 3 % is expected by 2030 compared to the emissions recorded in 2005. Total GHG emissions (excluding LULUCF) is likely to reach 126 Mt of CO_2 equivalent, which would mean an emissions reduction by 15 % compared to 2005 and by approximately 49 % compared to 1990.

Chart 21 - Projected trend in GHG emissions (excluding LULUCF) in the context of current measures, including with division by ETS and non-ETS sectors

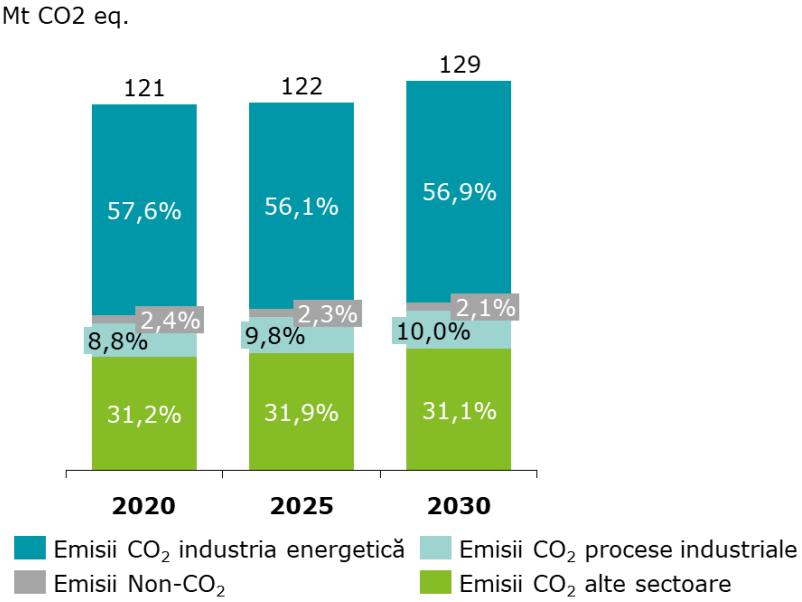


Source: Ministry of the Environment, Waters and Forests, Romania's Report in accordance with Commission Implementing Regulation (EU) No 749/2014

RO	***EN***
ETS	ETS
non-ETS	non-ETS
Previziune în contextul măsurilor actuale	Projection in the context of current measures

According to the below chart, it is noticeable that the most significant emission reductions will be triggered by the emissions in the energy industry, whereas no significant changes are expected in the other sectors.

Chart 22 - Projected trend in GHG emissions (excluding LULUCF) by sector in the context of current measures



Source: Romania's Report in accordance with Commission Implementing Regulation (EU) No 749/2014

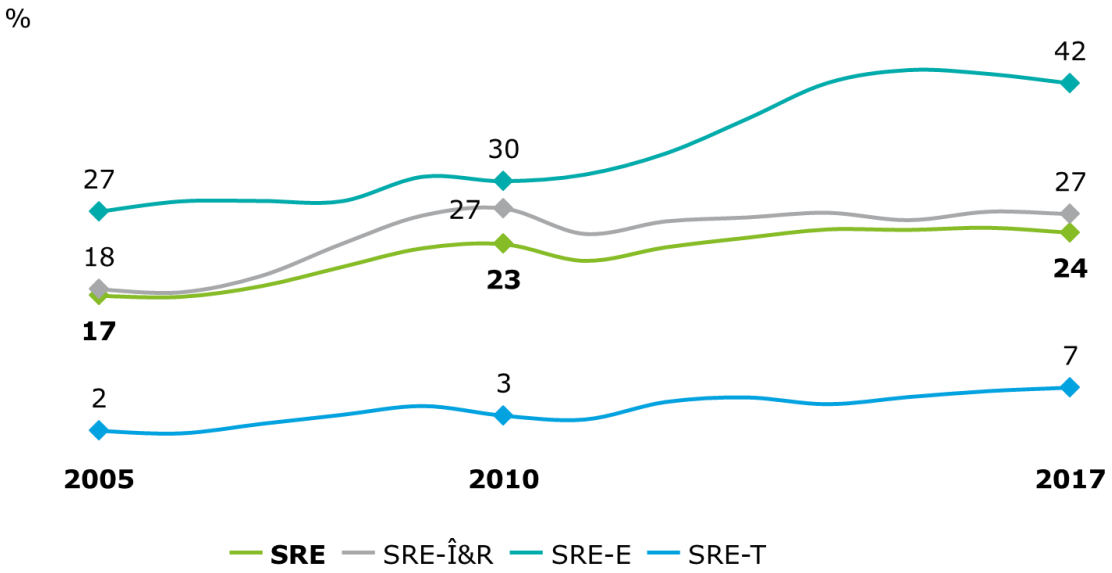
RO	***EN***
Emisii CO_2 industria energetică	CO_2 emissions from the energy industry
Emisii CO_2 procese industriale	CO_2 emissions from industrial processes
Emisii Non-CO_2	Non-CO_2 emissions
Emisii CO_2 alte sectoare	CO_2 emissions from other sectors

4.2.2. Renewable energy

i. Current share of renewable energy in gross final energy consumption and in different sectors (heating and cooling, electricity and transport) as well as per technology in each of these sectors

According to the latest public information available, Romania recorded a 24 % share of renewable energy in the gross final consumption, this indicator recording an increase from 17 % in 2005. This trend was also recorded in the presented sectors, the highest trend being recorded for the share of renewable energy in the consumption of electricity.

Chart 23 - Current share and trend in the renewable energy and division by sector



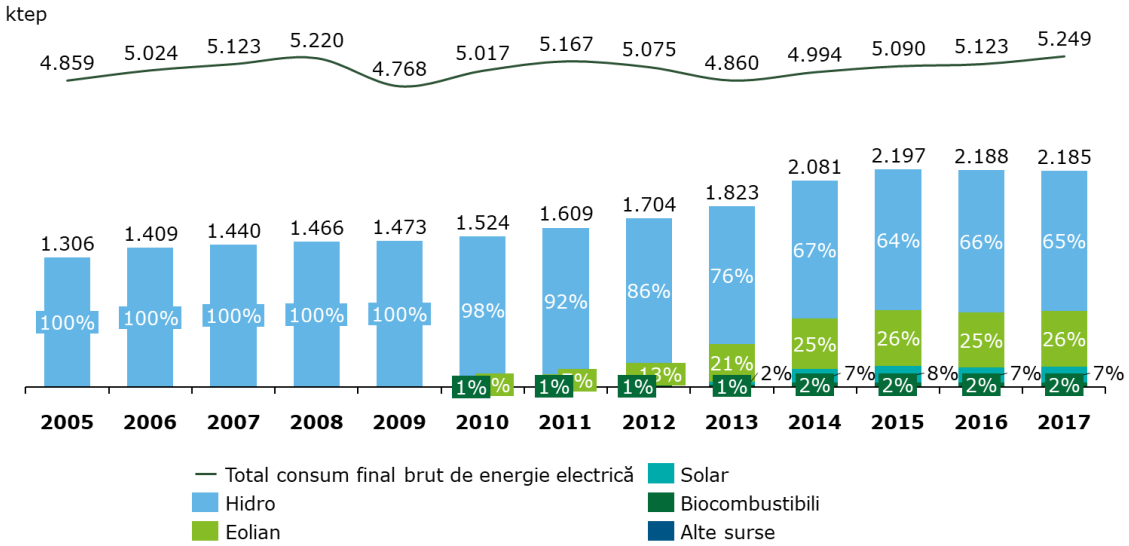
Source: Eurostat

RO	***EN***
SRE	RES
SRE-Î&R	RES-H&C
SRE-E	RES-E
SRE-T	RES-T

Structure of final renewable energy consumption - electricity (RES-E)

The chart below shows the structure of renewable energy production and gross final consumption of electricity, both indicators being taken into account in the calculation of the renewable energy share presented above. This share had been fully triggered by the production of hydro-power until 2009. In this respect, the increase in the RES-E share in the period 2010-2017 was triggered by the development of the wind and solar technologies, a significant increase being recorded in the production of onshore wind energy. On the other hand, gross final consumption of electricity followed a slightly upward trend.

Chart 24 – Trend in the gross final consumption and in production of renewable energy between 2005 and 2017 by source type



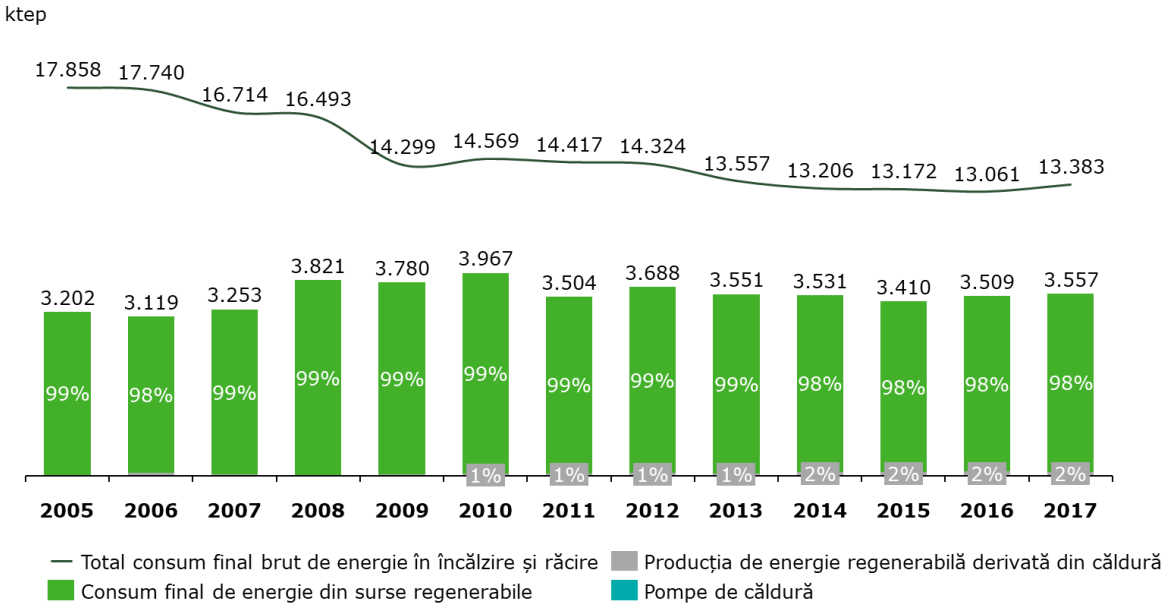
Source: Eurostat

RO	***EN***
Total consum final brut de energie electrică	Total gross final consumption of electricity
Hidro	Hydro
Eolian	Wind
Solar	Solar
Biocombustibili	Biofuels
Alte surse	Other sources

Structure of final renewable energy consumption - heating and cooling (RES-H&C)

In the heating and cooling sector, the RES share has increased against the background of a reduction in gross final energy consumption due to an increase in energy efficiency. As for sources of consumption/production of renewable energy, no significant changes have been recorded. Final renewable energy consumption is totally accounted for by consumption of biomass (firewood, agricultural waste). At the same time, no gross final consumption of energy from the use of heat pumps has been recorded in Romania to this date.

Chart 25 – Trend in the gross final consumption and in consumption from renewable sources for heating and cooling between 2005 and 2017 by source type



Source: Eurostat

RO	***EN***
Total consum final brut de energie în încălzire şi răcire	Total gross final consumption of energy in heating and cooling
Producţia de energie regenerabilă derivată din căldură	Production of renewable energy from heat
Consum final de energie din surse regenerabile	Final renewable energy consumption
Pompe de căldură	Heat pumps

Structure of final renewable energy consumption - transport (RES-T)

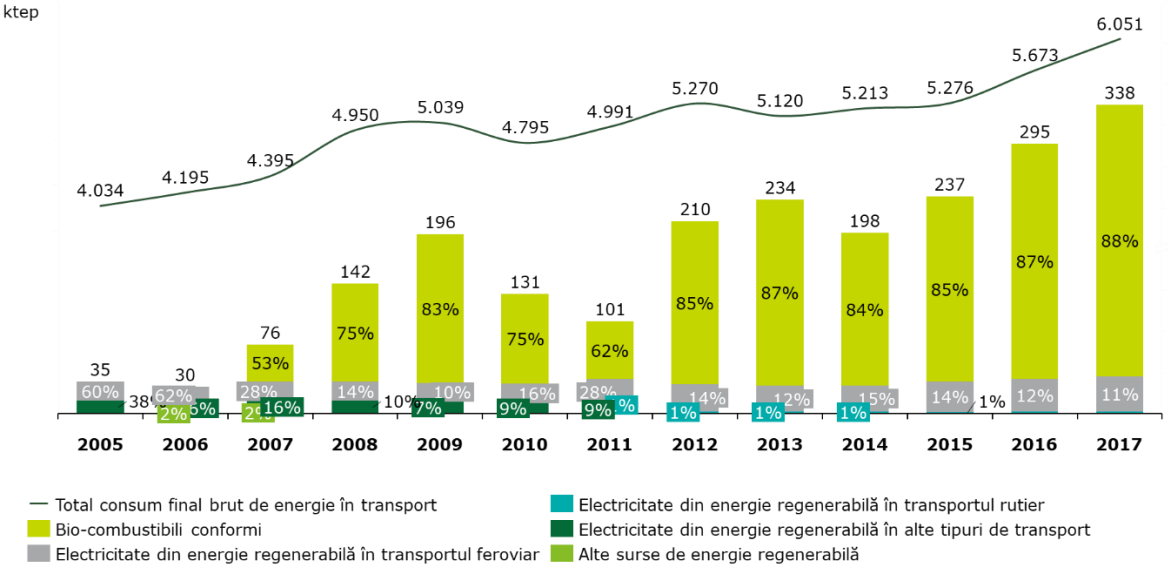
As regards the transport sector, the chart below shows the trend in the gross final consumption of energy (total energy consumption and consumption of energy from renewable sources), no multiplication factor being applied, as in the calculation of the RES-T share. However, these indicators are relevant for assessing the trend in the main factors underlying the composition of the share.

In the period 2005-2017, final energy consumption in this sector recorded a general increase, the only exceptions being recorded in 2010 and 2013. Renewable energy consumption largely followed the same trend. As for the trend in the structure of the final renewable energy consumption in transport, the main changes were marked by:

- ✓ a significant increase in consumption of compliant biofuels for its consideration in the calculation of the renewable energy share; the reduced value of this indicator in 2011 was triggered by the fact that a considerable amount was considered to be non-compliant;

- ✓ an upward trend in the consumption of electricity from renewable sources in the road transport;
- ✓ a slight increase in the consumption of electricity from renewable sources in the rail transport;
- ✓ a decrease in the consumption of renewable energy in types of transport other than road and rail transport.

Chart 26 – Trend in the gross final consumption and in consumption from renewable sources in transport between 2005 and 2017 by source type



Source: Eurostat

RO	***EN***
Total consum final brut de energie în transport	Total gross final consumption of energy in transport
Bio-combustibili conformi	Compliant biofuels
Electricitate din energie regenerabilă în transportul feroviar	Renewable energy in rail transport
Electricitate din energie regenerabilă în transportul rutier	Renewable energy in road transport
Electricitate din energie regenerabilă în alte tipuri de transport	Renewable energy in other types of transport
Alte surse de energie regenerabilă	Other renewable energy sources

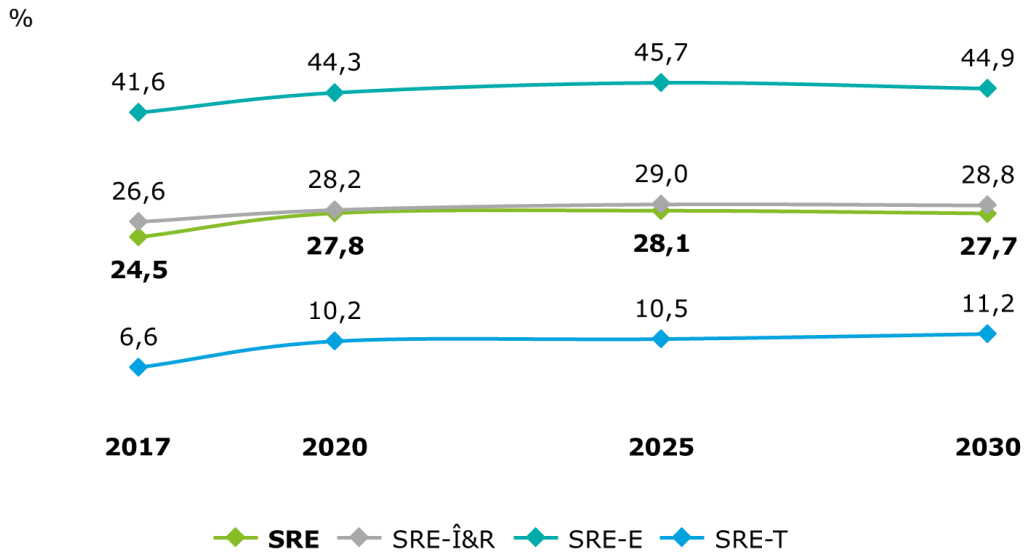
ii. Indicative projections of development with existing policies for the year 2030 (with an outlook to the year 2040)

In the context of current policies, an increase in the RES share is expected for all indicators. The highest increase is likely to be recorded for the share of renewable energy in transport, which is likely to reach 11.2 % in 2030. This trend, although favourable, would not be enough

to achieve the EU target of 14 % (set afterwards by amending the RED)[59]), so additional measures will be required to increase this indicator. Moreover, the projection of the RES-T share does not take into account the new calculation methodology for this indicator, which entails different multipliers for biofuels and consumption of electricity from renewable sources.

Furthermore, the improvement in the heating and cooling sector are not considerable, so this sector should also be considered when developing policies designed to foster consumption of renewable energy, in a linear increase, in accordance with the Directive on the promotion of the use of energy from renewable energy sources, as amended in 2018 (Interinstitutional File 2016/0382).

Chart 27 - Projections regarding the trend in the RES shares in the context of current policies



Source: The 2016 PRIMES Scenario prepared by the Ministry of the Economy, Energy and the Business Environment

RO	***EN***
SRE	RES
SRE-Î&R	RES-H&C
SRE-E	RES-E
SRE-T	RES-T

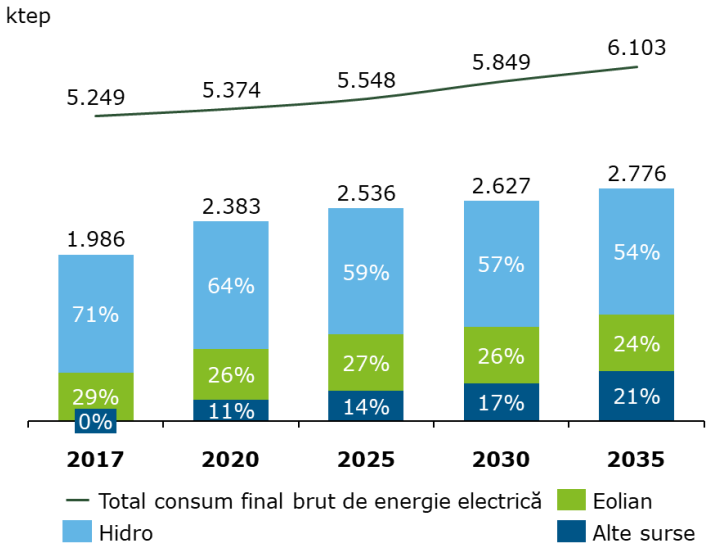
Projected trend in final renewable energy consumption in the context of current policies - electricity (RES-E)

In the forthcoming period, all sources of production of renewable energy are expected to record an increase (solar energy in particular) against the background of a cost reduction trend for the wind and solar energy following technological developments. Hydro-power is expected to record a slight increase until 2020 and then to slightly fall and to relatively level out until 2035. However, this increase in renewable energy consumption will not translate into

[59] Renewable Energy Directive

significant increases in the RES share because of an almost equivalent increase in the total gross final consumption of electricity.

Chart 28 – Projected trend, in the context of current policies, in the gross final consumption and production of renewable energy by source type



Source: The 2016 PRIMES Scenario prepared by the Ministry of the Economy, Energy and the Business Environment

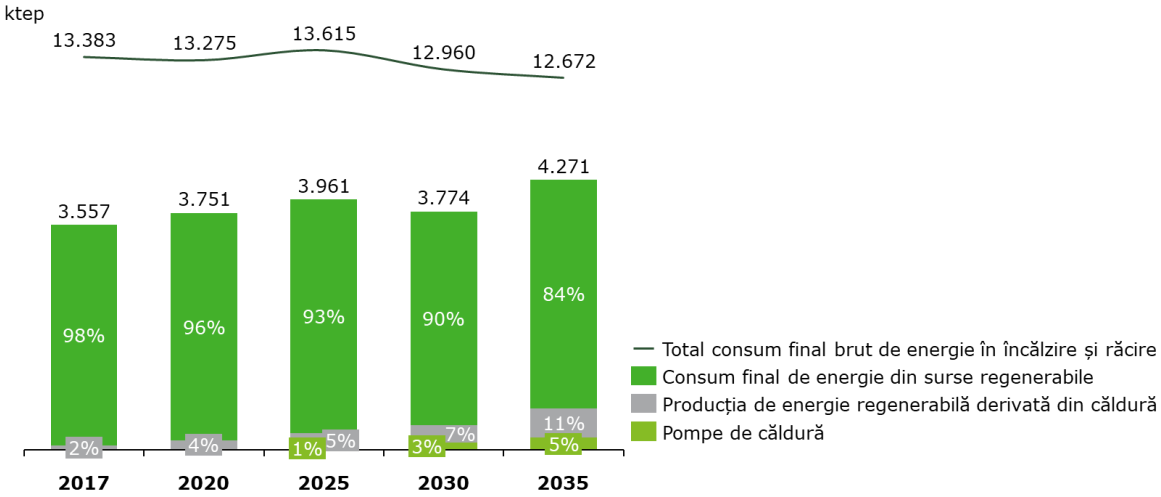
RO	***EN***
Total consum final brut de energie electrică	Total gross final consumption of electricity
Hidro	Hydro
Eolian	Wind
Alte surse	Other sources

Projected trend in final renewable energy consumption in the context of current policies - heating and cooling (RES-H&C)

The projected trend in the heating and cooling sector, in the context of current policies, primarily entails an increase in the gross final consumption of energy by 2025 and then a decrease triggered by an increase in energy efficiency. Final consumption of renewable energy will constantly increase by 2035, with the exception of 2030, when a drop will be recorded.

As for the structure of the final renewable energy consumption, the main change compared to the historical trend will be reflected in the energy consumed through heat pumps and by an increase in the production of renewable energy derived from heat, in particular in 2035.

