EPG
ENERGY POLICY GROUP

POLICY PAPER

ANALYSIS

The Draft of the Romanian National Energy-Climate Plan 2021-2030

December 2018

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Executive Summary

According to the new policy framework on the Governance of the Energy Union, the National Energy-Climate Plans (NECP) constitute obligations of the EU Member States to develop one-decade-long energy-climate policies starting with 2021-2030. The Romanian Government published the NECP draft at the end of November 2018.

Spread on 169 pages, this first NECP draft 2021-2030 provides a comprehensive summary on the Romanian energy system, including the sources of greenhouse gas (GHG) emissions. At the same time, the draft sets the national targets for 2030 regarding the reduction of GHG emissions, the share of renewable energy sources (RES) in the final energy consumption, and the increase of energy efficiency.

However, the NECP draft also has a number of important deficiencies. From the beginning, the document surprises with a proposed RES target of only 27.9% for 2030, far below the national potential of cost-efficient development of RES and also well below the collective EU target of 32%.

The analysis carried out in this report shows that the manner in which the NECP draft accommodates the net increases in electricity generation capacity by 2030 for virtually all forms of primary energy – except for the natural gas units, whose aggregate capacity stagnates, and of coal, for which an implausibly low decrease is expected – is to rely on a massive increase in final energy consumption to 341 TWh in 2030 compared to 269 TWh in the PRIMES 2016 projection, and 300 TWh in the Romanian Energy Strategy 2019-2030, with an Outlook to 2050.

It must be noted that both the National Energy Strategy and the NECP draft are avowedly based on the results of the PRIMES 2016 quantitative modeling, which was carried out in the elaboration of the National Energy Strategy 2016-2030 with an Outlook to 2050, whose draft was published in December 2016. Unfortunately, the differences from the PRIMES 2016 projections are not adequately explained in any of the two more recent strategic documents.

The NECP draft anticipates 86.6 TWh of final electricity consumption in 2030, well above the 51 TWh of the PRIMES 2016 projection. As argued in this report, simply by considering a more realistic electricity consumption, in the range of 60-70 TWh, the RES target in 2030 is achieved without additional policies for RES support. At the same time, the report also looks at the realistic prospects of the coal-fired power generation sector.

The report recommends an assessment of the measures and mechanisms included in the Romanian legislation. Thus, it is expected that RES will be provide impetus by the introduction of "contracts for difference" (CfDs); the draft NECP, however, mentions a suspicious delay until 2025 of the use of the CfD for RES installed capacities. On the other hand, the coal sector will face ever more severe obstacles and restrictions: the rising price of EU ETS allowances, the exclusion of the new coal-fired power plants from the Capacity Market after 2025 (by limiting the admitted emissions to 550g CO_2/kWh), as well as the more severe BAT limits on emissions of pollutants. At the same time, absent any tempestuous regulation that would oppose the EU policies, the high price of the ETS will facilitate the substitution of the coal by natural gas in the power generation mix.

Generally, the NECP draft suffers from a lack of transparency and rigor regarding the analytical basis and the needed methodological clarity. No public consultations with experts and stakeholders were held in preparation of the document, nor did a new, dedicated modeling take place, although this would have been utterly justified, considering the changes in the EU targets and the regulatory framework over the last two years, as well as developments in the international fuels and technology markets.

Furthermore, the NECP draft is not accompanied by a comprehensive and transparent methodology annex that would explain unequivocally the link between the scenarios used in the PRIMES 2016 modeling and those mentioned in the NECP draft (recall that the projections in the National Energy Strategy 2016-2030 were presented for Optimum Scenario, POPT), as well as the calculations thorough results were reached that differ from those of the PRIMES 2016 modeling. Such an annex is mandatory for the next version of the NECP draft.

Methodological transparency and a better public involvement of experts and stakeholders in drafting the NECP would have made it possible to avoid the impression that some projections of strategic relevance, such as the energy production and consumption, are rather a matter of political commitment than a result of rigorous analysis.