Chart 29 – Projected trend, in the context of current policies, in the gross final consumption and consumption of energy from renewable sources for heating and cooling by source type



Source: The 2016 PRIMES Scenario prepared by the Ministry of the Economy, Energy and the Business Environment

RO	***EN***
Total consum final brut de energie în încălzire și răcire	Total gross final consumption of energy in heating and cooling
Consum final de energie din surse regenerabile	Final renewable energy consumption
Producția de energie regenerabilă derivată din căldură	Production of renewable energy from heat
Pompe de căldură	Heat pumps

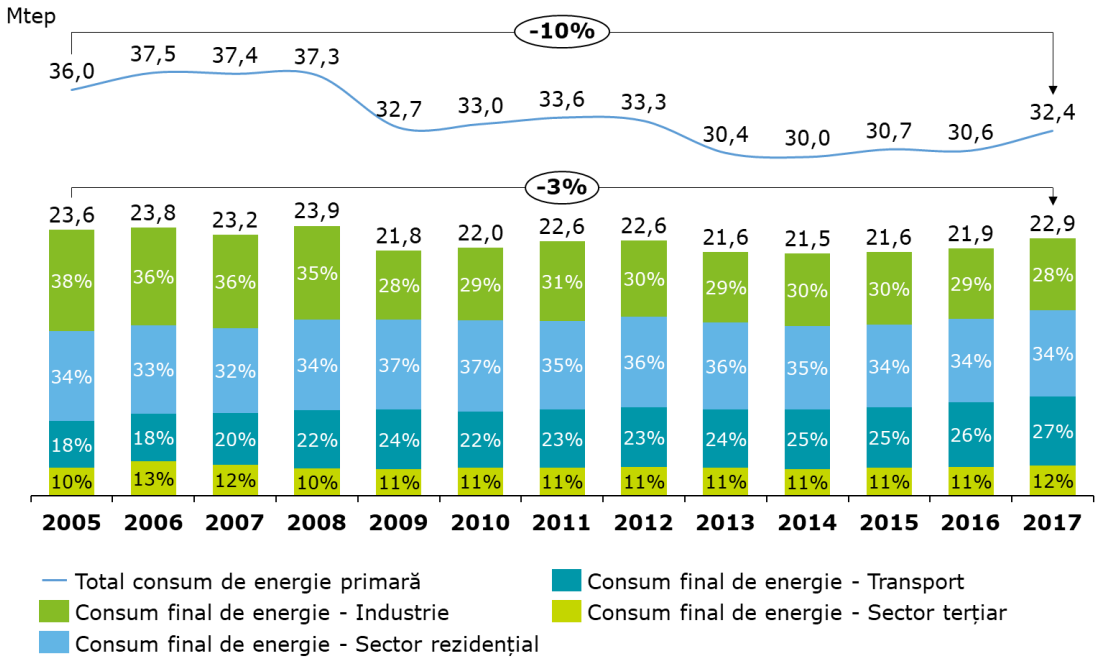
4.3. Dimension energy efficiency

i. Current primary and final energy consumption in the economy and per sector (including industry, residential, service and transport)

The chart below shows the historical trend in primary and final energy consumption in the period 2005-2017, including final consumption per sector This trend shows, first of all, a 10 % decrease in the primary energy consumption and only 3 % decrease in final energy consumption, which indicates an increase in the energy intensity.

The residential sector recorded the highest share in total final energy consumption in almost all the analysis years (with a few exceptions). As a trend, this final consumption has not recorded major changes. The second source of final consumption is the industrial sector. In this sector, final energy consumption recorded a downward trend and it is the main determinant of the reduction in the total final energy consumption. The tertiary sector also includes, in this case, consumption from agriculture.

Chart 30 - Trend in the primary and final energy consumption, including division by sector, in the period 2005-2017

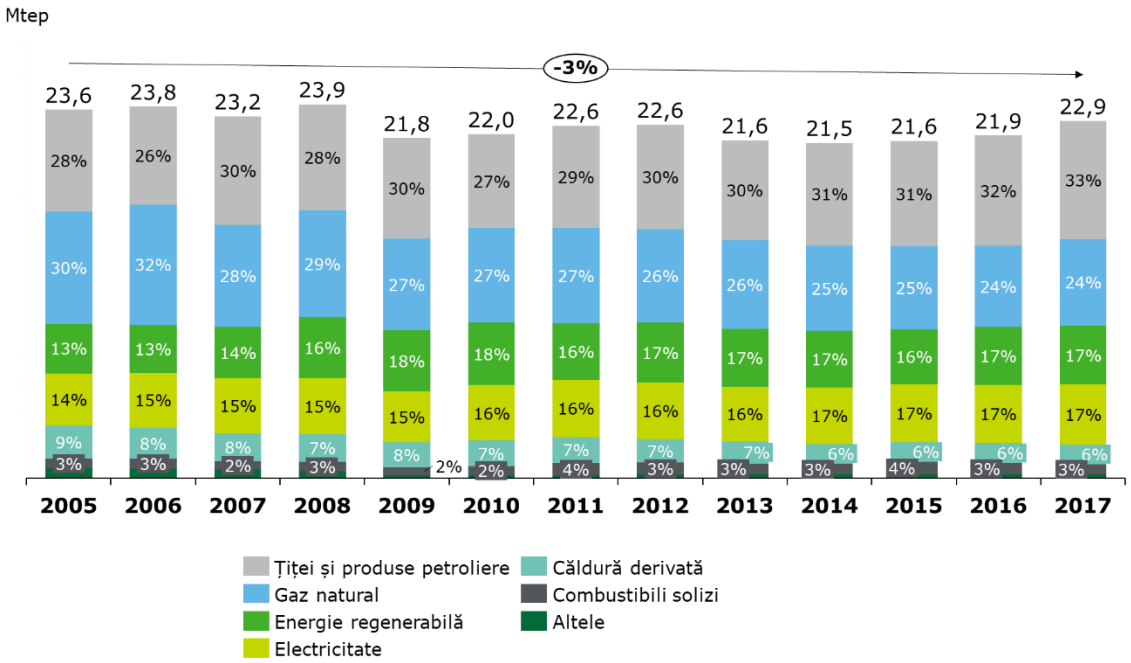


Source: EU Commission, Energy datasheets – EU 28, 8 October 2019

RO	***EN***
Total consum de energie primară	Total primary energy consumption
Consum final de energie - Industrie	Final energy consumption - industry
Consum final de energie - Sector rezidenţial	Final energy consumption - residential sector
Consum final de energie - Transport	Final energy consumption - transport
Consum final de energie - Sector terţiar	Final energy consumption - tertiary sector

The highest share in consumption of energy sources was accounted for by consumption of crude oil and petroleum products, followed by natural gas; consumption of natural gas has recorded a falling trend. In this period, no major changes were recorded in consumption of renewable energy and electricity, although they were on a slightly upward trend.

Chart 31 - Trend in the structure of final energy consumption by energy source in the period 2006-2017



Source: EU Commission, Energy datasheets – EU 28, 8 October 2019

RO	***EN***
Ţiţei şi produse petroliere	Crude oil and petroleum products
Gaz natural	Natural gas
Energie regenerabilă	Renewable energy
Electricitate	Electricity
Căldură derivată	Derived heat
Combustibili solizi	Solid fuels
Altele	Other

ii. Current potential for the application of high-efficiency cogeneration and efficient district heating and cooling[60]

The potential for applying high-efficiency cogeneration and efficient district heating and cooling is presented in the Report on the assessment of the national potential for application of high-efficiency cogeneration and efficient district heating and cooling prepared by the Ministry of Public Works, Development and Administration and the Ministry of the Economy, Energy and the Business Environment in December 2015. According to this report, this potential is assessed for the urban environment where the ratio between the built area and the total area is 0.3. This indicator is expected to increase with the increase in the housing area per residential unit.

The main components of the potential are:

[60] In accordance with Article 14(1) of Directive 2012/27/EU

- reconnection to SACET;
- extension of SACET to new buildings.

The total efficient heating/cooling potential was estimated in 2015 to 86.4 PJ, of which 70.8 PJ from reconnection and 43.2 PJ achieved.

Table 22 - Efficient heating potential by 2030

Efficient heating potential	**m.u.**	**2015**	**2020**	**2025**	**2030**
Reconnection	PJ	70.8	66.3	59.2	52.7
New buildings	PJ	15.7	18.6	23.1	27.7
TOTAL	**PJ**	**86.4**	**84.9**	**82.3**	**80.3**

Source: Report on the assessment of the national potential for application of high-efficiency cogeneration and efficient district heating and cooling, the Ministry of Public Works, Development and Administration and the Ministry of the Economy, Energy and the Business Environment

In order to foster the realization of this potential, the following measures need to be adopted:

1. adapting SACET and the sources to the new heat consumption values, under conditions of efficient operation and compliance with the environmental protection rules;
2. increasing energy efficiency throughout the entire chain: resources, production, transport, distribution, consumption;
3. due to the advantages and to the highly developed mature technology, cogeneration is promoted as a fundamental vector for the restructuring of heat production and distribution system;
4. speeding up the upgrading of the infrastructure for local interest energy services, with public and/or private financial aid;
5. enhancing the engagement of local public administration authorities in strict accordance with their duties and powers under the law;
6. promoting the use of renewable energy sources for a reduction in the price for heat and compliance with the environmental requirements.

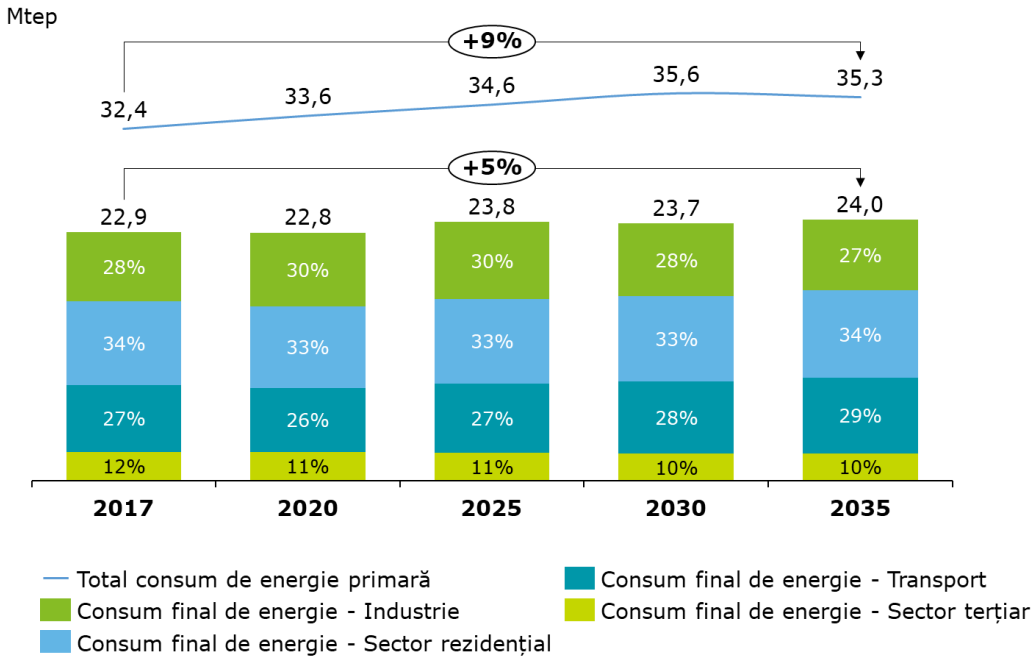
iii. Projections considering existing energy efficiency policies, measures and programmes as described in point 1.2.(ii) for primary and final energy consumption for each sector at least until 2040 (including for the year 2030)[61]

The consumption projections in Romania, taking into account the existing measures[62], assume an increase in the primary and final energy consumption following the economic growth. However, a decrease in the energy intensity is projected because the rise in primary consumption is steeper than that of the final consumption.

As regards the sectoral trends, consumption of energy in transport is expected to have the most significant rise following an increase in the number of passenger cars/1 000 inhabitants (as also described in Section 4.1.ii). Final energy consumption will also increase in the residential sector, however less than in transport.

[61] This reference business as usual projection shall be the basis for the 2030 final and primary energy consumption target which is described in 2.3 and conversion factors.
[62] Presented in Section 1.2 ii.

Chart 32 - Projected trend in the primary and final energy consumption, including division by sector, in the context of current measures and policies

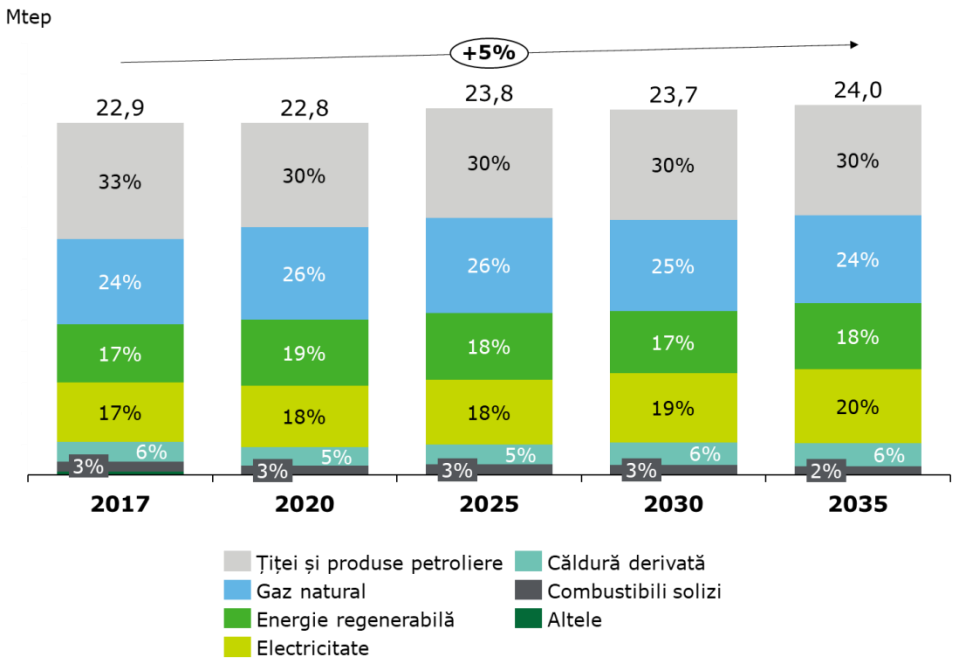


Source: PRIMES 2006 Scenario prepared by the Ministry of the Economy, Energy and the Business Environment, European Commission, Energy datasheets - EU 28, 8 October 2019

RO	***EN***
Total consum de energie primară	Total primary energy consumption
Consum final de energie - Industrie	Final energy consumption - industry
Consum final de energie - Sector rezidenţial	Final energy consumption - residential sector
Consum final de energie - Transport	Final energy consumption - transport
Consum final de energie - Sector terţiar	Final energy consumption - tertiary sector

An increase in the electricity and renewable energy consumption is expected in terms of energy sources. A slight increase in the final consumption of natural gas will also be recorded following the exploitation of deposits in the Black Sea. Consumption of crude oil and oil products, and of solid fuels, is expected to fall by the end of the analysis period.

Chart 33 - Projected trend in the structure of final energy consumption by energy source in the context of current measures and policies



Source: PRIMES 2006 Scenario prepared by the Ministry of the Economy, Energy and the Business Environment, European Commission, Energy datasheets - EU 28, 8 October 2019

RO	***EN***
Ţiţei şi produse petroliere	Crude oil and petroleum products
Gaz natural	Natural gas
Energie regenerabilă	Renewable energy
Electricitate	Electricity
Căldură derivată	Derived heat
Combustibili solizi	Solid fuels
Altele	Other

iv. Cost-optimal levels of minimum energy performance requirements resulting from national calculations, in accordance with Article 5 of Directive 2010/31/EU

There is currently no sufficient information in order to be able to determine the cost-optimal levels of minimum energy performance requirements at national level, as calculated in accordance with Article 5 of Directive 2010/31/EU.

4.4. Energy security dimension

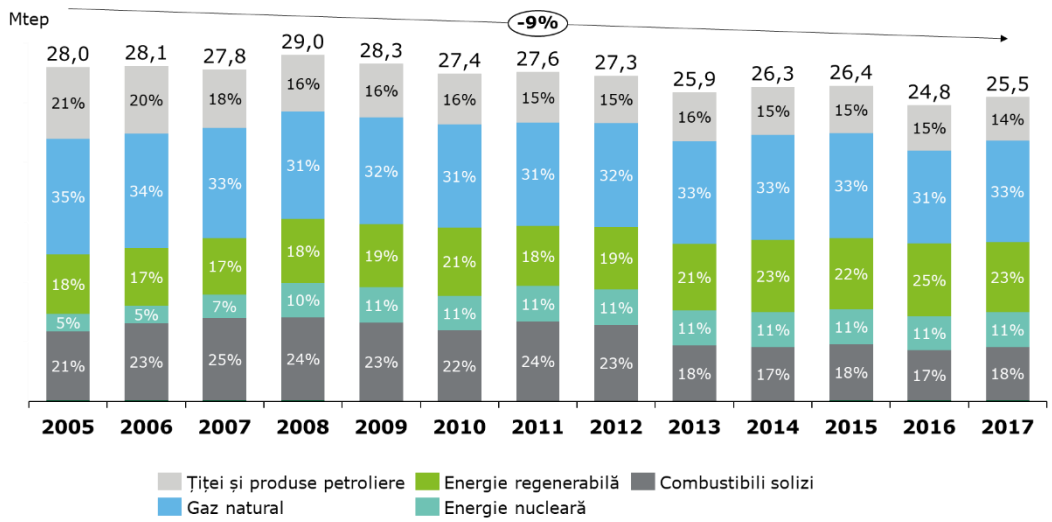
i. Current energy mix, domestic energy resources, import dependency, including relevant risks

The energy source with the highest share in the total production in 2017 is represented by production of natural gas, with over 30 % in the total production, followed by renewable

energy (23 %). Moreover, a falling trend is noticeable for solid fuels and crude oil, and petroleum products.

A downward trend in primary energy production in Romania has been recorded, total production in 2017 being by 9 % below that recorded in 2005. This reduction is however smaller than the reduction in the quantity of imported energy; in 2017, Romania imported by 19 % less energy compared to 2005.

Chart 34 - Historical trend in the production of primary energy in Romania by energy source, 2005-2017[63]



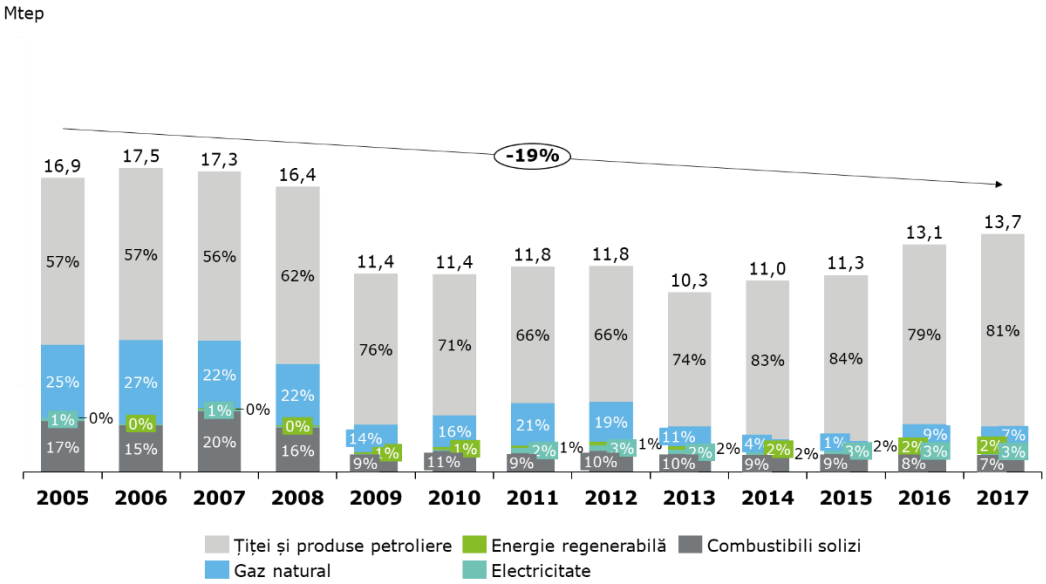
Source: EU Commission, Energy datasheets – EU 28, 8 October 2019

RO	EN
Ţiţei şi produse petroliere	Crude oil and petroleum products
Gaz natural	Natural gas
Energie regenerabilă	Renewable energy
Energie nucleară	Nuclear energy
Combustibili solizi	Solid fuels

The highest share in energy imports in 2017 was accounted for by crude oil and petroleum products, the share of this source increasing in the analysed period. The reduction in import dependency was achieved on account of the reduction in the imports of natural gas, renewable energy and solid fuels.

[63] The definition of the indicator is found by accessing the link: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Primary_production_of_energy

Chart 35 - Historical trend in energy import in Romania by energy source, 2005-2017

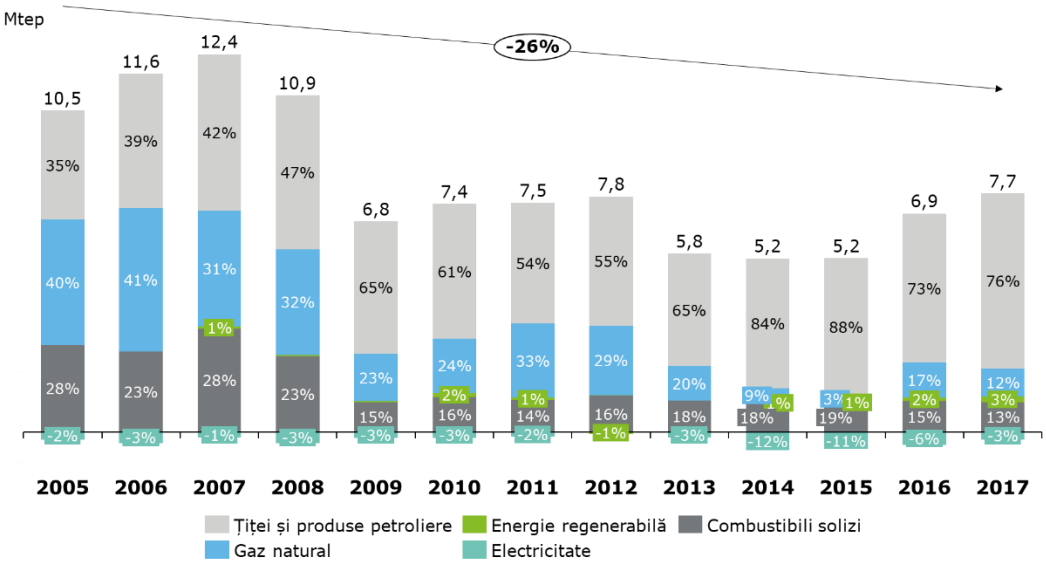


Source: EU Commission, Energy datasheets – EU 28, 8 October 2019

RO	***EN***
Ţiţei şi produse petroliere	Crude oil and petroleum products
Gaz natural	Natural gas
Energie regenerabilă	Renewable energy
Electricitate	Electricity
Combustibili solizi	Solid fuels

As regards net import of energy, Romania was a net exporter of electricity (with only one exception) between 2005 and 2017.

Chart 36 - Historical trend in net energy import in Romania by energy source, 2005-2017



Source: EU Commission, Energy datasheets – EU 28, 8 October 2019

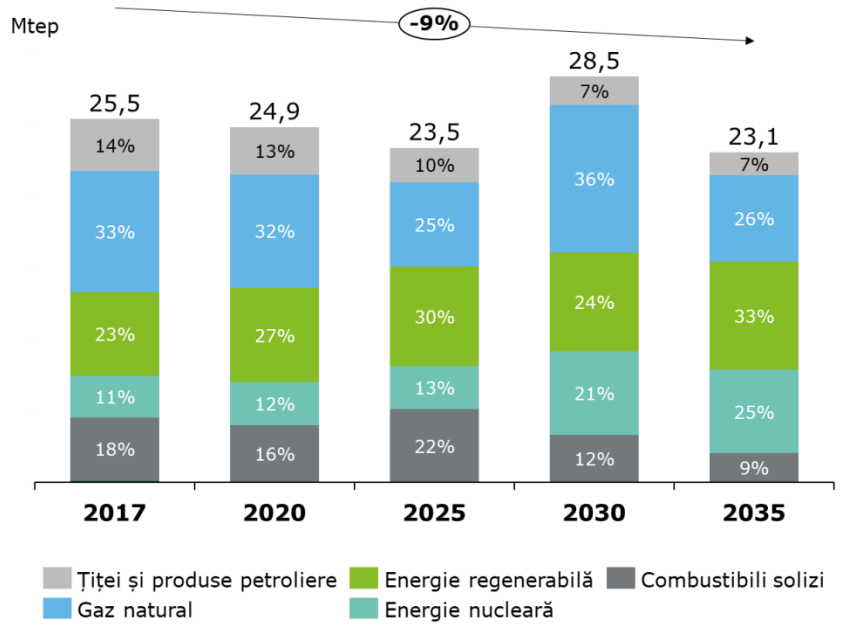
RO	EN
Ţiţei şi produse petroliere	Crude oil and petroleum products
Gaz natural	Natural gas
Energie regenerabilă	Renewable energy
Electricitate	Electricity
Combustibili solizi	Solid fuels

ii. Projections of development with existing policies and measures at least until 2040 (including for the year 2030)

in the context of current policies and measures, the projection shows a decrease in energy production mainly on account of a reduction in the production of solid fuels and natural gas. On the other hand, an increase in production of nuclear energy is expected, including after 2030, following the commissioning of Nuclear Power Units 3 and 4 in Cernavoda, as well as an increase in production of renewable energy.

As regards net import, Romania is expected to further remain a net exporter of electricity at a much lower level than before though. Moreover, imports of crude oil and petroleum products are expected to remain high in order to be able to cover the demand. Overall, dependency on imports is expected to increase in the context of a projection of increase in primary consumption and of decrease in production.

Chart 37 - Projected trend in primary energy production by energy source, in the context of current policies and measures

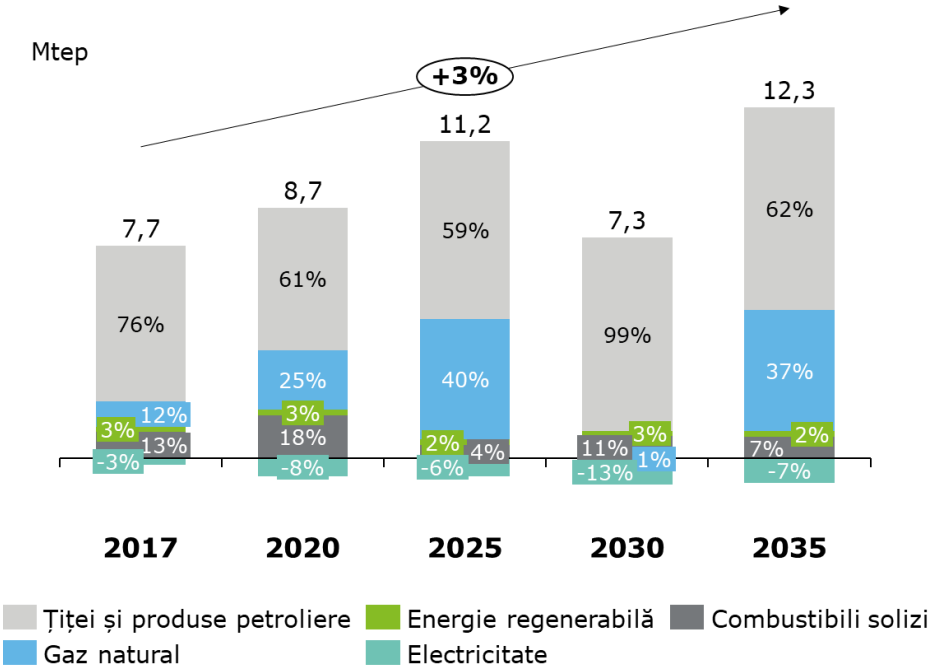


Source: PRIMES 2006 Scenario prepared by the Ministry of the Economy, Energy and the Business Environment, European Commission, Energy datasheets - EU 28, 8 October 2019

RO ***EN***

Ţiţei şi produse petroliere	Crude oil and petroleum products
Gaz natural	Natural gas
Energie regenerabilă	Renewable energy
Energie nucleară	Nuclear energy
Combustibili solizi	Solid fuels

Chart 38 - Projected trend in net import of energy by energy source, in the context of current measures and policies



Source: PRIMES 2006 Scenario prepared by the Ministry of the Economy, Energy and the Business Environment, European Commission, Energy datasheets - EU 28, 8 October 2019

RO	***EN***
Ţiţei şi produse petroliere	Crude oil and petroleum products
Gaz natural	Natural gas
Energie regenerabilă	Renewable energy
Electricitate	Electricity
Combustibili solizi	Solid fuels

4.5. Dimension internal energy market

4.5.1. Electricity interconnectivity

i. Current interconnection level and main interconnectors[64]

The interconnection capacity of Romania is currently 7 %, as presented in the Country Report of Romania in 2017 *["SWD (2017) 88 final"]*, and it is expected to increase for 2020 to over 9 %, thus facilitating the achievement of the 10 % target by 2020. This increase in the current interconnection level of 7 % to over 9 % will be reached if the interconnection capacity with Serbia is extended.

The total length of the electricity transmission grid is 8 834.4 km and interconnection lines sum up 426.9 km in the total grid. The composition of the electricity transmission grid (ETG) is the following: 81 power stations[65], of which: 39 400 kV stations, 42 220 kV stations; 8 834.4 km of overhead power lines (OPL), of which: 3.1 km of 750 kV lines, 4 915.2 km of 400 kV lines, 3 875.6 km of 220 kV lines, 40.4 km of 110 kV lines (interconnection lines with neighbouring countries).

The current interconnections are listed in the table below:

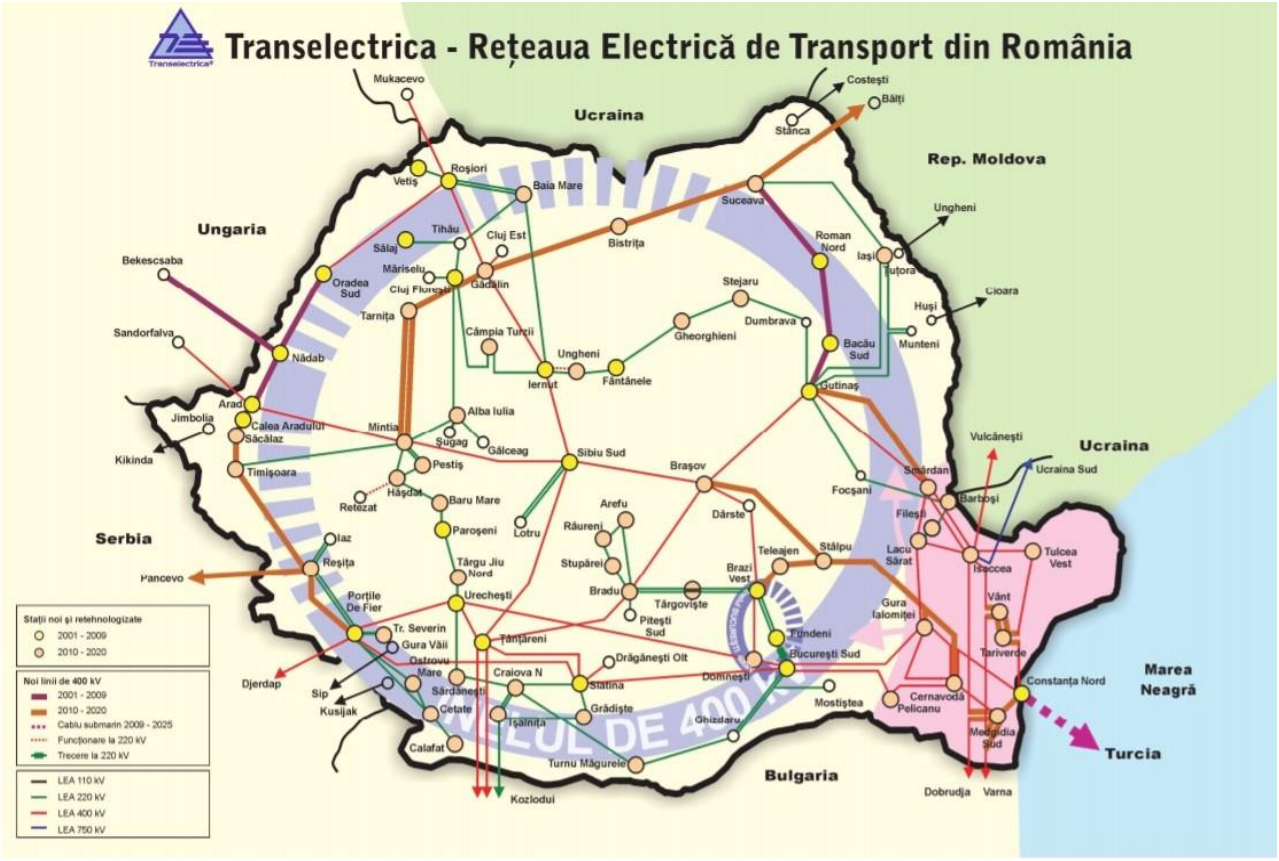
[64] With reference to overviews of existing transmission infrastructure by Transmission System Operators (TSOs)
[65] The 750 kV Isaccea station was demolished in 2019.

Table 23 – Interconnection lines linking the national electricity transmission system to the system of neighbouring countries

Order no.	Border	OEL interconnection
1	Bulgaria	400 kV Țânțăreni – Kozlodui OPL
2	Bulgaria	400 kV Stupina – Varna OPL
3	Bulgaria	400 kV Rahman – Dobrudja OPL
4	Serbia	400 kV Iron Gates – Djerdap OPL
5	Serbia	400 kV Reșița – Pancevo OPL
6	Serbia	110 kV Jimbolia – Kikinda OPL
7	Serbia	110 kV Gura Văii – Sip OPL
8	Serbia	110 kV Ostrovu Mare – Kusjak OPL
9	Hungary	400 kV Arad – Sandorfalva OPL
10	Hungary	400 kV Nadab – Bekescsaba OPL
11	Ukraine	400 kV Roșiori – Mukachevo OPL
12	The Republic of Moldova	400 kV Isaccea – Vucănești OPL
13	The Republic of Moldova	110 kV Stânca – Costești OPL
14	The Republic of Moldova	110 kV Cioara – Huși OPL
15	The Republic of Moldova	110 kV Țuțora – Ungheni OPL
16	The Republic of Moldova	110 kV Falciu – Goteşti OPL

Source: Transelectrica, ETG Development Plan for 2018–2027, Annex B-2, Electricity Transmission Grid in Romania, http://www.transelectrica.ro/web/tel/transport-detalii

Figure 5 - Current situation of the electricity transmission grid in Romania



Source: ANRE 2017 National Report, ETG Development Plan for 2018-2027, Transelectrica

ii. Projections of interconnector expansion requirements (including for the year 2030)[66]

According to the ANRE 2017 National Report, as regards the 2030 target of 15 % for the interconnection level, the implementation of Projects of Common Interest (PCIs) and the development of the other electricity transmission grid projects, which are included in the ETG Development Plan for 2018-2027, will have a considerable contribution to the achievement of this target.

The European Electricity Network Development Plan will be completed by the six regional groups of the ENTSO-E. CNTEE Transelectrica SA is part of the following regional groups: the Continental Central East and the Continental South East Regional Groups.

In order to implement the priorities regarding the European energy infrastructure, the European Commission included certain ETG development projects (included in the National ETG Development Plan) on the Fourth List of European Projects of Common Interest (PCI), as approved on 31 October 2019 in the priority electricity corridor No 3. *North -South electricity interconnections in Central Eastern and South Eastern Europe (NSI East Electricity)*: north-south and east-west interconnections and internal lines for better integration of the internal market in the European market and to enhance takeover of production from renewable sources, which are clustered as follows:

[66] With reference to national network development plans and regional investment plans of TSOs

- **Bulgaria–Romania Cluster, also known as the Black Sea Corridor, which includes the following Projects of Common Interest:**
  - 400 kV d.c. OPL Smârdan-Gutinaş (RO) (an equipped circuit);
  - 400 kV d.c. OPL Cernavodă-Stâlpu, with in/out circuit in Gura Ialomiţei (RO).

Together with a project promoted by the Bulgaria ESO-EAD initiator:

  - 400 kV d.c. OPL Dobrudja–Burgas (BG).

- **Romania–Serbia Cluster, also known as Mid Continental East Corridor and Italy–Montenegro, which includes the following projects of common interest:**
  - 400 kV d.c. OPL Reşiţa (RO)–Pancevo (Serbia);
  - the 400 kV OPL Iron Gates-Reșița and extension of the 220/110 kV Reșița Station by building a new 400 kV station;
  - change of the 220 kV d.c. OPL to a 400 kV line Reşiţa–Timişoara–Săcălaz–Arad, including the construction of the 400 kV Timişoara and Săcălaz stations.

The above projects are included in the latest edition of the pan-European 10-year electricity network development plan (TYNDP 2018) and prepared by ENTSO-E under Article 8 of Regulation (EC) No 714/2009.

Below is a short description of the Black Sea Corridor and Mid Continental East Corridor projects:

- **Black Sea Corridor:**

The purpose of this project is to strengthen the electricity transmission corridor alongside the Black Sea Coast (RO-BG) and between the coast and Western Europe.

This project, which has a significant contribution to the implementation of the strategic energy infrastructure objectives of the EU, is supported by an increase in the level of interconnection between Romania and Bulgaria and by the development of the infrastructure supporting the transmission of power flows between the Black Sea Coast and the North Sea Coast, and the Atlantic Ocean Coast. Moreover, this project will be conducive to enhanced exchanges in the area, thus strengthening the integration of the regional and European energy market.

The development of renewable energy sources of an intermittent nature will boost significantly in the context of an increase in the capacity of the grid to transmit the energy produced from renewable sources from South-Eastern Europe to the main consumption centres and the storage sites located in Central and Northern Europe.

- **Mid Continental East Corridor:**

This project is included in the priority electricity corridor "North -South electricity interconnections in Central Eastern and South Eastern Europe" (NSI East Electricity) and it will culminate with an increase in the exchange capacity at the borders between Romania, Hungary and Serbia. Moreover, this project will enable deeper integration of electricity markets and enhanced security in supply in the south-eastern area of Europe.

Criteria for determining the interconnection level

In the light of the amendments to the Proposal for a Regulation of the European Parliament and of the Council of 28 June 2018 on the governance of the Energy Union, the interconnection strategy will have to consider, apart from the interconnection targets set at EU level, ***the following indicators of the urgency of measures in this field:***

- price differential in the wholesale market exceeding an indicative threshold of EUR 2/MWh between Member States, regions or bidding zones;
- the nominal transmission capacity of interconnectors below 30 % of peak load;
- the nominal transmission capacity of interconnectors below 30 % of installed renewable energy production capacity.

According to the data sent by CNTEE Transelectrica SA, two of these indicators are above the 30 % threshold and, for this reason, there is no urgency in the implementation of the measures set out in the abovementioned proposal for a Regulation, as follows:

- for the nominal interconnection capacity in percentage of the peak load (the peak load in the winter of 2018 = 9 700 MW was considered), the current value is 113 %[67];
- For the nominal interconnection capacity in percentage of the installed capacity in renewable energy sources, the current value is 97 %.

The minimum available capacity for cross-border trade

Regulation (EU) 2019/943 establishes the minimum available capacity of 70 % of the transmission capacity for cross-border trade, in compliance with the operational security limits after taking into account contingencies, from 2016 onward. In this respect, Article 15 of Regulation (EU) 2019/943 provides for the requirements to develop an Action Plan in order to reach the established minimum capacity.

As regards the minimum available capacity for cross-border trade, the electricity transmission operator applied for a one-year derogation from the minimum capacity.

In this context, the application for a derogation was submitted by Transelectrica in November 2019. The reasons underlying the application for a derogation are:

- Absence of coordinated capacity calculation at the level of capacity calculation regions (CCR) CORE and SEE

  Pursuant to Article 16(8) of Regulation (EU) 2019/943, the application of a minimum available capacity for inter-zonal trade is mandatory for borders using a coordinated net transmission capacity-based (CNTC) approach or a flow-based approach. Article 16(8) also states that the minimum available capacity for inter-zonal trade is determined in accordance with Commission Regulation (EU) 2015/1222 establishing a guideline on capacity allocation and congestion management. Therefore, the minimum available capacity for inter-zonal trade is calculated and monitored for the day-ahead and intraday market time-frames in accordance with Article 14 of Commission Regulation (EU) 2015/1222. ACER Recommendation No 1/2019 on the implementation of the available capacity for inter-zonal trade in accordance with Regulation (EU) 2019/943 states that, overall, the minimum available capacity for inter-zonal trade must be monitored for the day-ahead market time-frame.

  The capacity calculation methodologies for the day-ahead market time-frame of the Core CCR (for the RO-HU border) and the SEE RCC (for the RO-BG border), which were

[67] Transelectrica analysis table, New criteria for the interconnection capacities, 2030

developed in accordance with Commission Regulation (EU) 2015/1222, are approved by ACER and by the regulatory authorities in the SEE CCR and their implementation deadline is the end of 2020.

The current capacity calculation methodology applied by Transelectrica uses a NTC-based calculation method that does not comply with the requirements of Commission Regulation (EU) 2015/1222. The NTC calculation is currently made on a monthly basis, with a daily resolution, based on own calculation scenarios on the Romanian interface. Regional coordination is achieved only for the common grid model developed on a monthly basis and the aggregation of the minimum values proposed by the two TSOs per border. The values of the inter-zonal available capacity for the day-ahead and intra-day market time-frames are deducted from those calculated on a monthly basis. The capacity calculation results based on the individual methodology of Transelectrica certainly feature major uncertainties due to the fact that the entry data is estimated as highly uncertain long before the electricity supply day. The application of an available capacity for inter-zonal trade to an uncoordinated capacity calculation increases the risk of breaching the operational security limits for the real-time operation of the NES.

- Power flows in cross-border trade with third countries

  ACER Recommendation No 1/2019 provides that it is possible to take into account power flows at the non-EU borders in the capacity calculation and in the calculation of the available margin for inter-zonal trade if an agreement is concluded with the third country(ies) concerned. Moreover, ACER Recommendation No 1/2019 states that the agreement with third countries should also include the apportionment of costs with remedial actions.

  Cross-border trade at the Romanian borders outside the EU have a significant impact on the transmission capacity available at the Romanian borders within the EU. Trade at the RO-HU borders of the Core CCR is influenced by the cross-border trade at the RO-RS and RO-UA borders. This is understandable in the light of the fact that Romania and Hungary have common borders with RS and UA. Trade at the RO-BG border of the Core CCR is influenced by the cross-border trade at the RO-RS and BG-RS borders.

  Compliance with the requirements of Article 16(8) of Regulation (EU) 2019/943, without taking into account power flows in cross-border trade with third countries, leads to an artificial increase in the available capacities at the RO-HU and RO-BG borders and to increased risks as regards maintenance of the NES operational security.

- Redispatching and countertrading

  In accordance with Article 16(4) of Regulation (EU) 2019/943, redispatching and countertrading are relied on in order to maximise the available capacity with a view to reaching the minimum capacity under Article 16(8). These are applied in a coordinated manner and following the application of the cost sharing methodology. The redispatching, countertrading and cost sharing methodologies developed in accordance with Regulation (EU) 2015/1222 are to be implemented after the coordinated capacity calculation at CCR level has become operational.

  The application of an individual redispatching process by CNTEE Transelectrica in 2020 in order to reach the minimum capacity under Article 16(8) of Regulation (EU) 2019/943 is not feasible. On the one hand, there is no operational experience regarding the redispatching process for increase in the cross-border capacity and, on the other hand, no calculation programmes are available, as required to assess the impact of these remedial actions which generate costs.

The application submitted by Transelectrica for a one-year derogation from the minimum available capacity for inter-zonal trade in accordance with Article 16(9) of Regulation (EU) 2019/943 of 5 June 2019 on the internal market for electricity was approved under Decision No 2206 of 20 December 2019 by the President of ANRE.

4.5.2. Energy transmission infrastructure

i. Key characteristics of the existing transmission infrastructure for electricity and gas

Electricity transmission infrastructure

The electricity transmission grid (ETG) consists of overhead power lines (OPL) with rated voltage of 750 kV, 400 kV, 220 kV and 110 kV and power stations with voltage above 400 kV/220 kV, summing up 8 834.4 km of total length of the electricity transmission grid and interconnection lines summing up 426.9 km in total.

83.6 % of the total OPL length were put into service in the period 1960-1979, 14.07 % in the period 1980-1999 and approximately 2.3 % after 2000.

It is noticeable that a low rate of OPL putting into service has been recorded after 2000. The OPL usage rate is given by the percentual ratio between their operating period and their lifetime under the rules (48 years according to the latest edition of the Catalogue on classification and normal operating periods of immovable assets). According to the analysis of 2017, a very high usage rate, i.e. 95.7 %, was recorded for OPL put into service until 1979 and they account for 83.6 % of the total overhead power lines managed by the TSO.

As regards the total installed capacity in transformers, approximately 20.7 % was commissioned in the period 1960-1979, 22.1 % in the period 1980-1999 and 57.2 % after 2000. Many of the transformers and auto transformers were found to be outdated, i.e. approximately 43 % of their total capacity, among those commissioned before 2000. For those commissioned after 2000, the average usage rate with reference to the installed capacity is approximately 33 %. The usage rate of transformers/auto transformers is determined the same as that of OPL, noting that, in this case, the stipulated lifetime is 24 years.

There is a low rate of high-voltage electricity transmission and distribution lines commissioned after 2000, the average being below 4 % of the total length of these categories of electrical installations. Therefore, most of the installations pertaining to electricity transmission and distribution grids currently in operation have a long operational period, predominantly above 35 years.

In the category of medium and low voltage power lines (including connections), which were commissioned after 2000, it is noticeable that they account for a higher rate in the total length of this type of electrical installations, reaching 10 % for medium voltage and 20 % for low voltage.

The number of power stations in the distribution grids, which were commissioned after 2000, accounts for approximately 9 % of their total number. The number of transformer substations and supply points reached approximately 28 % of the total number pertaining to the two categories of power lines in 2017.

Natural gas transmission infrastructure

The natural gas is transported through main pipelines with a total length of over 13 350 km (data for the reference year 2018) and through their related installations, equipment and fittings, the gas supply connectors having diameters ranging between 50 mm and 1 200 mm under pressure between 6 and 63 bar; they take over the natural gas extracted from the

production sites or imported gas and transport them in order to be supplied to final consumers on the internal and external natural gas markets.

The natural gas transmission system (SNT) consists of the following components: over 13 350 km of transmission pipelines and natural gas supply connectors, of which 370 km of transit pipelines; 1 237 natural gas measurement control stations (directions); 58 valve control stations (VCS, NT); 7 imported gas measurement stations; 4 measurement stations mounted on the international natural gas transmission lines (GMS); 3 gas compression stations (GCS); 1 039 cathode protection stations (CPS) and 902 gas odorising stations (GOS).

As regards the technical state of gas distribution systems, they sum up a total length of 49 444 km and are owned by the 37 gas distribution operators. 58.1 % of the total length of these pipes are manufactured from polyethylene and have undergone extended development in the past 20 years. Therefore, 31.5 % of the total 49 444 km of national distribution system networks are less than 10 years old, 40.5 % are 10 to 20 years old and only 7.3 % are older than 30 years.