After careful scrutiny of all sections of the NECP draft, the report ends with a number of constructive suggestions, intended to support an improvement of the draft's next version and, of course, of the final version of the NECP 2021-2030.

1. Introduction: NECP and the Governance of the Energy Union

The new EU policy framework regarding the Energy Efficiency Governance, part of the *Clean Energy for All Europeans* Package, requires EU Member States to implement National Energy and Climate Plans (NECPs) to cover the five interdependent dimensions of the Energy Union – energy security, solidarity and trust; a fully integrated internal energy market; energy efficiency; climate action and decarbonizing the economy; research, innovation and competitiveness – for 10 years, starting with 2021-2030, based on a common reporting template. The NECPs are to be updated every five years.

Integrated energy-climate planning, the obligation to consult with the neighboring member states and with the European Commission (EC), as well as the obligation to realize biennial progress reports in achieving the goals, objectives and priorities committed to through effectively turn the NECP real energy and climate strategies of the EU member states.

In particular, the NECP should clearly show the contribution of EU countries, through specific energy-climate policies and measures, to achieving the EU collective key targets for 2030:

- reducing greenhouse gas emissions (GHGs) by 40% below 1990 levels by 2030;
- achieving a share of at least 32% for renewable energy sources (RES) of the total final energy consumption;
- increasing the energy efficiency by at least 32.5% compared to the 2007 PRIMES projection for 2030.

If the EC considers that a NECP does not contribute enough to the achievement of the EU objectives or if the collective progress of the Member States towards achieving these objectives proves to be insufficient, then it may issue specific recommendations to the Member States.

The timetable for realization of the NECP is as follows:

- By December 31, 2018: submission of the NECP drafts to the European Commission by all Member States;
- By June 30, 2019: recommendations made by the EC on the NECP drafts;
- By December 31, 2019: submission of the final NECP for 2021-2030, including a summary of the points of views from the public;
- By March 15, 2023 – and every two years thereafter: Submission to the Commission of the first biennial progress report on the implementation of the national energy and climate plans: progress towards targets, up-to-date projections and updates of necessary policies and measures to be taken;
- By June 30, 2023: submission to the Commission of the updated NECP draft, or justification of maintaining the current one;
- By June 30, 2024: notification to the European Commission of the final updated NECP draft.

The Energy Governance policy framework highlights some important elements in the NECP process:

- ◊ Early and effective engagement of the public in the preparation of the NECP, including consultations with local authorities, academia, civil society, investors and citizens in a structured dialogue on energy and climate issues;
- ◊ Publication of the draft and final version of the NECP, the Progress Report, as well as the quantitative projections and the results of the evaluation of costs and effects of the public policies.

This report is an analysis by the Energy Policy Group (EPG) think-tank on the draft of the National Plan for Energy and Climate Change 2021-2030, called in this report the NECP draft, published by the Ministry of Energy in November 2018.

The Romanian Government succeeded in finalizing and publishing in time this complex document. However, as detailed in the following sections, the NECP draft suffers from many shortcomings. In order to remove as much of them as possible in drafting the final NCP version, this report provides a constructive critique of the draft, the conclusions of which are summarized in a series of practical recommendations.

2. The national targets assumed in the NECP draft

2.1 Overview and plan development process

The NECP draft is a strategic plan based on a large amount of statistical data, on an inventory of Romanian energy and environmental legislation, and on projections regarding the energy and climate indicators by 2030, spreading over no 169 pages. Making it happen on time, before the deadline of 31 December 2018 – a deadline that has raised difficulties for other EU Member States – and putting it into public consultation is a success.

Nevertheless, the NECP draft contains some controversial strategic options, inadequately substantiated by economic, climate or energy security arguments. In the very opening of the first chapter, "Overview and planning process," the table on page 11 summarizes the main objectives for 2030. The assumed goal for the RES share in the gross final energy consumption of only 27.9% is striking. The figure is confusing, as it is not only much under the new common target EU target of 32%, but also well below the Romanian renewable potential. This topic is detailed in section 2.1, below.