The 2019-2028 NTSDP also includes projects to develop the natural gas storage system, two of which are projects of common interest already included on the Third List of TYNDP. It is about the project entitled "Enhancing the storage capacity of the Sărmășel Storage Facility (Transylvania)" with reference number 6.20.6 of SNTGN Romgaz SA - DEPOGAZ SA Natural Gas Storage Subsidiary and the project promoted by SC DEPOMUREŞ with the project "Depomureş-Târgu Mureș Storage Facility", with a reference number on the Third List/2017 - 6.20.4. Moreover, three major strategic projects are also included for Romania, which were proposed by Romgaz-DEPOGAZ Subsidiary and which are included in the 2019-2028 Plan, more specifically "Upgrading the infrastructure of the natural gas storage system - Bilciurești", for the 2018-2025 time-frame and with the value of EUR 59 million; "Enhancing the underground natural gas storage capacity for the Ghercești storage facility" estimated for the 2020-2025 time-frame, with the value of EUR 122 million; "New underground storage facility in Moldova" estimated for the 2020-2025 time-frame, with an estimated value of EUR 80 million.

ii. Projections of network expansion requirements at least until 2040 (including for the year 2030)

Electricity

The national transmission system consists of power lines and stations mostly built in the years 1960-1980 at the technological level of that time.

Due to the maintenance programme and to the refurbishment and modernisation programme, installations have been maintained to date at an appropriate level of technical condition.

The following ten years are dedicated to completing the refurbishment and modernisation projects for the installations and equipment under development and new projects will be initiated.

CNTEE Transelectrica communicated the grid development projects to be implemented:

1. **Stage 2018:**
   - 400 kV d.c. OPL Reșița–Pancevo (Serbia).

2. **Stage 2022:**
   - overhead power lines (OPL) of 400 kV Porțile de Fier–Reșița (first stage of transition to 400 kV voltage on the route of Porţile de Fier–Reşiţa–Timişoara–Săcălaz–Arad);
   - connection of OPL of 400 kV Stupina–Varna (Bulgaria) entry to/exit from the 400kV station in Medgidia South through a 400 kV d.c. OPL;

- connection of OPL of 400 kV Rahman–Dobrudja (Bulgaria) entry to/exit from the 400kV station in Medgidia South through a 400 kV d.c. OPL;
- the second transformer of 250 MVA, 400/110 kV in the Sibiu South Station;
- connection of the 220 kV station in Ostrovu Mare (Porțile de Fier II hydro-power plant) in–out from a circuit of a 220 kV d.c. OPL; Porțile de Fier–Cetate;
- the second autotransformer of 400 MVA, 400/220 kV in the Iernut Station;
- the second autotransformer of 400 MVA, 400/220 kV in the Brazi West Station;
- 400 kV d.c. OPL (1 equipped circuit) Smârdan–Gutinaș;
- 400 kV d.c. OPL Cernavodă–Gura Ialomiței–Stâlpu;
- transition to 400 kV voltage of OPL Brazi West–Teleajen–Stâlpu;
- 400 kV d.c. OPL (1 equipped circuit) Medgidia South–Constanța North;

3. Stage 2027:

- 400 kV d.c. OPL Reșița–Timișoara/Săcălaz–Arad (second stage of transition to 400 kV voltage on the route Porţile de Fier–Reşiţa–Timişoara–Săcălaz–Arad);
- 400 kV d.c. OPL Gădălin–Suceava;
- 400 kV d.c. OPL Suceava–Bălți;
- 400 kV d.c. OPL Stâlpu–Brașov (1 equipped circuit).

The solutions established for the development of the grid must enable to remove congestions on the main lines of power flows between the production centres in the eastern part of the country and consumption and storage centres in the west.

No projections have been issued to date as regards the development of the electricity transmission infrastructure for 2040.

Natural gas

National Natural Gas Transmission System

The National Natural Gas Transmission System (SNT) in Romania is operated by SNTGN Transgaz SA, the technical operator of the transmission system (TSO). The natural gas transmission capacity is secured by the pipe and supply connection network with diameters ranging between 50 and 1 200 mm and a total length of 13 350 km of natural gas main transmission pipelines supply connectors, of which 370 km of international natural gas transmission pipelines.

SNT is connected to the neighbouring countries, more specifically Ukraine, Hungary, Moldova and Bulgaria, through the following cross-border interconnection points:

Interconnection with UKRAINE:

1. Orlovka (UA)–Isaccea (RO) interconnection pipeline with the following characteristics: DN 1000, capacity = 8.6 billion m^3/year and P_{max} = 55 bar

2. Tekovo (UA)–Medieșu Aurit (RO) interconnection pipeline with the following characteristics: DN 700, capacity = 4.0 billion m^3/year and P_{max} = 70 bar

Interconnection with HUNGARY:

3. Szeged (HU)–Arad (RO)-Csanadpalota interconnection pipeline with the following technical characteristics: DN 700, capacity = 1.75 billion m^3/year and P_{max} = 63 bar

Interconnection with the REPUBLIC OF MOLDOVA:

4. Ungheni (MO)–Iași (RO) interconnection pipeline with the following technical characteristics: DN 500, capacity = 1.5 billion m^3/year and P_{max} = 50 bar

Interconnection with BULGARIA:

5. Ruse (BG)–Giurgiu (RO) interconnection pipeline with the following technical characteristics: DN 500, capacity = 1.5 billion m^3/year and P_{max} = 40 bar

The Development Plan for the National Natural Gas Transmission System sets out the development lines of the Romanian natural gas transmission network and of the major projects which the national transmission system operator (NTS) intends to implement in the following ten years. The purpose is to reach a maximum level of transparency as regards the development of the natural gas NTS in order to provide market players with the possibility of timely informing on the existing and planned transmission capacities in order to ensure, by public consultation, that decisions on investments in the natural gas transmission network meet the market requirements.

The Development Plan for the National Natural Gas Transmission System (NTS) in the period 2019-2028 meets the requirements of the European energy policy as regards:

- securing natural gas supply;
- enhancing interconnection of the national natural gas transmission network with the European network;
- increasing the flexibility of the national natural gas transmission network;
- ensuring the liberalisation of the natural gas market;
- integrating the natural gas market at EU level.

The NTS operator proposes major investment projects in the Development Plan for the National Transmission System, in order to ensure the strategic and sustainable development of the natural gas transmission infrastructure in Romania, at the same time aiming at ensuring its compliance with the requirements of the EU relevant regulations.

The main projects included in the Development Plan for the National Natural Gas Transmission System for the period 2019-2028 are[68]:

1. **Development of the National Natural Gas Transmission System within the territory of Romania on the Bulgaria–Romania–Hungary–Austria Corridor**

The project is purposed to create a natural gas transmission capacity between the interconnection points between the Romanian natural gas transmission system and the Hungarian and Bulgarian ones. For this purpose, an approximately 529 km long pipe must be built on the Podișor–Hațeg–Horia route and three new compression stations in Jupa, Bibești and Podișor.

The staged implementation of the BRHA project entails:

- Stage I consisting in the achievement of the following objectives:
    - the Podișor–Recaș 32'' x 63 bar and 479 km long pipe;
    - tree gas compression stations (CS Podișor, CS Bibești and CS Jupa), each station being equipped with two compression units (one in service and the other as a backup), with the possibility of ensuring bidirectional gas flow;

[68] Development Plan for the Natural Gas Transmission System for 2019-2028, as approved by ANRE

- the transmission capacity of 1.75 billion m^3/year to Hungary and 1.5 billion m^3/year to Bulgaria;
- estimated investment value - EUR 478.6 million.

- Stage II consisting in the achievement of the following objectives:

  - the Recaș-Horia 32'' x 63 bar and approximately 50 km long pipe;
  - upgrading the three compression stations (CS Podișor, CS Bibești and CS Jupa) by mounting an additional compression unit in each station;
  - upgrading the existing gas measurement station - GMS Horia;
  - the transmission capacity of 4.4 billion m^3/year to Hungary and 1.5 billion m^3/year to Bulgaria;
  - estimated investment value - EUR 68.8 million.

Projected completion date: 2020 for Stage I and 2022 for Stage II

2. Development of the Southern Transmission Corridor within the territory of Romania to take over natural gas from the Black Sea shore

The major objective of this investment consists in building a telescopic natural gas transmission pipe, i.e. Tuzla – Podișor, with the length of 308.3 km and DN 1200 and DN 1000, which connects the available natural gas resources on the Black Sea shore to the Bulgaria-Romania-Hungary-Austria corridor, thus providing for the possibility of transmitting natural gas to Bulgaria and Hungary through the existing interconnections Giurgiu–Ruse (with Bulgaria) and Nădlac–Szeged (with Hungary). Moreover, this pipe will be interconnected with the current international natural gas transmission pipe T1. The pipe is telescopic and comprises two segments:

- Segment I: the Black Sea shore-Amzacea, with the length of 32.4 km, to have a technical capacity of 12 billion m^3/year;
- Segment II: Amzacea-Podișor, with the length of 275.9 km, to have a technical capacity of 6 billion m^3/year.

The estimated investment value is EUR 360.4 million and the projected completion date is 2021.

3. Interconnecting the National Natural Gas Transmission System with the international natural gas transmission pipe T1

This project is particularly important because:

- its implementation will culminate with a transmission corridor between the markets in Greece, Bulgaria, Romania and Ukraine considering that the new interconnection between Greece and Bulgaria is achieved;
- the transmission contract pertaining to the capacity of the Transit 1 pipe expired on 1 October 2016; from the gas year 2016-2017 onward the transmission capacity of the Transit 1 pipe is traded on the basis of bids in accordance with the European Code on capacity allocation mechanisms in cross-border interconnection points and Order No 34/2016 of ANRE;
- reversible physical flows will be possible at the Negru Vodă 1 point in accordance with the requirements of Regulation (EU) No 1938/201769;

[69] GMS Negru Vodă 1 is bidirectional, but the gas reversible flow may be secured when the NTS interconnection with the international transmission pipe T1 has been completed

- The project also becomes necessary in the context of taking over into the Romanian transmission system the natural gas recently discovered in the Black Sea in order to sell it on the Romanian and regional markets.

The project will consist in the following:

- Phase I:
    - interconnection works between NTS and the international transmission pipe T1 in the area of the Isaccea measurement station;
    - rehabilitation of the DN 800 mm Cosmești – Onești pipe (66.0 km).
- Phase II:
    - modernisation and upgrading of the Siliștea compression station;
    - modernisation and upgrading of the Onești compression station;
    - Changes within the NT Siliștea, NT Șendreni and NT Onești.

The estimated investment value is EUR 77.7 million and the projected completion date is 2020.

4. Developments of the NTS in North-East Romania in order to improve the natural gas supply in the area and to secure the transmission capacities to the Republic of Moldova

Considering the need to improve natural gas supply in the north-east region of Romania and taking account of the opportunity provided by the new interconnection pipe between Romania and the Republic of Moldova (Iași-Ungheni), namely to provide transmission capacities to/from the Republic of Moldova, a series of developments are required for the Romanian natural gas transmission system in order to provide for the technical parameters in line with the consumption requirements in the targeted areas.

The project will consist in the following:

- construction of a new transmission pipe, i.e. DN 700, on the Onești-Gherăiești route – 104 km;
- construction of a new transmission pipe, i.e. DN 700, on the Onești-Leșcani route – 61 km;
- construction of a gas compression station in Onești - installed capacity of 9.14 MW;
- construction of a gas compression station in Gherăiești - installed capacity of 9.14 MW;

Transgaz can secure outflow of 43,8 million m^3/year from the NTS to the Republic of Moldova. At the end of the NTS development project in the north-east area of Romania, on the RO-MD route, a flow rate of 1,5 billion m^3/year may be secured at operating pressure of 16-50 bar.

The estimated investment value is EUR 174.2 million and the projected completion date is 2021.

5. Upgrading the bidirectional natural gas transmission corridor Bulgaria-Romania-Hungary-Austria (BRHA stage 3)

Assuming that the transmission capacities required to sell the natural gas in the Black Sea on the Central-West European markets exceed the transmission potential of the BRHA corridor at the second stage, SNTGN Transgaz SA planned to develop the central corridor which practically follows the route of certain pipes in the current system, but which is currently operated under inadequate technical parameters for a main pipeline.

The project will consist in the following:

- rehabilitating certain existing pipes pertaining to the NTS;
- replacing certain existing pipes pertaining to the NTS with new pipes or installing new pipes in parallel with existing pipes;
- developing four or five new compression stations with a total installed capacity of approximately 66-82.5 MW;
- increasing the capacity of transmission of natural gas to Hungary by 4.4 billion m^3/year.

The estimated investment value is EUR 530 million and the projected completion date is 2025.

6. Project regarding new developments of the NTS in order to take over the natural gas in the Black Sea

Considering the natural gas deposits recently discovered in the Black Sea, SNTGN Transgaz SA intends to extend the NTS in order to create an additional point for collection of the natural gas extracted from the marine exploitation perimeters of the Black Sea.

The project consists in the construction of an approximately 25 km long transmission pipe with DN 500 from the Black Sea shore to the existing international transmission pipe T1. The transmission capacity is 1.23 billion m^3/year.

The necessity of this project emerged from the discussions held/initiated by SNTGN Transgaz SA in 2015 with the holders of exploration and exploitation licences for the perimeters in the Black Sea.

The estimated value of the investment is EUR 9.14 million and the estimated completion deadline is 2021 depending on the schedules of upstream offshore projects.

7. Interconnection between the National Natural Gas Transmission System in Romania and the natural gas transmission system in Serbia

In the light of the European Energy Union Strategy and of the actions involving the implementation of the objectives of this strategy (competitiveness, sustainability and security in energy supply), Romania is particularly interested in implementing the energy security dimension, in developing the energy infrastructure by diversifying the energy sources and transmission routes, in strengthening solidarity among Member States and in ensuring the efficient operation of the energy market.

The efforts to enhance interconnectivity between the natural gas transmission systems in Member States and energy security in the region also include the project for establishing interconnection between the National Natural Gas Transmission System in Romania and the Serbian system.

The assessed option for exporting natural gas to Serbia is to take over natural gas from the future BRHA pipeline (stage I). The closest point of the BRHA pipeline to the border between Romania and Serbia is Petrovaselo Locality in Timiș County.

The project entitled "Interconnecting the national natural gas transmission system with the peer natural gas transmission system in Serbia" consists in building a pipeline interconnecting the national natural gas transmission system and the peer natural gas transmission system in Serbia on the approximately 97 km long Recaș-Mokrin route. According to the 2018-2027 NTSDP, the pipeline route will follow the Recaș-Mokrin corridor, its course being changed from the Arad-Mokrin route in the 2017-2027 NTSDP.

The project will consist in building a new approximately 97 km long interconnection pipeline on the Recaș-Mokrin route, of which approximately 85 km within the territory of Romania and 12 km within the territory of Serbia, having the following characteristics:

- pressure in the BRHA pipeline in the Recaș area: 50-54 bar (PN BRHA – 63 bar);
- Diameter of the interconnection pipeline: DN 600 mm;
- Transmission capacity: 1.6 billion m^3/year, pressure in Mokrin: 39–45 bar;
- building a natural gas measurement station (located within the territory of Romania).

The estimated investment value is EUR 53.8 million and the estimated completion deadline is 2020.

8. Upgrading of Isaccea 1 GMS and of Negru Vodă 1 GMS

In order to enhance energy security in the region, the following interconnection agreements have been signed:

- the Interconnection Agreement for the Isaccea 1 Interconnection Point concluded with PJSC Ukratransgaz, Ukraine on 19 July 2016;
- the Interconnection Agreement for the Negru Vodă 1 Interconnection Point concluded with Bulgartransgaz on 19 May 2016.

The actions listed in these agreements also include upgrading of the natural gas measurement stations in the two interconnection points.

The project "Upgrading of the Isaccea 1 GMS and of Negru Vodă 1 GMS" consists in building two new natural gas measurement stations on the premises of the existing measurement stations.

The estimated investment value is EUR 26.7 million and the estimated completion deadline is 2021.

9. Interconnection between the national natural gas transmission system and the natural gas transmission system in Ukraine on the Gherăești-Siret route

This project aims at enhancing interconnection of the national natural gas transmission network with the European transmission network. SNTGN Transgaz SA has thus identified the opportunity of interconnecting the NTS with the natural gas transmission system of Ukraine on the Gherăești-Siret route.

The project consists in:

- building a natural gas transmission pipeline (130 km) and related installations on the Gherăești-Siret route;
- building a cross-border gas measurement station;
- upgrading the Onești and Gherăești compression stations.

The estimated investment value is EUR 125 million, with completion deadline in 2025.

4.5.3. Electricity and gas markets, energy prices

i. Current situation of electricity and gas markets, including energy prices

The electricity market

The electricity market in Romania comprises:

- the wholesale market, the size of which is determined by the totality of the transactions conducted, exceeding the quantity that is physically transmitted from production to consumption; the totality of the transactions includes resales for the purpose of adjusting the contractual position and of gaining financial benefits;
- the retail market, on which transactions are conducted between suppliers (competitive or of last resort) and final consumers [supplied under a competitive regime or under regulated conditions - under Article 53(2) and Article 55(1) of Law No 123/2012 on electricity and natural gas].

The participants in the electricity market and related operational structures are:

- the electricity transmission system operator (Transelectrica SA);
- the electricity market operator (OPCOM SA);
- any natural or legal person buying, selling or producing electricity, which is engaged in the aggregation or which is a demand response operator or an operator of energy storage services, including by placing trading orders on one or several electricity markets, including on the energy balancing market.

OPCOM SA, as the market operator, administers the following electricity markets:

- the Day-ahead Market (DAM);
- the Intra-Day Market (IDM);
- the organised framework for trading under a competitive regime for bilateral electricity contracts under extended bidding (PCCB-LE), under ongoing negotiation (PCCB-NC) and under processing contracts (PCCB-PC);
- the Centralised Market of Double Ongoing Negotiation of Bilateral Electricity Contracts (PC-OTC);
- the Electricity Market for Large Final Consumers (PMC);
- the Centralised Market for the Universal Service (PCSU);
- the Green Certificates Market (PCV);
- the Centralised Market of Renewable Energy Sustained by Green Certificates.

In 2018, 124 producers of electricity, as holders of dispatchable units from hydro-power, nuclear, heat, wind, photovoltaic and biomass production sources, operated in Romania. In 2018, 61.97 TWh of electricity were produced, whereas the electricity supplied by the respective producers to the grid accounted for 58.31 TWh.

Table 24 – Structure of electricity producers as holders of dispatchable units for 2018

Dispatchable producer	Electricity produced in 2018 (GWh)	Market share (%)
Hidroelectrica SA	17 232	27.81 %
Complexul Energetic Oltenia SA	14 143	22.82 %
SN Nuclearelectrica SA	11 377	18.36 %
OMV Petrom SA	4 848	7.82 %
Electrocentrale Bucureşti SA	2 592	4.18 %
Enel Green Power Romania SRL	1 226	1.98 %

Dispatchable producer	Electricity produced in 2018 (GWh)	Market share (%)
Romgaz SA	1 165	1.88 %
Complexul Energetic Hunedoara SA	960	1.55 %
Tomis Team SRL	646	1.04 %
CET Govora SA	525	0.85 %
Ovidiu Development SRL	479	0.77 %
Verbund Wind Power SRL*	431	0.7 %
EDPR Romania SRL	426	0.69 %
Veolia Energie Prahova SRL	408	0.65 %
Other dispatchable producers (with market shares below 1 %)	5 515	8.9 %
TOTAL	**61 973**	**100 %**

Source: ANRE National Report for 2018

The electricity production sector is dominated by the main three producers of electricity from classical sources, namely Hidroelectrica, CE Oltenia and Nuclearelectrica, which provide approximately 69 % of the electricity produced in dispatchable units.

The table below lists the concentration indicators calculated according to the energy supplied to the grids for 2018:

Table 25 - Concentration indicators for the electricity production market for 2018

Concentration indicators	2018
C1 (%)	29.02 %
C3 (%)	68.91 %
HHI	1,742

Source: ANRE National Report for 2018

The values of concentration indicators maintain the electricity production sector within the boundaries separating the moderately concentrated markets from highly concentrated markets.

Below are the annual volumes supplied per wholesale market component in 2018 and the share in the internal consumption recorded in 2018:

Table 26 - Annual volumes supplied per wholesale market component in 2018

Wholesale market components	2018 (GWh)	Share in internal consumption in 2018 (%)
Market of regulated contracts	-	-
Market of directly negotiated contracts	438	0.8
Centralised bilateral contracts markets	67 005	120.2
Centralised market for the universal service	2 208	4.0
Day-ahead market	23 541	42.2
Intra-day market	159	0.3
Balancing market	3 305	5.9
Exported*	5 479	9.8

Source: ANRE National Report for 2018
**The quantity pertaining to the export contracts in 2018 includes both quantities exported by suppliers/traders and export through CNTEE Transelectrica SA as transfer agent for the coupled day-ahead market.*

In 2018, the supply of electricity traded on centralised electricity bilateral contracts markets organised by OPCOM (PC-OTC, PCCB-LE and PCCB-NC), which ensure in particular the supply of electricity afferent to the transactions under contracts concluded on the medium or long term, prevailed, being followed by the day-ahead market for short-term supply transactions.

For the cross-border commercial activity set out in the following table, it is noticeable that Romania maintains its position of net exporter in the region:

Table 27 - The cross-border commercial activity of Romania for 2018

Import-export transactions	2018
Exported	
Volume (GWh)	5 479
Average price (RON/MWh)	193.66
of which, on the coupled DAM*	

Import-export transactions	2018
Volume (GWh)	1 399
Average price (RON/MWh)	180.23
Import	
Volume	2 934
Average price (RON/MWh)	248.66
of which, on the coupled DAM*	
Volume (GWh)	1 123
Average price	253.40

Source: ANRE National Report for 2018

**The quantity pertaining to the export contracts in 2018 includes both quantities exported by suppliers/traders and export through CNTEE Transelectrica SA as transfer agent for the coupled day-ahead market.*

In 2018, **97 holders of electricity supply licences** were active **on the retail market**, of which 5 suppliers were designated by ANRE as suppliers of last resort and 25 also hold a licence for the commercial exploitation of the electricity production capacities.

The value of concentration indicators - HHI and C1, as calculated for the entire competitive retail market in 2018, is equal to HHI-551 and C1-10 %, which indicates a non-concentrated market determined by the large number of active suppliers and their division as market power.

Consumption of electricity by final consumers was approximately 50 TWh throughout the year, **i.e. by 3.3 % higher than the share in 2017.** Most of this quantity (approximately 74.5 % of the final consumption) was consumed by non-household consumers (over 37 TWh, i.e. by 4 % more than in 2017), whereas for consumption by household consumers (approximately 12.8 TWh), only a 1.4 % increase was recorded:

The table below lists the structure of the Romanian market in 2018:

Table 28 - Structure of the retail market in Romania in 2018

Consumer type	Regulated market		Competitive market	
	No of consumers	Volume (GWh)	No of consumers	Volume (GWh)
Household	6 489 134	9 656 82	2 127 461	3 116
Non-household	186 362	993.4	175 493	36 256

Source: ANRE National Report for 2018

In accordance with Order No 145/2014 of ANRE on the implementation of smart electricity measurement systems (SMS), as subsequently amended and supplemented, concessionaire electricity distribution operators were obliged to develop pilot projects endorsed by ANRE:

- in 2015, 18 pilot projects worth of RON 69 639 770 were developed for the eight concessionaire electricity distribution operators (CDO);
- in 2016, 22 pilot projects worth of RON 67 855 333 were developed for four of the eight CDO;
- in 2017, in accordance with Article 5(3) of Order No 145/2014 of ANRE, concessionaire electricity distribution operators were entitled to make investments in SMS of not more than 10 % of the value of annual investment programmes approved. These investments were not to be made as pilot projects endorsed by ANRE, but they had to be substantiated as prudent investment projects for the purposes of the Methodology establishing the electricity distribution tariffs, as approved by Order No 72/2013 of ANRE and of the Procedure on the preparation and approval of the investment programmes of economic operators as concessionaires of the electricity distribution service, as approved by Order No 8/2016 of ANRE.

Therefore, on 31 December 2017, the structure by consumer type and the total number of consumers integrated in SMS are as follows:

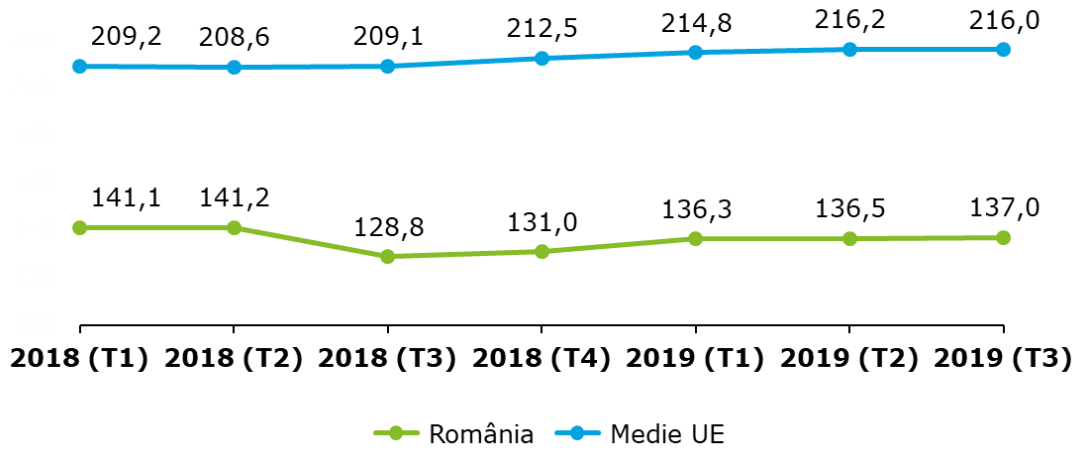
Table 29 - Structure of the retail market in Romania by consumer type as at 31 December 2017

	Household consumers	Non-household consumers	Total	% low-voltage consumers integrated in SMS
Number of consumers integrated in SMS	415 993	27 713	442 706	4.8 %

Source: ANRE assessment of the results recorded on 31 December 2017 by using the smart electricity measurement systems developed

The below charts show the trend in the quarterly average electricity price in Romania and the EU average (28 MS) for household and industrial consumers, respectively. This price includes all the applicable taxes and excise duties. It is thus noticeable that, in both cases, the price in Romania is lower than the European average, the most significant differences being observed in household consumers.

Chart 39 - Trend in the quarterly average electricity price for household consumers in Romania and EU 28 [EUR/MWh]

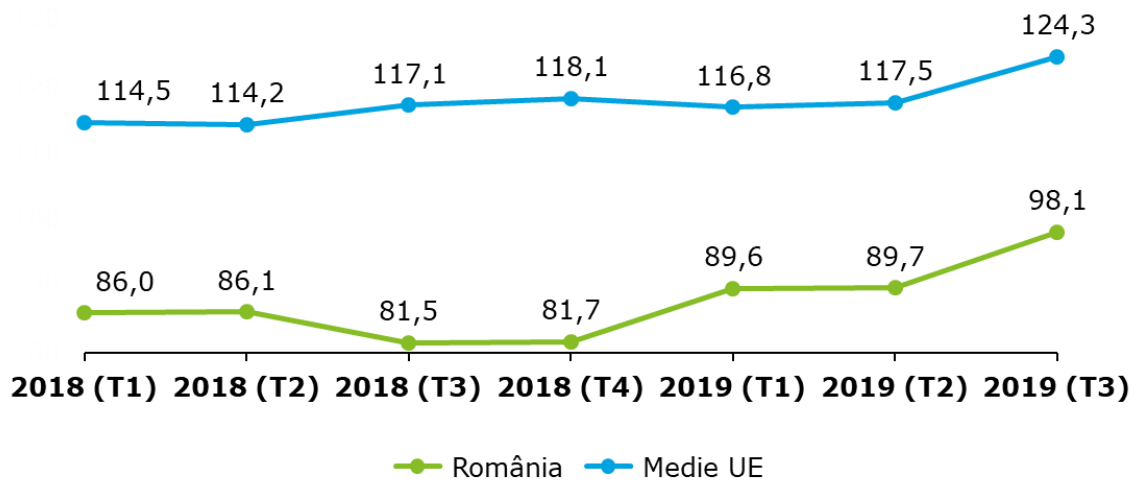


Source: DG Energy, Quarterly reports on the European electricity market, first quarter of 2018-third quarter of 2019

RO	***EN***
România	Romania
Medie UE	EU average
T1	Q1

Note: The quarterly average electricity prices for household consumers include all the taxes and excise duties.

Chart 40 - Trend in the quarterly average electricity price for industrial consumers in Romania and EU 28 [EUR/MWh]



Source: DG Energy, Quarterly reports on the European electricity market, first quarter of 2018-third quarter of 2019

RO	***EN***
România	Romania
Medie UE	EU average
T1	Q1

Note: The quarterly average electricity prices for industrial consumers exclude the VAT and other recoverable taxes

Natural gas market

The natural gas market in Romania comprises[70]:

- the regulated market - which includes the natural monopoly activities, their related activities and supply at a regulated price and under framework contracts, as approved by ANRE; this market concerns household consumers and it is to be fully liberalised as of July 2021;
- the competitive market - which includes the sale of natural gas on the wholesale market (between suppliers as natural or legal persons who carry out the natural gas supply activity, including natural gas producers, between suppliers and distributors, and between suppliers and the transmission system operator) and on the retail market (between suppliers, including eligible producers and consumers). Pricing on the competitive market is freely based on the demand and offer as a result of the competitive mechanisms by trading on the centralised markets, in a transparent manner, publicly and non-discriminatorily, and based on negotiated contracts, whereas pricing on the retail market is also based on type bids.

The structure of the market in Romania, by destination of natural gas, is the following:

- the wholesale market - where the produced and imported natural gas is sold/traded among economic operators in the natural gas sector, mainly in order to cover the contractual obligations/consumptions and to adjust portfolios;
- the retail market (sales to final consumers on the regulated market and on the competitive market).

Depending on the contract type, the competitive market operates under:

- bilateral contracts;
- transactions on centralised markets (where gas is sold to other licence holders and to final consumers);
- other types of transactions or contracts.

[70] According to the Monthly Follow-up Report for the Internal Natural Gas Market for August 2018, prepared by ANRE (https://www.anre.ro/ro/gaze-naturale/rapoarte/rapoarte-piata-gaze-naturale/rapoarte-lunare-de-monitorizare-pentru-piata-interna-de-gaze-naturale-2018)

In August 2018, the following were active on the market in Romania:

- 8 producers of natural gas;
- 88 suppliers;
- 36 distribution system operators;
- a transmission system operator (SNTGN Transgaz SA);
- 2 storage operators (SNGN Romgaz - DEPOGAZ Ploieşti SRL Natural Gas Storage Subsidiary and SC Depomureș SA.);
- 2 operators on the centralised markets (BRM SA and OPCOM SA).

In 2018, natural gas production in Romania was sustained by 8 natural gas producers: SNGN Romgaz SA, OMV Petrom SA, Amromco Energy SRL, Raffles Energy SRL, Foraj Sonde SA, Stratum Energy LLC, Hunt Oil Company Of România SRL and SC Mazarine Energy România SRL

The quantity of natural gas produced in 2018 was 111 203 TWh, as follows (TWh):

Table 30 - Quantity of natural gas produced in 2018, by producer [TWh]

Company	Quantity of natural gas produced - 2018 (TWh)
Amromco Energy	2.352
Foraje Sonde	0.099
Hunt Oil Company	0.814
Mazarine Energy Romania	0.137
OMV Petrom	50.495
Raffles Energy	0.041
Romgaz	55.986
Stratum Energy Romania	1.279
Total	**111.203**

Source: ANRE National Report for 2018

In 2018, Romania imported approximately 16.2 TWh of natural gas and exported approximately 0.3 TWh.

In 2018, the quantities traded on centralised markets, on the platforms administered by the OPCOM and BRM operators, amounted to a total of 70.51 TWh, of which 68.01 TWh for the wholesale market and 2.50 TWh for the retail market.

In 2018, 80 suppliers activated on the retail natural gas market, of which:

- 35 suppliers active on the regulated retail natural gas market;
- 78 suppliers active on the competitive retail natural gas market.

In 2018, consumption supplied by suppliers to final consumers was approximately 119.19 TWh, of which approximately 85.25 TWh accounted for non-household consumption and 33.94 TWh accounted for household consumption, as follows:

Table 31 – Structure of electricity supply to final consumers for 2018 by consumer type

Final consumers	No of consumers	Consumption (TWh)	Share in total consumption
Household consumers	3 661 002	33.94	28.48 %
Non-household consumers	204 454	85.25	71.52 %
Total	**3 865 456**	**119.19**	**100 %**

Source: ANRE National Report for 2018

The breakdown by competitive and regulated market in 2018 is set out below:

Table 32 – Structure of electricity supply to final consumers for 2018 by market type

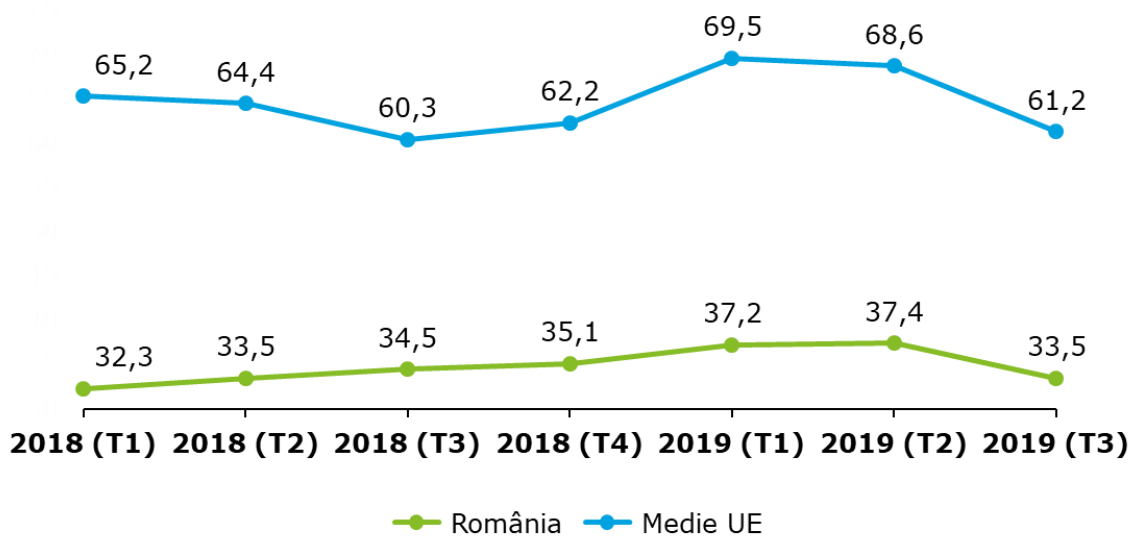
Consumer type	Regulated market		Competitive market	
	No of consumers	Volume (TWh)	No of consumers	Volume (TWh)
Household	3 441 069	31.98	219 933	1.96
Non-household	Not applicable	Not applicable	204 454	85.25

Source: ANRE National Report for 2018

The internal natural gas market has been fully liberalised for non-household consumers since 1 January 2015.

The below charts show the trend in the quarterly average natural gas price in Romania and the EU average (28 MS) for household and industrial consumers, respectively. This price includes all the applicable taxes and excise duties. It is thus noticeable that, in both cases, the price in Romania is lower than the European average, the most significant differences being observed in household consumers.

Chart 41 - Trend in the quarterly average natural gas price, excluding VAT, for household consumers in Romania and EU 28 [EUR/MWh]

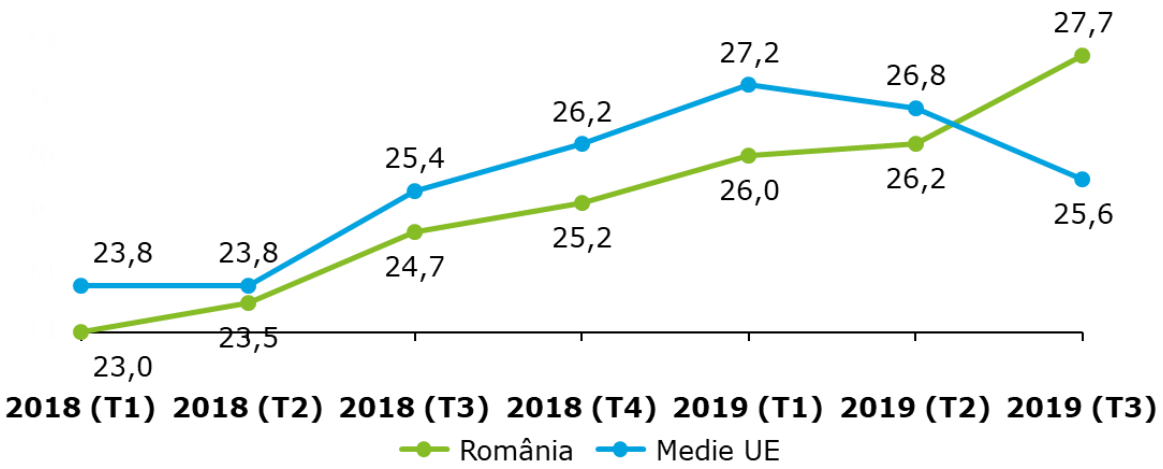


Source: DG Energy, Quarterly reports on the European natural gas market, first quarter of 2018-third quarter of 2019

RO	***EN***
România	Romania
Medie UE	EU average
T1	Q1

Note: The quarterly average electricity prices for household consumers include all the taxes and excise duties.

Chart 42 - Trend in the quarterly average natural gas price, excluding VAT, for industrial consumers in Romania and EU 28 [EUR/MWh]



Source: DG Energy, Quarterly reports on the European natural gas market, first quarter of 2018-third quarter of 2019

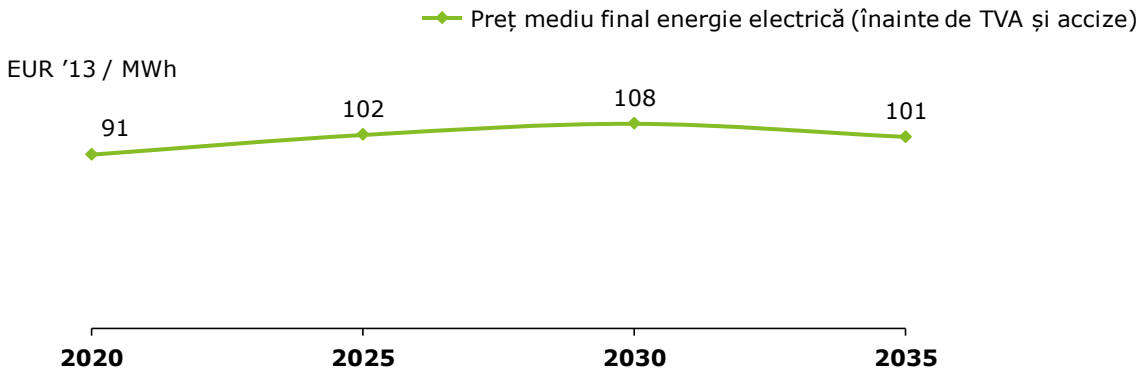
RO	***EN***
România	Romania
Medie UE	EU average
T1	Q1

Note: The quarterly average electricity prices for industrial consumers exclude the VAT and other recoverable taxes

ii. Projections of development with existing policies and measures at least until 2040 (including for the year 2030)

The chart below shows the projected trend in the electricity price under the current conditions. This price does not include the VAT and the excise duty.

Chart 43 - Projected trend in the average electricity price, excluding the VAT, in the context of current measures and policies



Source: The 2016 PRIMES Scenario prepared by the Ministry of the Economy, Energy and the Business Environment

RO	***EN***
Preț mediu final energie electrică (înainte de TVA si accize)	Final average energy price (before VAT and the excise duty)

Note: The final electricity price is an average of the final price to household and industrial consumers, includes all the fees relating to the system services (e.g. transmission, distribution) and other costs (e.g. green certificates) and does not include the VAT and excise duty

As regards the trend in the natural gas price in the context of current policies and measures, it was presented in Section 4.1.iii "Global energy trends, prices in fossil fuels at international level, price of carbon dioxide under the EU ETS".

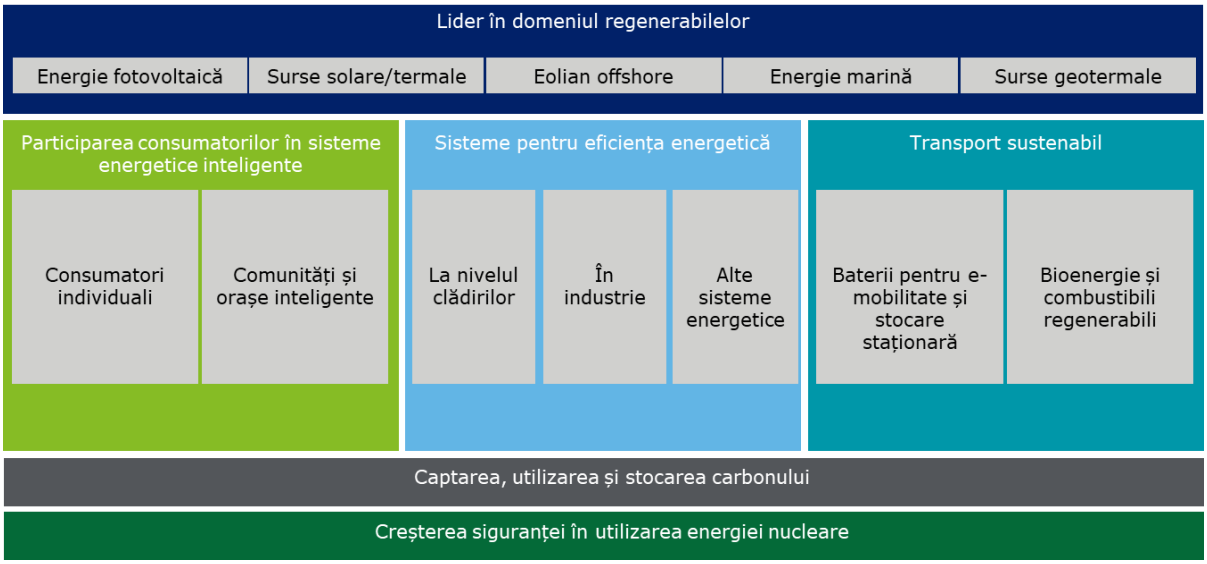
4.6. Dimension research, innovation and competitiveness

i. Current situation of the low-carbon-technologies sector and, to the extent possible, its position on the global market (that analysis is to be carried out at Union or global level)

Compared to the five strategic action lines proposed by the European Commission, the research-innovation pillar records the largest gap between Romania's potential and the concentration of efforts to harness that potential, such tendency being also reflected at sectoral level. The main challenges are related to the absence of funding predictability, the under-sizing of the critical mass of human resources, the low absorption of European funds and the red tape.

At European level, the main instrument for promoting and mobilising funding resources in the field of research, innovation and competitiveness in the energy sector is the Strategic Energy Technology Plan (SET). It addresses priorities such as: strengthening the EU's position as a leader in the area of renewable resources, consumers' engagement in the protection of the ecosystem through smart systems, energy efficiency systems, sustainable transport, carbon capturing, usage and storage, and enhancement of security in the use of nuclear energy.

Figure 6 - Main components of the SET Plan



Source: Strategic Energy Technology Plan (SET Plan), 2017

RO	***EN***
Lider în domeniul regenerabilelor	Leader in renewable energy
Energie fotovoltaică	Photovoltaic energy
Surse solare/termale	Solar/thermal sources
Eolian offshore	Wind offshore
Energie marină	Marine energy
Surse geotermale	Geothermal sources
Participarea consumatorilor în sisteme energetice inteligente	Consumers' participation in the smart energy systems
Sisteme pentru eficienţa energetică	Energy efficiency systems
Transport sustenabil	Sustainable transport
Consumatori individuali	Individual consumers
Comunităţi şi oraşe inteligente	Smart communities and cities
La nivelul clădirilor	At building level
În industrie	In the industry
Alte sisteme energetice	Other energy systems
Baterii pentru e-mobilitate şi stocare staţionară	Batteries for e-mobility and stationary storage
Bioenergie şi combustibili regenerabili	Bioenergy and renewable fuels
Captarea, utilizarea şi stocarea carbonului	Carbon capture, use and storage
Creşterea siguranţei în utilizarea energiei nucleare	Increase in security in the use of nuclear energy

The research infrastructures and the projects described below, which are at various development stages, may be overlapped with the SET structure, as follows.

Consumers' participation in the smart energy system

The regulatory framework fostering prosumers' participation in the energy circuit was improved by Law No 184/2018, providing for a clearer definition of the concept of "prosumer", streamlining the authorisation procedures and providing for fiscal facilities and options to promote production of renewable energy[71], such as exemption from the obligation of annual and quarterly purchase of green certificates, and from the payment of all fiscal obligations pertaining to the quantity of electricity produced (self-consumption/excess quantity sold to suppliers).

Smart cities

The transformation strategy for the capital city is under development, aiming at addressing topics in the energy sector, such as production of renewable energy, monitoring of energy grids by means of computer and communication technologies, control of pollution and monitoring of water/air/soil quality, use of photovoltaic and solar panels on buildings, extension of cogeneration solutions, particularly high-efficiency cogeneration, use of solutions for storing energy excess and reduction of failure recovery time and of maintenance costs.

Alba-Iulia City, through the municipality's partnership with various multinational companies in the technological sector, and with local and regional SMEs, benefitted from the implementation of several smart city projects, such as[72]:

- functional projects: smart lighting, IoT (Internet of Things) industrial equipment for public energy management, thermodynamic solar system with 450 % efficiency, which produces hot water on a continual basis, even at night;
- projects under implementation: LED smart metering set + IoT sensors for three buildings pertaining to an educational establishment, which enable remote transmission of electricity, water and natural gas consumption - a complete smart lighting solution;
- project under review: "Smart Electricity Grids and Renewable Energy Systems" constitutes a system of integrated solutions for high-capacity energy storage in key points connected to renewable energy production sources (photovoltaic system).

Energy efficiency systems

The CCAP (Centre for Advanced Research in Propulsion) research infrastructure plans to become an excellence pole in aeronautical, naval and spatial propulsion concepts.

In the SmartGrid area, it is noticeable that the Ministry of Education and Research and the Executive Unit for Funding Higher Education, Research, Development and innovation (*Unitatea Executivă pentru Finanțarea Învățământului Superior, a Cercetării, Dezvoltării și Inovării - UEFISCDI*), which is a public institution subordinated to the Ministry of Education and Research, are engaged in the European ERANet SmartGridPlus Programme, which aims at streamlining knowledge sharing of the Smart Grid initiatives at regional and continental level[73].

[71] Part I of Official Gazette of Romania, No 635 of 20 July 2018. Law approving Government Emergency Order No 24/2017 amending and supplementing Law No 220/2008
[72] https://albaiuliasmartcity.ro/solutii/**,** accessed on 30 October 2018 at 9.20
[73] Source: UEFISCDI, https://uefiscdi.ro/era-net-smart-grids-plus, accessed on 30 October 2018 at 9.55

Under the same ERANet, we would like to indicate the Romanian engagement in the CERA-SG project (efficient data collection in smart grids), which is coordinated by MINcom Smart Solutions GmbH (Germany), under a partnership with a local SME, the Pitesti University and a European energy company, and FISMEP (the open source API platform that seeks to achieve results applicable to areas such as smart buildings, smart grids, advanced energy service monitoring systems), which brings together research centres in Romania (the Polytechnical University), Germany, Sweden, and local and European energy companies under the coordination of the RWTH Aachen University in Germany[74].

RENEWS is a research infrastructure that aims at creating and strengthening a national excellence centre in the field of energy, environment and water, also contributing to the ESFRI 1.2 objective regarding the upgrading of the research structure by connecting national and international grids[75].

Enhancement of nuclear security and reduction of radioactive waste in Generation IV nuclear reactors

- ALFRED (Advanced Lead Fast Reactor European Demonstrator) is a research project for a demonstration reactor for the lead cooled fast reactors (LFR, Lead Fast Reactors) technology. The LFR technology is sustained by the European Union through the SNETP initiatives (Sustainable Nuclear Energy Technology Platform) and ESNII (European Sustainable Nuclear Industrial Initiative), for the development of Generation IV nuclear systems. They are based on lead cooled fast reactors (LFR), sodium cooled fast reactors and gas cooled fast reactors. The project is in the portfolio of the international consortium FALCON (Fostering ALFRED CONstruction), which was established in 2013 in Bucharest by the Technologies for Nuclear Energy ("Tehnologii pentru Energia Nucleară") Autonomous Company, Ansaldo Nucleare and ENEA, being followed in 2014 by CVR (Centrum Výzkumu Řež, the Czech Republic). FALCON has signed to date ten scientific cooperation agreements with research-development organisations from EU Member States, which contribute to the development of the LFR technology, and a memorandum of collaboration with SN Nuclearelectrica in 2018.

The FALCON consortium has estimated the testing period for the technologies and the completion of the design and engineering stages for ALFRED in the forthcoming period in order to complete the construction of the demonstrator from Mioveni Pitesti (Romania) before 2030. ALFRED would thus have a total capacity of 300 MWh and the estimated costs could range between EUR 1 and 1.4 billion[76].

- The experimental pilot installation for separation of tritium and deuterium (PESTD) - ICSI Nuclear, which is a national interest objective, is purposed to develop the heavy water detritiation technology as a moderator and cooling agent in CANDU nuclear reactors and to check the specific materials and equipment in tritiated environment and at cryogenic temperatures. The experimental pilot installation is included on the list of nuclear installations supervised by the International Atomic Energy Agency in Vienna. The ICSI partners in the nuclear field include KIT Karlsruhe - the Tritium Laboratory and the Institute for Transuranium Elements in Karlsruhe, Germany, the Centre of Nuclear Energy in Belgium and the Atomic Energy Commission in France. Moreover, ICSI is listed in the international databases and as a member in research networks: the European Commission - Research Executive Agency - Validation Services - Legal Entity Appointed Representative (LEAR), EU

[74] Source: ERA-Learn.eu, https://www.era-learn.eu/network-information/networks/era-net-smartgridplus/era-net-smart-grids-plus-joint-call-for-proposals/cost-efficient-data-collection-for-smart-grid-and-revenue-assurance, accessed on 30 October 2018 at 9.57

[75] Report on the research infrastructure in Romania – Roadmap 2017, Romanian Committee for Research Infrastructures

[76] ALFRED Memorandum - 7 January 2014, Report on the research infrastructure in Romania – Roadmap 2017, Romanian Committee for Research Infrastructures

research and innovation programme Horizon 2020, EURATOM - International Thermonuclear Experiment Reactor (ITER), European Fusion Development Agreement (EFDA) and Fusion for Energy (F4E)[77].

- As regards the relevant international cooperation, the "Horia Hulubei" National Research-Development Institute for Physics and Nuclear Engineering participates in the infrastructures of CERN Geneva (the European Organisation for Nuclear Research), FAIR Darmstadt (the Facility for Antiproton and Ion Research) and has engaged in bilateral cooperation with IN2P3 France (the National Institute of Nuclear and Particle Physics), INFN Italy (the National Institute for Nuclear Physics) and JRC-CE (the EC Joint Research Centre).

Sustainable transport

The National Centre for Hydrogen and Fuel Cells (*Centrul Naţional pentru Hidrogen şi Pile de Combustibil - CNHPC*), as part of ICSI Energy Rm. Vâlcea, coordinates the research activity in the field of hydrogen production, storage and applications on fuel cells. The main action lines pursued are:

- conversion of hydrogen into energy, gas-to-power;
- energy storage technologies to obtain the parameters in order to develop power-to-gas stations;
- hybrid energy storage technologies - the Lithium-Ion Programme;
- development of clean propellers for mobility - the "H-mobility" Programme.

ICSI collaborates under joint initiatives for hydrogen technologies and fuel cells (Joint Technology Initiative on Hydrogen and Fuel Cells Research Group and N.ERGHY Group)[78].

ii. Current level of public and, where available, private research and innovation spending on low-carbon-technologies, current number of patents, and current number of researchers

The funding options include national investment funds (integrated in the implementation instruments of the National Research, Technological Development and Innovation Strategy 2014-2020), European Funds (COP, Horizon Europe), funds from the private environment or other funds (e.g. programmes budgeted by the Ministry of Public Works, Development and Administration and the Ministry of European Funds).

The National Research-Development and Innovation Plan for the period 2015-2020 (NRDIP III) constitutes a major mechanism for the funding of relevant activities. It fosters the priority fields identified in the National Research-Development and Innovation Strategy for 2020:

Priority smart specialisation fields

- bioeconomy;
- information technology and communications, space and security;
- energy, environment and climate change;
- eco-nanotechnologies and advanced materials.

Public priority fields

- health;
- heritage and cultural identity;

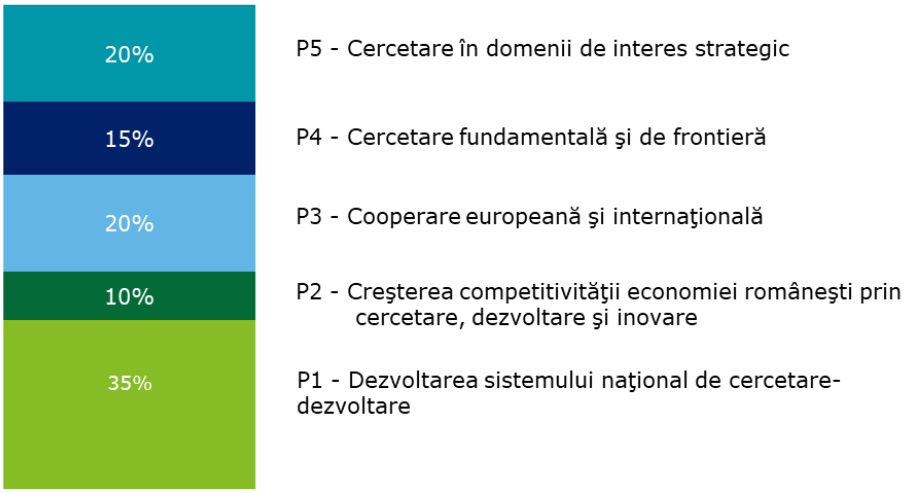
[77] ALFRED Memorandum - 7 January 2014, Report on the research infrastructure in Romania – Roadmap 2017, Romanian Committee for Research Infrastructures

[78] Annual Activity Report, 2017 - National Research-Development Institute for Cryogenic and Isotopic Technologies - ICSI Rm. Vâlcea

- new and emerging technologies.

The total budget of NRDIP III for the entire period of implementation amounts to a maximum of RON 15 billion. The investment model is likely to be adjusted from the initial level, the initial distribution being set out in the chart below.

Chart 44 - Budget breakdown for NRDIP III



Source: The National Research-Development and Innovation Plan for 2015-2020 (NRDIP), as adopted under Government Decision No 583/2015, as amended by Government Decision No 8/2018

RO	***EN***
P5 - Cercetare în domenii de interes strategic	P5 - Research in strategic fields
P4 - Cercetare fundamentală şi de frontieră	P4 - Fundamental and border research
P3 - Cooperare europeană şi internaţională	P3 - European and international cooperation
P2 - Creşterea competitivităţii economiei româneşti prin cercetare, dezvoltare şi inovare	P2 - Enhancing the competitiveness of the Romanian economy by research, development and innovation
P1 - Dezvoltarea sistemului naţional de cercetare-dezvoltare	P1 - Developing the national research-development system

The subprogrammes with direct applicability to the energy sector are mainly listed under subpoint P5 and are set out below.

Table 33 - Selection of subprogrammes under the Research-Development and Innovation Strategy for 2014-2020, with applicability to the energy sector

Programme	Objectives
Subprogramme 5.2 - Participation in the international research and development bodies and programmes in the atomic and subatomic field	• Enhancing the visibility of the Romanian research by participation in the international nuclear and elementary particles research bodies and programmes • Strengthening scientific and industrial cooperation, knowledge sharing and state-of-the-art technologies at European and international level in the nuclear and elementary particles field • Promoting industrial innovation in the nuclear energy sector • Developing nuclear technologies by strengthening cooperation between Romania (through the IFA Institute for Atomic Physics in Bucharest) and international partner organisations (e.g. CEA - the French Alternative Energies and Atomic Energy Commission) • Establishing an efficient communication platform between the research, educational, industrial and economic establishments in Romania and the international research bodies in the nuclear field and elementary particles
Subprogramme 5.5 - Programme for research, development and innovation for Generation IV reactors - ALFRED	• Developing research-development-innovation activities in order to strengthen competences in correlation with the requirements of the future ALFRED infrastructure • Preparing the research-development-innovation programmes to be developed under the future ALFRED infrastructure • Boosting the Romanian scientific and technological potential through support infrastructures and the ALFRED infrastructure through technological development projects and support activities developed in partnership with support organisations in Romania or with relevant international organisations • Establishing cooperation among research, educational, industrial and economic establishments in Romania and between them and peer international bodies in the development of technologies for Generation IV advanced reactors and nuclear security • Substantiating and developing he project for the implementation of the research infrastructure - the ALFRED Technology Demonstrator

Source: The National Research-Development and Innovation Plan for 2015-2020 (NRDIP), as adopted under Government Decision No 583/2015, as amended by Government Decision No 8/2018

Other funding options are included in the financing mechanisms of the European Economic Area (EEA) - FM EEA 2014-2021 and the 2014-2021 Norwegian financing mechanism under the programmes coordinated by the Ministry of Public Works, Development and Administration and the Ministry of European Funds, and are described in the table below.

Table 34 - Additional programmes for funding energy projects

Programme	Objectives
"Business Development, Innovation and SMEs" (programme operator - Innovation Norway)	• Budget ~ EUR 22.7 million • For projects in the private sector for investments in innovative products, services and solutions that lead directly or indirectly to more efficient technological processes in terms of resources use (budget and indicators pertaining to the energy efficiency objective have not been determined yet).
Research	• Budget ~ EUR 47 million • For research projects and projects in the area of generation efficiency, transmission, smart grids and distribution of electricity, green energy production technologies, and diversification/balancing of energy sources (the budget for this component has not been established yet).

Source: Reply of the Ministry of Public Works, Development and Administration and of the Ministry of European Funds by letter No 131291/2017

The staff of the research-development structures in the energy industry counts 560 researchers (by cumulating the data published by the "Horia Hulubei" National Research-Development Institute for Physics and Nuclear Energy, the National Research-development Institute for Electrical Engineering - Advanced Research, the National Research-Development Institute for Energy, the Pitesti Nuclear Research Institute and the National Research-Development Institute for Cryogenic and Isotopic Technologies)[79].

Moreover, for the abovementioned institutions, 33 patent applications were submitted and 200 products/solutions resulted from the research in 2017.

iii. Breakdown of current price elements that make up the main three price components (energy, network, taxes/levies)

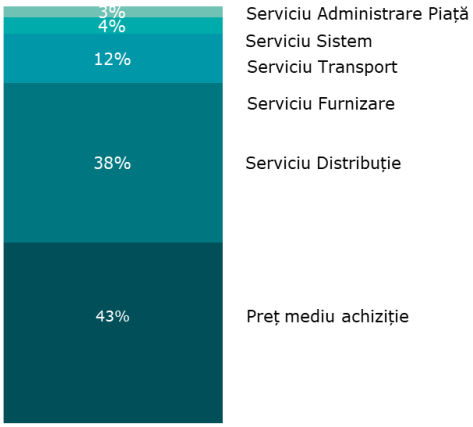
The mean unit costs for the supply of electricity to final household consumers, which are supplied under the universal service, comprise the following elements:

- Net purchase price
- Distribution service cost
- Supply service cost
- Transmission service cost
- System service cost
- Market administration service cost

Below is their breakdown based on the share in the total value:

[79] As per the annual reports of 2017 of the abovementioned institutions

Chart 45 - Breakdown by electricity price components and their share in the total value



Source: The ANRE Quarterly Report - Results of the follow-up on the regulated electricity market in the second quarter of 2019, household consumers

RO	***EN***
Serviciu Administrare Piaţă	Market administration service
Serviciu Sistem	System service
Serviciu Transport	Transport service
Serviciu Furnizare	Supply service
Serviciu Distribuţie	Distribution service
Preţ mediu achiziţie	Average purchase price

iv. Description of energy subsidies, including for fossil fuels

The subsidy system is configured as follows:

- Aids to reduce energy poverty; they consist of social benefits granted from the State budget through the budget of the Ministry of Labour and Social Protection and the family maintenance allowance, and aids to secure the minimum income guaranteed for families and single persons under poverty. Aids are also granted for home heating for all the four heating systems: heat, natural gas, electricity and wood, coal and oil fuels, to vulnerable consumers, as defined by Government Emergency Order No 70/2011, other special aids for vulnerable consumers, and social electricity tariffs (until 1 January 2018).
- Subsidies for heat without differentiating consumers under vulnerability criteria, which are applied directly to the electricity price. Over 60 % of these subsidies are allocated to the operator responsible for the capital city area.

According to independent studies, subsidies totalling RON 1.1 billion were granted in 2015, of which RON 208 million for the first category and the remaining RON 900 million for the heat subsidies (for the second category the study cumulated the values recorded for 15 municipalities).

In the period 2015-2018, aids were granted from the budget of the Ministry of Labour and Social Protection for home heating for all the four heating systems, as follows:

Table 35 - Number of persons receiving the home heating aid

Cold season period	**2015-2016**	**2016-2017**	**2017-2018**	**2018-2019**
Total number of beneficiary families:	**636 256**	**536 080**	**386 966**	**230 357**
Total number of beneficiary persons:	**1 523 370**	**1 251 025**	**899 402**	**582 335**
Heat	*96 467*	*76 855*	*56 431*	*30 238*
Natural gas	*128 388*	*94 310*	*62 594*	*42 951*
Electricity	*8 825*	*8 218*	*4 615*	*2 994*
Wood	*402 576*	*356 697*	*263 326*	*154 174*

Source: The Ministry of Labour and Social Protection

The only State aid granted for coal is in accordance with Council Decision (EC) No 787/2010 on State aid to facilitate the closure of uncompetitive coal mines and activities are to be carried out in order to close down mining works and to ensure the greening of the affected mine perimeters.

The Romanian State initially notified the closure of three mines in Valea Jiului. The State aid SA 33033 was authorised under Commission Decision C(2012) 1020 final of 22 February 2012. This State aid was subsequently amended by including two more mines from Valea Jiului. The last amendment to the State aid was re-authorised under Commission Decision C(2018) 1001 final of 16 February 2018. The State aid for closure of the Petrila, Paroseni and Uricani coal mines is administered by the National Mine Closure Society in Valea Jiului (*Societatea Națională de Închideri Mine Valea Jiului SA - SNIMVJ*) and the State aid for closure of the Lonea and Lupeni coal mines is administered by Complexul Energetic Hunedoara SA (CEH).

The table below lists the value of the State aid authorised for closure of coal mines for the period 2011-2024 in accordance with Commission Decision C(2018) 1001 final.

Table 36 - Aids granted for closure of coal mines [thousand RON]

Aid authorised under Commission Decision C(2018) 1001 final	**2011-2024**
To cover production losses for SNIMVJ (Article 3 of Council Decision 2010/787/EU)	545 830
To cover production losses for CEH (Article 3 of Council Decision 2010/787/EU)	214 087
To cover exceptional costs for SNIMVJ (Article 4 of Council Decision 2010/787/EU)	369 615
To cover exceptional costs for CEH (Article 4 of Council Decision	465 856

Aid authorised under Commission Decision C(2018) 1001 final	**2011-2024**
2010/787/EU)	
Total	**1 595 388**

Source: Decision C(2018) 1001 final

In November 2019, the Romanian State adopted Government Emergency Order No 69/2019 applying certain measures for social protection granted to persons made redundant through collective dismissals effected under redundancy plans by Societatea Națională de Închideri Mine Valea Jiului SA and Societatea Complexul Energetic Hunedoara SA in the period 2019-2024. The order provides for the monthly supplementary income to be granted as a social protection measure, which is received by the persons made redundant from the companies for which the granting of State aid was approved in order to facilitate the closure of uncompetitive coal mines. As the abovementioned companies are located in a mono-industrial region, these measures are required in order to mitigate the social impact of the structural changes entailed by the closure of the uncompetitive coal mines in Valea Jiului and, implicitly, to promote just transition having regard to the legislative policy of the Romanian State and to the requirements for correlation with internal regulations and for harmonisation of the national law.

From the viewpoint of the European competition rules, the proposed measures do not constitute State aid.

The below table shows the financial impact on the general consolidated budget on the short term, for the current year, and on the long term (for five years).

Table 37 - Financial impact of Government Emergency Order No 69/2019 on the general consolidated budget [thousand RON]

Indicator	**2019**	**2020**	**2021**	**2022**	**2023**
Unemployment benefit	-	3 676	3 414	1 810	1 665
Supplementing income	-	11 697	21 309	9 907	8 812
Total annual value	**-**	**15 373**	**24 723**	**11 717**	**10 477**
Total 2019-2023			**62 290**		

Source: Justification Note for the Government Emergency Order applying certain measures for social protection granted to persons made redundant through collective dismissals effected under redundancy plans by Societatea Națională de Închideri Mine Valea Jiului S.A and Societatea Complexul Energetic Hunedoara SA in the period 2019-2024

5. Impact assessment of planned policies and measures[80]

The integration of the modelling results for the two macroeconomic scenarios assessed (modelling scenario in the context of existing WEM measures and modelling scenario in the context of planned WAM measures) reflects aspects pertaining to the Romanian economy, where the need for expedited development on the economic, political and social level must be brought in line with Romania's desire to contribute to the European shared effort to achieve decarbonisation, energy efficiency, enhanced energy security, completion of the common energy market and increase in competitiveness by developing the research and innovation activities. This combination of views was also taken into account in Romania's energy strategy document according to which "the growth and increase in the competitiveness of the Romanian economy, the increase in the quality of life and the concern for the environment are indissociably linked to the development and modernisation of the energy system".

The modelling scenario in the context of the existing WEM measures and the modelling scenario in the context of the planned WAM measures are set out in part 2 of Annex I attached to this Plan. The description of the methodology used for the WAM scenario modelling is set out in the section "Methodology (general description)".

From this viewpoint, part 2 of Annex I lists a series of entry parameters and modelling results for the scenario based on existing measures and the scenario which considers the planned policies and measures described in Section 3.

5.1. Impacts of planned policies and measures described in section 3 on energy system and GHG emissions and removals, including comparison to projections with existing policies and measures (as described in section 4)

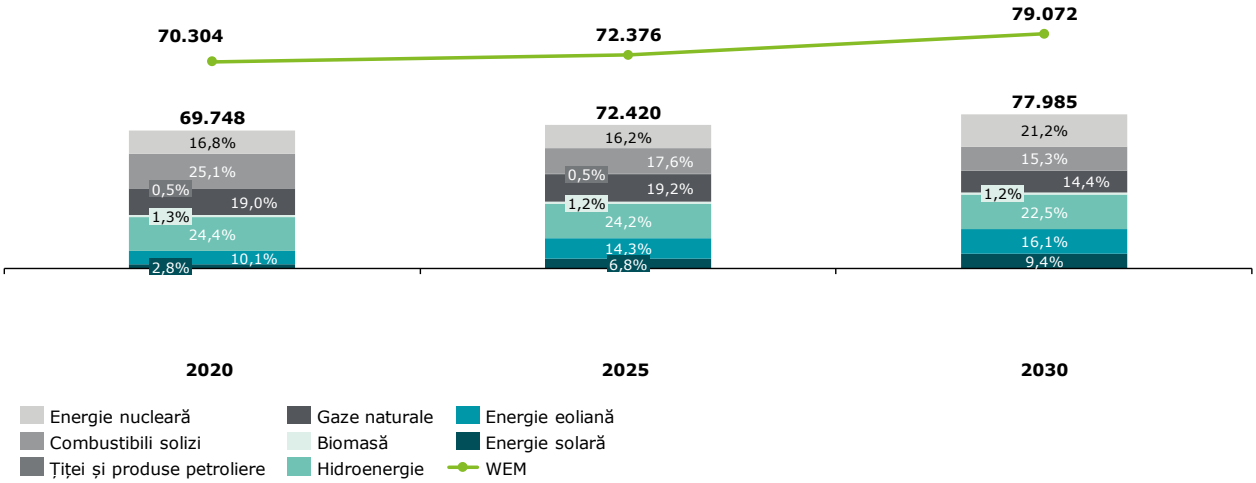
i. Projections of the development of the energy system and GHG emissions and removals as well as, where relevant of emissions of air pollutants in accordance with Directive (EU) 2016/2284 under the planned policies and measures at least until ten years after the period covered by the plan (including for the last year of the period covered by the plan), including relevant Union policies and measures

Gross electricity generation

Having regard to the above context, the comparison between the two modelling types in the gross electricity generation chapter indicates similar upward trajectories even if, in the WAM scenario, the increase is weighted at a 1.1 % CAGR projected for 2020-2030. The gross electricity generation pertaining to the two scenarios is listed below:

[80] Planned policies and measures are options under discussion and having a realistic chance of being adopted and implemented after the date of submission of the national plan. The resulting projections under section 5.1.i shall therefore include not only implemented and adopted policies and measures (projections with existing policies and measures), but also planned policies and measures.

Chart 46 – Gross electricity generation - WAM vs WEM [GWh]



Source: Deloitte calculation based on the information submitted by the INECP Interinstitutional Working Group and of the Commission's recommendations

RO	***EN***
Industrie	Industry
Terțiar	Tertiary sector
Rezidențial	Residential
Transport	Transport
WEM	WEM

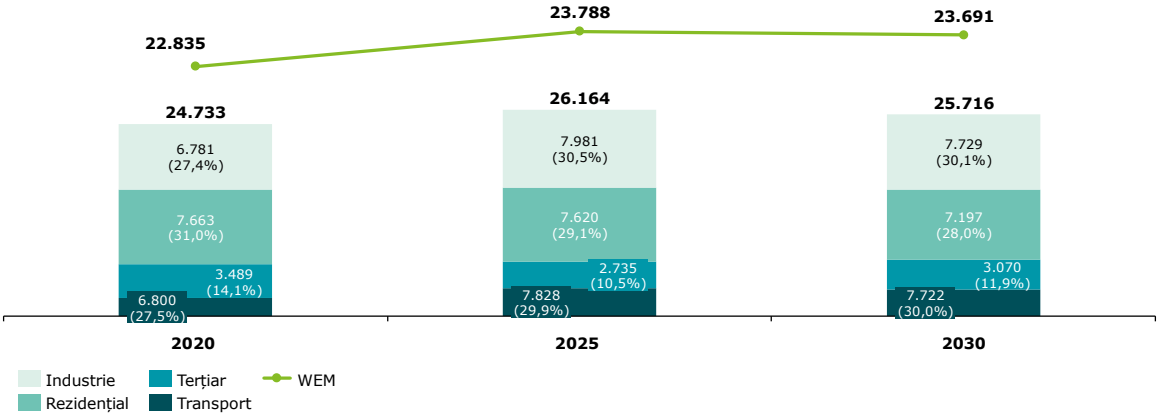
In conclusion, the WAM scenario projects a lower gross electricity generation rate for 2030 compared to the WEM scenario (negative correction of 1.37 %), mainly due to the drop in consumption against the background of additional energy efficiency measures. Moreover, compared to the WEM scenario, the energy mix will undergo the following changes:

- the production from nuclear energy features a negative correction (the commissioning of the third nuclear reactor towards the end of 2030);
- the drop in the generation of electricity from solid fuels (negative correction by 10.15 % compared to WEM for 2030), considering the increased costs to ensure compliance with the environmental requirements (carbon emissions and other air pollutants);
- increase in production from photovoltaic sources (increase by 130 % compared to WEM for 2030) and from onshore wind sources (60.7 % compared to WEM for 2030) features a significant positive correction which partially offsets the curtailment of production from conventional resources (coal in particular).

Energy consumption

The economic growth projected for Romania is necessarily reflected in the final energy demand, which features a positive correction of almost 8.55 % in the WAM scenario compared to the WEM scenario for 2030, taking into account the energy efficiency and competitiveness increase measures based on research and innovation.

Chart 47 – Final energy consumption - WAM vs WEM [ktoe]



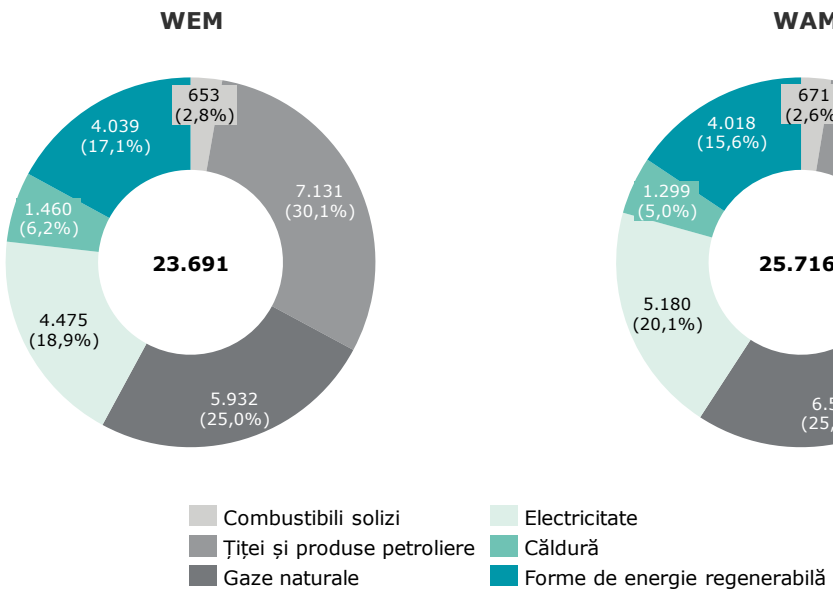
Source: Deloitte calculation based on the information submitted by the INECP Interinstitutional Working Group and of the Commission's recommendations

As regards final energy consumption, the two scenarios are differentiated by (WAM vs WEM):

- the increase in energy consumption in the transport sector, with a 15.67 % correction for 2030;
- the increase in energy consumption in the industrial sector (14.59 %) and in the tertiary sector (24.66 %) for 2030;
- the decrease in energy consumption in the residential sector by 7.84 % in 2030 due to the additional energy efficiency measures.

As regards the final energy mix consumption for 2030, the increase in final energy consumption (compared to WEM, a positive correction of 8.55 %) will be mainly generated by an increase in electricity consumption (positive correction of 15.75 % in the WAM scenario compared to WEM). The final energy mix consumption for 2030 is detailed below:

Chart 48 – Final energy consumption by energy source - WAM vs WEM – 2030 [ktoe]



Source: Deloitte calculation based on the information submitted by the INECP Interinstitutional Working Group and of the Commission's recommendations

RO	*EN*
Combustibili solizi	Solid fuels
Ţiţei si produse petroliere	Crude oil and petroleum products
Gaze naturale	Natural gas
Electricitate	Electricity
Căldură	Heat
Forme de energie regenerabilă	Renewable energy forms

Renewable energy consumption

The abovementioned production and consumption tendencies reflect Romania's contribution to the achievement of the European decarbonisation, energy efficiency, energy security, internal market and competitiveness targets included in the EU programmatic documents. The comparison between the two modelling types in the specific area of renewable energy reveals the following results:

- a 30.7 % global share in renewable resources is reached in 2030 (compared to the 24 % target in 2020) following the projected additional policies and measures;

- the upward movement of the share of renewable energy used in the transport sector, which increases from 11.2 % (the WEM scenario - 2030) to 14.2 % (the WAM scenario - 2030), is noticeable in the context of additional policies and measures, which aim at transport electrification and second generation biofuels;

- as regards the RES share in heating and cooling, a 4.2 % increase is also recorded (WAM vs WEM – 2030) as a result of applying additional measures for the installation of heat pumps and solar panels, and of integrating other renewable energy sources in the production of heat for district heating systems;

- for the RES share in electricity, having regard to the additional measures and policies, a 4.5 % increase in the WAM scenario has been noticed, compared to the WEM for 2030.

Air pollutants and air quality

Directive (EU) 2016/2284 of the European Parliament and of the Council of 14 December 2016 on the reduction of national emissions of certain atmospheric pollutants, amending Directive 2003/35/EC and repealing Directive 2001/81/EC (hereafter the new NEC Directive) entered into force on 31 December 2016 and was transposed by Law No 293/2018 on the reduction of national emissions of certain air pollutants.

Law No 293/2018 provides for the development of the national air pollutant control programme (NAPCP), an obligation being imposed on the central public environmental protection authority to submit the first NAPCP to the European Commission by 1 April 2019. In order to prepare the NAPCP, the Ministry of the Environment, Waters and Forestry submitted a project financing application form under the Operational Programme Administrative Capacity 2014-2020 (OPAC IP14/2019), which was under evaluation by MA OPAC on the date when the INECP was prepared.

The assessment of the interactions with the air quality and air emissions policy would be inconsistent to a certain extent because the figures reported by the Ministry of the

Environment, Waters and Forestry in March 2019[81] on air pollutants, in accordance with Directive (EU) 2016/2284, are determined on the basis of the existing and currently planned policies at the level of knowledge of 2018-2019, whereas the projections for GHG emissions are reported on the basis of the calculations made two to three years ago under assumptions that are different from the INECP.

Moreover, the RES target of 30.7 % from the revised version of the plan mainly rests on the assumption of a decrease in the share of coal-based electricity generation in the gross electricity generation and such assumption is not indicated in the abovementioned reports.

Since the abovementioned reports are not harmonised with the INECP and in the absence of a sufficiently developed version of the NAPCP, this INECP cannot include a consistent assessment of the interactions with the air quality and air emissions policy, with the necessary information on air pollutants projected in the planned policies and measures.

The following reports will envisage harmonisation with the INECP and the abovementioned assessment is to be included in the future plan revisions. When the INECP was prepared, the Forestry Reference Level (FRL) and the National Forestry Accounting Plan (NFAP) were under development, the reporting deadline for the final documents being 31 December 2019. The updating of the GHG emissions/removals in the LULUCF sector, which is part of the National Inventory of Greenhouse Gas Emissions (INEGES), with an impact on the determination of FRL and of GHG emissions/removals projections, was also under preparation. The completion deadline for Biannual Report No 4 is 31 December and the remaining reports are to follow their normal course in 2020, starting with 15 January, when the INEGES data is reported to the Commission and the European Environment Agency.

When the INECP was prepared, there were no sufficiently advanced draft versions of the indicated documents/reports to extract the necessary data.

ii. Assessment of policy interactions (between existing policies and measures and planned policies and measures within a policy dimension and between existing policies and measures and planned policies and measures of different dimensions) at least until the last year of the period covered by the plan, in particular to establish a robust understanding of the impact of energy efficiency / energy savings policies on the sizing of the energy system and to reduce the risk of stranded investment in energy supply

Please see the general description of the interactions listed in Chapter 1. In order to view to the detailed list of policies and measures, please refer to Annex 2 "WEM-WAM Policies".

iii. Assessment of interactions between existing policies and measures and planned policies and measures, and between those policies and measures and Union climate and energy policy measures

Please see the general description of the interactions listed in Chapter 1. In order to view to the detailed list of policies and measures, please refer to Annex 2 "WEM-WAM Policies".

[81] https://cdr.eionet.europa.eu/ro/eu/nec_revised/projected/

5.2. Macroeconomic and, to the extent feasible, the health, environmental, employment and education, skills and social impacts, including just transition aspects (in terms of costs and benefits as well as cost-effectiveness) of the planned policies and measures described in section 3 at least until the last year of the period covered by the plan, including comparison to projections with existing policies and measures

The modelling tailored to the existing policies and measures (WEM) and that tailored to the additional policies and measures (WAM) were based on macroeconomic elements quantified as input and output variables. The increase in the quality of life has been and still is a major objective for the complex of current and additional policies and measures.

In this respect, Overall Objective 3 of the Energy Strategy, which is entitled "Protection of vulnerable consumer and reduction of energy poverty", indicates price accessibility as one of the main challenges of the energy system and a strategic responsibility.

In the same context, Overall Objective 6 entitled "Enhancing the quality of education on energy and continuing training of human resources" indicates the need to supplement the qualified staff in the field of energy. In this respect, the development of specific educational packages at all levels is mentioned: secondary schools and public and dual system vocational schools, continuing vocational training at work, faculties, Master's Degree programmes and doctoral schools.[82]

Beyond the focus of these initiatives on the energy field, the general macroeconomic elements ascertain the beneficial effect of implementing the WAM model on certain relevant elements:

- although the falling trend in the population of Romania is maintained, it is slightly slowed down by the implementation of the planned model, with a population count of 18.4 million reached in 2030 (compared to 18 million in the WEM scenario);
- the gross domestic product escalates to a significant extent, having a relative value of almost 28 % in the WAM modelling compared to the WEM for 2030;
- the gross added value has leaped dramatically (by approximately 30 %) in 2030 in the WAM scenario compared to WEM. with the exception of constructions (a projected decrease of approximately 5 % compared to the WEM scenario in 2030), increases are projected for each of the component sectors, namely by 35.7 % for the tertiary sector (services + agriculture), by 11.5 % for the energy sector and by 32.4 % for the industrial sector compared to the WEM scenario in 2030;
- the social dimension of the macroeconomic increase is also reflected in the number and size of households, but particularly in their available income, which would account for a 34 % increase under a WAM modelling versus the WEM modelling in 2030.

Even if these indicators are normally reflected in increases and benefits also generated in other areas of the social and economic environment (health, environment, employment, education, competence level etc.), no sufficient elements are currently available to draw up an impact assessment.

Aspects related to just transition

The coal mining activity in Romania is concentrated in two subregions. i.e. Valea Jiului and Rovinari/Turceni, which are located in Hunedoara and Gorj counties. Carbon mining is also achieved in Vâlcea and Mehedinți counties.

[82] The Energy Strategy of Romania for 2019-2030, with outlook to 2050

90 % of the labour in the mining sector is employed in the two counties, i.e. Hunedoara and Gorj, and the total number of jobs directly dependent on coal mining and production of coal-based energy amounts to 18 600, with other 10 000 jobs indirectly dependent on coal. The power plants in Hunedoara and Gorj emit approximately 90 % of the greenhouse gas emissions (GHG) from coal-based plants or approximately 30 % from the GHG emissions in Romania from mining and the manufacturing industry. If mining and the use of fossil fuels are ceased, these jobs are likely to be endangered.

Moreover, both counties have industrial facilities with high carbon emissions, which raises additional challenges to the decarbonisation objective because these companies are foreseen to undergo restructuring procedures before 2030, which is likely to have a negative impact on the employment rate. This preliminary assessment would reveal that the intervention of the Just Transition Mechanism is justified particularly in these geographical areas. The intervention of the Just Transition Mechanism will also be necessary in other counties with mining activities, such as Vâlcea and Dolj.

Moreover, the Just Transition Mechanism need also to consider the counties with no mining activity, but where coal-based plants are still operational: Timișoara, Arad, Suceava, Bihor, Iași.

In order to address the challenges of the energy transition, investment priorities have been identified in order to reduce the social and economic costs entailed by the transition. The key actions of the Just Transition Fund could aim at:

- investments in the regeneration and decontamination of sites, rehabilitation of lands and redefining of projects;
- investments in the implementation of technologies and the infrastructure required to supply clean energy at affordable prices, the reduction of GHG emissions, energy efficiency and renewable energy sources;
- investments in SMEs, including start-ups, supporting economic diversification and reconversion;
- investments to set up new enterprises, including by consultancy services and "business incubators"[83];
- investments in the area of research and innovation and fostering of state-of-the-art technologies;
- development of workers' skills/competences;
- assistance to job seekers;
- technical assistance.

Significant job losses are projected for the abovementioned counties and the establishment and development of SMEs is likely to be unable to offset these losses. Exceptionally and only where required to implement territorial transition plans, support may be considered for investments in large enterprises, particularly for energy complex electricity generation facilities.

Moreover, industrial sites in these counties, where activities are carried out among those listed in Annex I to Directive 2003/97/EC, have a considerable number of employees, and their activity is endangered by the high GHG emission rate. Support may be considered for investments aimed at reducing GHG emissions, provided that they lead to significant reductions (far below the relevant reference values used for free allocation under Directive 2003/87/EC) and that they are compatible with the European Green Deal.

[83] Enterprises active in supporting newly-established companies by financial and/or technical services.

In the Dolj, Galați, Prahova, and Mureș counties, as well as in the Timisoara, Arad, Bihor, Suceava, and Iași counties there is a significant number of employees in fossil fuel-based heat and electricity production and in the manufacturing and heavy industries (chemicals, metal processing, fertilizers etc.), which are energy intensive. These counties account for approximately 35 % of the GHG emissions in Romania, which originate in the mining and manufacturing industries.

Since it has been projected that the identified sectors will be subjected to energy transition changes, the intervention of the JTF is also justified in these geographical areas to support their reconversion.

5.3. Overview of investment needs

i. Existing investment flows and forward investment assumptions with regard to the planned policies and measures

The investment flow that is relevant for the WEM scenario modelling undergoes a positive correction under the measures and policies projected for the WAM scenario. The projections indicate a significant increase in investments by 56.8 % in the period 2021-2030 in the WAM scenario (**total investment value of approximately EUR 150 billion for 2021–2030** - WAM), compared to the WEM scenario.

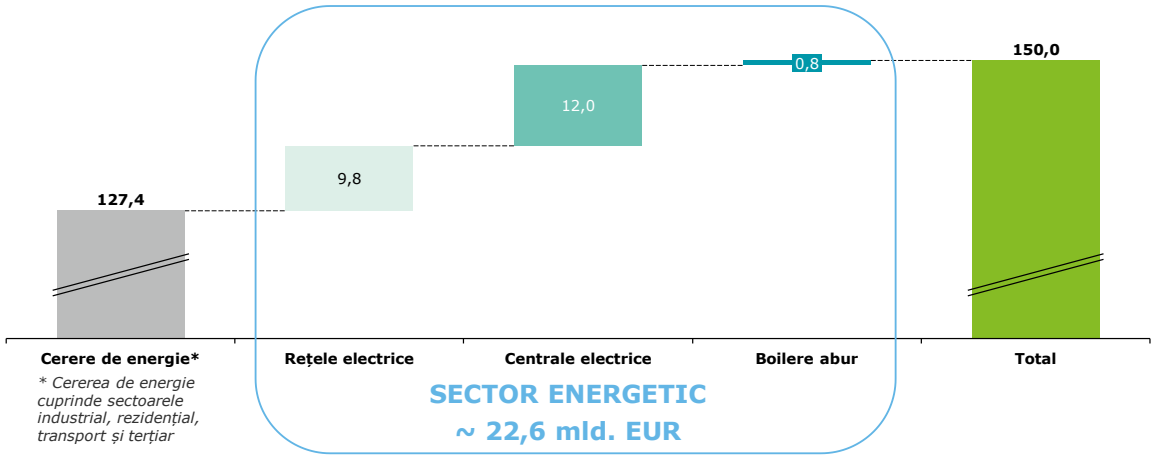
A more detailed account of the prognosis categories reveals relevant specificities:

- The chapter of investments required to meet the demand remains relatively constant (as a percentage in the total investments) in both scenarios ranging between 80 % and 90 %. It actually reflects the projected economic growth that will foster energy demand in all relevant fields (industrial, residential, tertiary, transport etc.).
- Under these conditions, the increase in investments required to meet the demand is very relevant for the industrial sector (384.5 %) and the tertiary sector (169.5 %) in the period 2021-2030.
- The investment demand from the bidding zone for electricity grids appears to be significantly high in the WAM scenario compared to the WEM (i.e. by 98 %) in the period 2021-2030.

The characteristics of an assessment of the investment needs actually reflect the economic growth assumptions presented and mentioned in Chapter 5.2, directly influencing the existing projects, in the sense of extending them, and new projects that become a necessity (elaborated in Chapter 4).

The investments in the period 2021-2030 (cumulative values), which are needed to achieve the objectives proposed in the context of the future policies and measures (WAM scenario), are presented in the chart below. The energy sector alone (production, transmission, distribution of electricity) thus requires total investments of approximately EUR 22.6 billion in the period 2021-2030.

Chart 49 - Cumulative investments required in the period 2021-2030 to achieve the proposed objectives (WAM scenario)



Source: Deloitte analysis based on the information submitted by the INECP Interinstitutional Working Group and of the Commission's recommendations

RO	***EN***
Cerere de energie* * Cererea de energie cuprinde sectoarele industrial, rezidenţial, transport şi terţiar	Energy demand* * The energy demand includes the industrial, residential, transport and tertiary sectors
Reţele electrice	Electricity grids
Centrale electrice	Power plants
Boilere abur	Steam boilers
Total	Total
SECTOR ENERGETIC	ENERGY SECTOR

In order to fund the investment demand pertaining to the INECP in the period 2021-2030 and to achieve the targets and objectives proposed in this plan, Romania intends to access various funding sources, as detailed below; it is a non-exhaustive list.

In the framework of the new 2021-2027 Multiannual Financial Framework[84]:

1. **Structural Funds:** European Regional Development Fund (ERDF) and the Cohesion Fund (CF)

The new MFF will have a thematic concentration, of which priority objective (PO) 2: A greener carbon free Europe and PO 3: A more connected Europe are the most closely linked to the investment demand under the INECP.

PO 2 is the most relevant for the **energy sector**. This objective promotes a greener low-carbon Europe by promoting non-polluting and fair energy transition, green investments, the

[84] When the INECP was prepared, the allocations for the new 2021-2027 MFF were still under negotiation. The INECP sets out guidelines regarding the amounts funded for the 2021-2027 MFF and they are likely to be amended as soon as a final political agreement has been reached.

circular economy, adaptation to climate change and risk prevention and management. The ERDF/CF specific objectives under this PO are:

- to promote energy efficiency and reducing greenhouse gases;
- to promote renewable energy generation;
- to develop smart energy systems, grids and storage outside the TEN-E;
- to prevent and to address the risks related to climate change and the natural risks (floods, drought, forest fires, landslides, earthquakes) according to the national priorities set and in the framework of the cross-border and transnational coordination and cooperation.

PO 2 is the most relevant for the **environment sector**. The ERDF/CF aim at the following specific objectives for this sector:

- to promote adaptation to the effects of climate change, to prevent risks and to strengthen resilience to disasters;
- to promote transition to a circular economy.

PO 3 is the most relevant for the **transport sector**. This PO will support investments aimed at:

- developing a sustainable, secure and intermodal TEN-T network adapted to the effects of climate change;
- developing and strengthening national, regional and local sustainable, flexible and intermodal mobility, including improvement of access to the TEN-T network and cross-border mobility;
- developing rail transport as a priority and achieving its intermodal integration with other modes of transport;
- insourcing external costs for all modes of transport.

The operational programmes (OP) proposed, under which the budget allocated to Romania for the period 2021-2027 will be administered and which are aligned with the investment needs described in the INECP, are: the Operational Programme Sustainable Development, the Operational Programme Smart Growth and Digitalisation, the Regional Operational Programmes (which will be implemented regionally) and the Just Transition Operational Programme. Below are the elements of the main operational programmes, noting that they were at the stage of proposal when the INECP was prepared and they are likely to undergo changes thereafter:

The Operational Programme Sustainable Development

The total financial allocation for this OP is EUR 5 782.571 million, of which: EUR 3 310 million from the ERDF, EUR 737.800 million from the CF and EUR 1 734.771 million from the State budget. The allocation proposal by sector is the following:

- **Energy** (energy efficiency, renewable energy, energy transmission): EUR 571.429 million
  - EUR 300 million from the ERDF
  - EUR 100 million from the CF

- EUR 171.429 million from the State budget

- **Environment**
  - *Waste*: EUR 142.857 million, of which: EUR 100 million from the CF and EUR 42.857 million from the State budget
  - *Water/wastewater*: EUR 4,268.286 million, of which: EUR 2 450 million from the ERDF, EUR 537.800 million from the CF and EUR 1 280.468 million from the State budget
  - *Biodiversity*: EUR 71.429 million, of which: EUR 50 million from the ERDF and EUR 21.429 million from the State budget
  - *Contaminated sites, air*: EUR 71.429 million, of which: EUR 50 million from the ERDF and EUR 21.429 million from the State budget

- **Risks** (national systemic, coast erosion)
  - EUR 350 million from the ERDF
  - EUR 140 million from the State budget

- **Integrated Territorial Instrument** (ITI West Region - Valea Jiului, South-East Region): allocations dedicated under the relevant axes depending on the needs derived from the ITI Strategies
  - Total financial allocation of EUR 114.286, of which: EUR 80 million from the ERDF and EUR 34.286 million from the State budget
  - Administrative capacity for beneficiaries (support for project development): total financial allocation of EUR 42.857 million, of which: EUR 30 million from the ERDF and EUR 12.857 million from the State budget

The Operational Programme Smart Growth and Digitalisation

The total financial allocation for this OP is EUR 2 142.857 million, of which: EUR 1 500 million from the ERDF and EUR 642.857 million from the State budget. The allocation proposal for the sectors related to the INECP is the following:

- **Smart specialisation** (Horizon synergies, internationalisation, industrial transition, nanotechnologies, robotics, RDI infrastructure): EUR 1,000 million
  - EUR 700 million from the ERDF
  - EUR 300 million from the State budget

- **e-Government, digitalisation, interoperability, cyber-security:** EUR 571.429 million
  - EUR 400 million from the ERDF
  - EUR 171.429 million from the State budget

- Financial instruments (**energy efficiency**): EUR 71.429 billion
  - EUR 50 million from the ERDF
  - EUR 21.429 million from the State budget

Regional Operational Programmes

For OP2 "a greener Europe", the amount of EUR 4 322.65 million (EUR 3 025.85 million from the ERDF) is allocated, as follows:

- **Mobility, consolidation, urban regeneration, urban transport** (metropolitan trains in Buc, TM, CJ, IS, SB, BV: EUR 350 million from the ERDF): EUR 3 465.503 million (EUR 2 425.852 million from the ERDF)
- **Energy efficiency** of buildings in the urban localities using solid fuel: EUR 857.134 million (EUR 600 million from the ERDF)

2. InvestEU

The InvestEU Programme of the new MFF provides for a guarantee of EUR 38 billion from the State budget to mobilise capital and to achieve an estimated investment target of EUR 650 billion in the period 2021-2027. This instrument will be developed through the implementation partners, the main partner being the group of the European Investment Bank (EIB). The project promotors will have access to grants in the form of financial products such as debts or participation in the capital, as listed by scope of intervention ("policy windows") clustering eligible investments, the following such scopes being most closely linked to the INECP:

- **Sustainable infrastructure**

  - This scope concerns the development of the energy system, the development of sustainable transport infrastructures, innovative equipment and technologies, environmental and resource protection, and development of the digital infrastructure connectivity. Eligible investments will be, among others:
  - production, supply and use of clean, sustainable and secure energy from renewable resources and other similar low-carbon or zero emission energy sources;
  - energy efficiency and energy savings;
  - development and modernisation of the sustainable energy infrastructure in energy transmission and distribution, storage, smart grids;
  - development of innovative low-carbon or zero emissions district heating and cogeneration systems;
  - production and supply of synthetic fuels from renewable energy or carbon neutral sources;
  - the infrastructure for carbon dioxide capturing and storage systems;
  - the infrastructure for alternative fuels: electricity, hydrogen, and liquefied or compressed natural gas mixed with bio-methane (> 50 %) and other low-carbon or zero emissions technologies;
  - the projects aimed at combating or adapting to climate change.

- **Research, innovation and digitalisation**

  This scope, for which a guarantee of EUR 11.25 billion is proposed, aims at nurturing digital transformation of enterprises, markets and Member States. The aim is to achieve a scientific, technological, economic and societal impact by strengthening the scientific and technological base of the EU, with the end purpose of implementing the strategic priorities of the EU and of providing support for the modernisation of innovative companies and the placement of technologies on the market.

- **Small and medium-sized enterprises**

  This scope, with a guarantee of EUR 11.25 billion, aims at promoting the global competitiveness of SMEs within the EU at any stage of their development.

- **Social investments**

  This scope, with a guarantee of EUR 4 billion, aims at: reducing inequalities, enhancing inclusiveness, social enterprises and social economy, social inclusion, improving citizens' health, welfare and overall quality of life, fostering educational results, and supporting just transition to a low-carbon economy.

Account is taken of the possibility of combining funding under the InvestEU Programme with other types of funding from the EU budget, such as Horizon Europe Programme, "Connecting Europe Facility", Pillar II of the "Just Transition Mechanism" (proposed by the European Commission as part of the "European Sustainable Investment Plan", which provides for the establishment of a specific scheme under the InvestEU to support investments for just transition, in particular for projects in the regions for which the Commission approved a regional transition plan).

3. Just Transition Fund (JTF)

In accordance with the Proposal for a Regulation of the European Parliament and of the Council establishing the Just Transition Fund, the budget resources for the JTF should be EUR 7.5 billion (considering the 2018 prices), with the possibility of increasing this threshold thereafter, where applicable. The proposal will be included in the negotiation of the following MFF and is estimated to be integrated in a global agreement regarding the following MFF.

The JTF will focus on the economic diversification of the territories impacted the most by the climate transition and on the retraining and active inclusion of workers and job seekers within those territories.

The allocation proposal for Romania is EUR 757 million and is contingent upon the approval by the European Commission of the regional transition plans referred to in the Proposal for a Regulation.

Funding sources outside the 2021-2027 MFF.

4. Modernisation Fund (MF)

2 % of the total quantity of certificates for the period 2021-2030 will be auctioned in order to establish the MF in accordance with Article 10(d) of the EU ETS Directive[85]. A share of 11.98 % will be allocated to Romania. Investments in the following fields, which were defined as a priority in the ETS Directive, will be funded:

- production and use of electricity from renewable resources;
- improvement of energy efficiency (including in transport, buildings, agriculture and waste), with the exception of solid fossil fuel-based energy production;
- energy storage;
- modernisation of energy grids, including pipes from the urban district heating systems, of electricity transmission grids, increase in interconnections among EU Member States;
- just transition in mining regions, in particular with the purpose of supporting re-education, development and re-employment of human resources in the respective regions.

These priority objectives will receive at least 70 % of the available funds and can be funded up to 100 % of the eligible costs. The projects within these scopes, which are not considered a priority, will be funded up to a maximum of 30 % of the available funds and can be funded up to 70 % of the eligible costs.

EIB will be a member of the Investment Committee, will ascertain the eligibility of projects and will ensure the monetisation of certificates and asset management.

[85] Directive (EU) 2018/410 of the European Parliament and of the Council of 14 March 2018 amending Directive 2003/87/EC to enhance cost-effective emission reductions and low-carbon investments, and Decision (EU) 2015/1814

5. Loans from the European Investment Bank

In accordance with the objectives of the new European Commission, including that concerning the EIB turning into the EU Bank for climate/environment, supporting projects and investments for combating climate change, the EIB priorities are:

- investments in **energy efficiency**, taking into account the EU target of 32.5 % by 2030, in particular for residential buildings, the launching of a new energy efficiency facility being foreseen - the European Initiative for Building Renovation, which will also concern the energy efficiency of SMEs;
- **decarbonisation of the energy supply**, considering the target committed to at EU level of reducing greenhouse gas emissions by at least 40 % compared to the level in 1990 (in this respect, EIB will undertake to support the integration of renewable energy projects and good regional cooperation);
- supporting investments in **innovative technologies and new types of energy infrastructure**;
- **the security of the energy infrastructure** (EIB will also support projects of common interest that do not concern the use of fossil fuels, among others, beyond 2022).

According to the lending policy in the field of energy, as adopted in November 2019, EIB will no longer finance investments in fossil fuels from 2022 onwards, including gas, with the exception of those with emissions of 250 g of CO_2/KWh or less. Moreover, EIB will establish an Energy Transition Package for Member States and most affected regions, focusing its financing and consulting activity on a national level to support investment projects fostering energy transition, including in the context of the INECP. EIB will also cooperate with the European Commission to support the Just Transition Mechanism through a loan facility for the public sector with the purpose of supporting regions facing difficulties in their transition to a climate neutral economy according to the Communication from the Commission regarding the Sustainable Europe Investment Plan [COM(2020) 21 final]. EIB will finance up to 75 % (by way of exception from the 50 %) of the eligible costs for investment projects in Member States benefitting from the Modernisation Fund, which meet its new lending policy.

6. The State budget

Where proposals are made to prepare draft legislative acts/measures/policies the application of which entails a decrease in revenues or an increase in the expenditure approved under the budget, the legislators must prepare a financial form in accordance with Law No 69/2010 on the fiscal-budget responsibility, as subsequently amended and supplemented.

The State budget will also supplement the allocation from the Structural Funds under the future 2021-2027 Operational Programmes.

ii. Sector or market risk factors or barriers in the national or regional context

An initial analysis that takes into account the risk factors with a potential impact on and relevant probability for the implementation of the projected policies and measures has identified categories of elements classified as strategic risks, market and financial risks and operational risks. A non-exhaustive list of these risks includes:

Strategic risks

- the Macroeconomy class - natural development of the economic cycle, modification of merit orders in investments;
- the Governance class - regular electoral cycles, stable vs fluid public policies;

- the Reputation class - public opinion, regional and/or EU policies and action lines.

Market and financial risks

- the Environment class - new national legislation and rules, new European legislation and rules;
- the Financial class - increase in implementation costs, increase in financing costs;
- the Supply Chain class - local or regional disruptions on the supply chain and/or the outsourced structure.

Operational risks

- the Legal Responsibility class - external commitments, internal commitments;
- the Nature class - natural disasters, climate change;
- the Human Factor class - man-made events and relevant impact, (physical, cyber etc.) security;
- the Quality/Operation class - new or emerging technology, national and/or regional technological integration.

iii. Analysis of additional public finance support or resources to fill identified gaps identified under point ii

The above list of risk factors does not include a detailed quantitative analysis of the abovementioned factors and barriers. Therefore, the probability and/or impact control options are currently defined strictly on a qualitative basis according to the existing good practices:

Strategic risks

- the Macroeconomy class - avoiding extremes in the modelling and consideration of median impact;
- the Governance class - promoting political consensus to reach the agreed targets, which brings predictability, stability and transparency to the legislative framework;
- the Reputation class - communication, engagement, negotiation and openness.

Market and financial risks

- the Environment class - engagement, diplomacy, commitment;
- the Financial class - flexibility, adaptability, innovation;
- the Supply Chain class - controlled redundancy, engagement.

Operational risks

- the Legal Responsibility class - monitoring, early warning, consistency;
- the Nature class - monitoring, resilient solutions, continuity plans;
- the Human Factor class - sound and resilient solutions, with an optimum level of redundancy;
- the Quality/Operation class - pragmatism, flexibility, engagement.

5.4. Impacts of planned policies and measures described in section 3 on other Member States and regional cooperation at least until the last year of the period covered by the plan, including comparison to projections with existing policies and measures

i. Impacts on the energy system in neighbouring and other Member States in the region to the extent possible

The level of interconnectivity of the national electricity transmission grid is foreseen to accelerate (see Chapter 4.5.1). This factor involves both internal investments for capacity increase and specific investments for transmission interconnections. As a logical consequence, it will also be possible to develop national projects with a regional impact, with further possibility to turn them into projects of common interest. They are supported by the EU and become clusters (Chapter 4.5.1) with an energy security operational impact and a commercial impact related to the single energy market. An updated list of these projects comprises:

- The Black Sea Corridor Cluster, with direct impact on the Romanian and Bulgarian energy systems
- The Mid Continental East Corridor Cluster, with direct impact on the energy system in Romania, Serbia, Montenegro and Italy

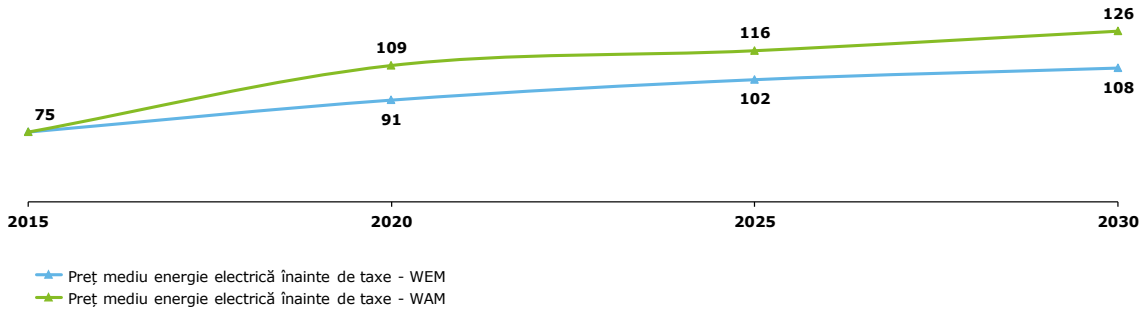
The electricity transmission corridors also include regional natural gas transmission initiatives. These pipelines have an operational, commercial and especially strategic impact, providing Romania and other neighbouring countries with a high level of energy security:

- the BRHA corridor transits Bulgaria, Romania, Hungary and Austria, impacting directly the energy systems in these Member States;
- the Southern Transmission Corridor, for which the transmission system operator intends to access EU funds and which would bring the gas extracted from the Black Sea to the BRHA pipeline, thus impacting the abovementioned countries;
- the project entitled "NTS Developments in North-East Romania", which is part of the priority axis 8 and which plans to secure the transmission capacity from/towards the Republic of Moldova;
- the project entitled "Interconnection of the national natural gas transmission system with the international natural gas transmission pipeline T1 and reverse flow Isaccea", which is included in the NSI East priority corridor, impacting the energy system in Romania and Ukraine;
- the interconnection of the national natural gas transmission system in Romania with the natural gas transmission system in Serbia, enabling energy security, the development of the energy infrastructure through diversification of sources and energy transmission routes, the strengthening of solidarity among Member States and the efficient operation of the energy market;
- the interconnection of the national natural gas transmission system with the natural gas transmission system in Ukraine, on the Gherăești-Siret route, which entails an increase in the interconnectedness of the national natural gas transmission network with the European transmission network.

ii. Impacts on energy prices, utilities and energy market integration

Having regard to the modelling characteristics of the WAM scenario (sustained economic growth, increase in electricity consumption and, implicitly, in the demand for electricity generation), the investment flow pertaining to the power plants and electricity grids will be significantly higher than that estimated in the WEM scenario, generating an average electricity price (prior to taxation) of EUR 126/MWh, compared to EUR 108/MWh (in the WEM scenario).

Chart 50 - Impact of projected additional measures on the average electricity price before taxation [EUR 13/MWh]



Source: WEM - PRIMES 2016 Scenario prepared for the Ministry of the Economy, Energy and the Business Environment, WAM - Deloitte Calculations based on the information submitted by the INECP Interinstitutional Working Group and on the Commission's recommendations

RO	***EN***
Preţ mediu energie electrică înainte de taxe - WEM	Final average electricity price before taxation - WEM
Preţ mediu energie electrică înainte de taxe - WAM	Final average electricity price before taxation - WAM

Note: The final electricity price is an average of the final price to household and industrial consumers, includes all the fees relating to the system services (e.g. transmission, distribution) and other costs (e.g. green certificates) and does not include the VAT and excise duty

iii. Where relevant, impacts on regional cooperation

The Ministry of Energy in Bulgaria submitted a letter to the Ministry of the Economy, Energy and the Business Environment in Romania with questions regarding the possibilities of regional cooperation in the Energy Union in the context of the INECP projects. In this respect, the representatives of the Ministry of the Economy, Energy and the Business Environment in Romania replied on 19 December 2019.

As regards the regional cooperation opportunities between Romania and Bulgaria, the only efficient form of multilateral regional cooperation in South-Eastern Europe at government level is CESEC. There are a series of ongoing initiatives for various projects, such as the PCI joint projects (BRUA, electricity interconnections) or LIP 15 projects, however there is no other format similar to that of the Baltic Council or the Pentalateral Energy Forum.

There is high potential for medium- and long-term bilateral cooperation in the Energy Working Group, however this format could be improved and developed into a form that is more similar to those in Western or Central European countries. The issues both countries are faced with are similar this is why similar solutions may be considered. If such cooperation will become operational and lucrative, it could be the core of regional cooperation, engaging both EU Member States and the Energy Community.

The promotion of national interests as a priority over regional ones is still a significant barrier to the strengthening of regional cooperation. Other barriers are raised by:

- the differences between the national regulations, even if they are in accordance with the EU law;
- the absence of PCI joint projects in fields other than interconnections or the internal market (such as renewable sources or energy efficiency).

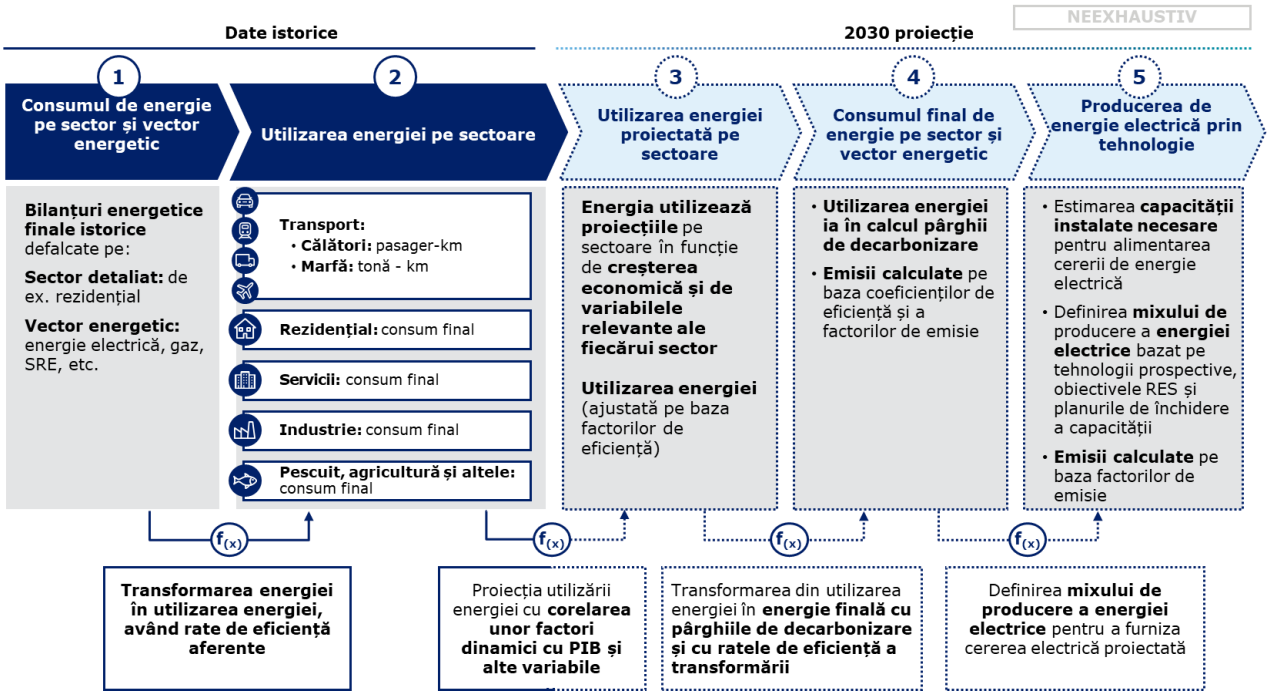
The integration of third countries (candidate countries for Serbia) in the regional cooperation plans could be beneficial if joint projects are to be identified. The issue of non-harmonised law will continue to be an obstacle even if the countries in the Energy Community have undertaken to implement the Clean Energy Package.

Methodology (overall description)

The modelling of the Romanian energy system was based on the projected policy and measure trends in accordance with various other technical and economic factors and indicators. In this respect, the proposed policies generated a series of inputs and assumptions as well as modelling outputs. It is a complex model that reviews the connections between various energy and non-energy parameters, and their impact on the calculated indicators.

The overview of the model methodology is presented in the figure below:

Figure 7 – Overview of the model methodology



Source: Deloitte

RO	***EN***
Date istorice	Historical data
2030 proiecţie	Projection for 2030
NEEXHAUSTIV	NON-EXHAUSTIVE
Consumul de energie pe sector şi vector energetic	Energy consumption by sector and energy vector
Utilizarea energiei pe sectoare	Use of energy by sector
Utilizarea energiei proiectată pe sectoare	Projected use of energy by sector
Consumul final de energie pe sector şi vector energetic	Final energy consumption by sector and energy vector
Producerea de energie electrică prin tehnologie	Production of electricity by technology
Bilanţuri energetice finale istorice defalcate	Historical final energy stocks broken down

pe:	by:
Sector detaliat: de ex. rezidenţial	Sector breakdown: e.g. residential
Vector energetic: energie electrică, gaz, SRE, etc.	Energy vector: electricity, gas, RES etc.
Transport: • Călători: pasager-km • Marfă: tonă - km	Transport: • Passengers: passenger-km • Goods: tonne-km
Rezidenţial: consum final	Residential: final consumption
Servicii: consum final	Services: final consumption
Industrie: consum final	Industry: final consumption
Pescuit, agricultură şi altele: consum final	Fishery, agriculture and other: final consumption
Energia utilizează proiecţiile pe sectoare în funcţie de creşterea economică şi de variabilele relevante ale fiecărui sector	The energy uses projections by sector depending on the economic growth and the relevant variables of each sector
Utilizarea energiei (ajustată pe baza factorilor de eficienţă)	Use of energy (adjusted according to efficiency factors)
• Utilizarea energiei ia în calcul pârghii de decarbonizare	• The use of energy takes into account decarbonisation leverage
• Emisii calculate pe baza coeficienţilor de eficienţă şi a factorilor de emisie	• Emissions calculated on the basis of efficiency coefficients and emission factors
• Estimarea capacităţii instalate necesare pentru alimentarea cererii de energie electrică	• Estimation of the installed capacity required to supply the electricity demand
• Definirea mixului de producere a energiei electrice bazat pe tehnologii prospective, obiectivele RES şi planurile de închidere a capacităţii	• Definition of the electricity production mix based on prospective technologies, RES targets and the capacity closure plans
• Emisii calculate pe baza factorilor de emisie	• Emissions calculated on the basis of emission factors
Transformarea energiei în utilizarea energiei, având rate de eficienţă aferente	Conversion of energy in use of energy, with related efficiency rates
Proiecţia utilizării energiei cu corelarea unor factori dinamici cu PIB şi alte variabile	The projected use of energy by correlating dynamic factors with the GDP and other variables
Transformarea din utilizarea energiei în energie finală cu pârghiile de decarbonizare şi cu ratele de eficienţă a transformării	Conversion from use of energy to final energy with decarbonisation leverage and conversion efficiency rates
Definirea mixului de producere a energiei	Definition of the electricity production mix

electrice pentru a furniza cererea electrică proiectată	to supply the projected electricity demand

The modelling aimed at achieving the strategic objectives proposed at institutional level and at adapting the energy system and ancillaries to the objectives of the five dimensions of the EU energy and climate policy in order to ensure their cost-effective and reasonable achievement, as well as their technical feasibility.

In this respect, the inputs/data substantiating the outputs were principally the following:

- ✓ the strategic objectives at the level of each competent institution in the energy and climate change sector;
- ✓ the measures proposed by these institutions to achieve these objectives;
- ✓ macroeconomic prognoses (such as gross domestic product, gross added value, population, which are in turn influenced by the policies established to foster economic growth);
- ✓ the projected costs of various technologies;
- ✓ the EU ETS carbon price;
- ✓ the international prices of fossil fuels (natural gas, coal and oil);
- ✓ the expected number of heating and cooling days in the analysis period etc.

the outputs are, among others:

- ✓ primary energy consumption at national level;
- ✓ final energy consumption at national level by consumption source and fuel;
- ✓ gross final energy consumption (for calculating the share of renewable energy);
- ✓ gross final renewable energy consumption (for calculating the share of renewable energy);
- ✓ electricity generation by resource;
- ✓ the investment demand to provide for the development of the energy saving and system to ensure the achievement of the strategic objectives;
- ✓ the electricity price.

Modelling was achieved by observing the following principles:

- ✓ consideration of the technical, financial and economic possibilities of generating energy from various resources;
- ✓ coverage of the energy consumption demand from indigenous resources and, if they do not suffice, coverage of the deficit from the import;
- ✓ development of the adjacent investments required to achieve these objectives depending on the established projections and on the current status of the national energy system (e.g. investments in electricity grids to ensure transmission and distribution of electricity, the production of which is projected to be achieved under conditions of security and economic viability);
- ✓ estimation of energy consumption based on economic growth and on the relevant variables of each sector;
- ✓ calculation of emissions based on efficiency coefficients and emission factors;
- ✓ determination of the installed capacity required to meet the electricity demand from indigenous production.