Regarding the reduction of greenhouse gas (GHG) emissions, the target for 2030 is 43.9% for the sectors covered by the EU ETS scheme, and 2% for non-ETS. The energy efficiency target for 2030 is 37.5% compared to the level set by the PRIMES 2007 projection. The national emissions reduction and energy efficiency goals are both above the EU 2030 collective targets.

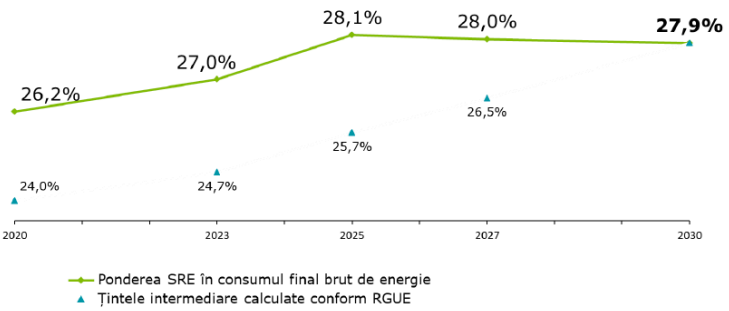
The first chapter covers about 40 pages with two long tables, titled "Main objectives, policies and measures of the plan" (pp. 15-39), respectively "Current Romanian policies and measures regarding energy and climate on the five dimensions of the Energy Union" (pp. 43-48). In the first table there are frequent general and vague formulations, while the second table is, in fact, a long inventory of the action plans, programs and laws in force in the energy sector. The first table needs to be more specific while the second one needs an evaluative dimension, whereby at least the central energy legislation should be assessed from the vantage point of its real contribution to achieving the national and EU strategic goals.

For example, in the category of policies/measures on RES, only Law No. 220/2008 establishing the support system for RES power generation (p. 44) is mentioned, along with its entire legislative and regulatory framework, yet without reference to the malfunctions created by the numerous *ad hoc* state interventions of in the legislative body regarding the producers of RES power and the green certificates market.

2.2 Analysis of the RES target for 2030

The presentation of the national objectives related to the Decarbonisation Dimension of the Energy Union in subsection 2.1.2, "Energy from Renewable Sources," starts with a graph showing the "indicative trajectory of the RES share in final energy consumption, 2021-2030" (p. 51):

Grafic 2 – Traiectoria orientativă a ponderii SRE în consumul final de energie, 2021 – 2030, [%]



Sursă: Calcule Deloitte pe baza Strategiei Energetice a României, 2019 – 2030, cu perspectiva anului 2050

Source: Deloitte calculations based on the *Energy Strategy 2016-2030, with an Outlook to 2050*

Several elements cause confusion about the figures and trends indicated in this graph. The 27.9% RES expected to be achieved in 2030 is far below the common EU target of 32%, but also well below the cost-effective RES potential, estimated by IRENA (2017)[1] at over 16.9 GW.

It is not quite clear how the value of 27.9% was calculated. The repeated phrase in the NECP draft, "Deloitte calculations based on the Energy Strategy of Romania for 2016-2030, with an outlook to 2050" does not say much, as the NECP draft is not accompanied by any methodological annex.

It is noticeable that the NECP draft was not based on a dedicated quantitative modelling, as it would have been necessary. The quantitative elements are mainly based on the PRIMES modelling of 2016, made in the elaboration of the *Energy Strategy 2016-2030, with an Outlook to 2050* (published in December 2016) – results partly taken over in the final version of the *Energy Strategy 2019-2030, with an Outlook to* 2050 (published in October 2018).[2]

Furthermore, it is not explained which specific evolution scenario of the RES sector is considered: what are the assumptions under which the projection is made until 2030, the constraints, the market and policy drivers. The NECP draft is mentioning a WEM (scenario based on current measures) and a WEP (scenario based on expected measures), yet they remain unknown to the reader. A reference from page 52 indicates that the projections on which the 2030 targets are based were made in the WEP scenario. Unfortunately, it is uncertain what is their link to the PRIMES 2016 projections, based on the Optimal Scenario (POPT),[3] which optimized the costs needed to reach the EU targets of emissions reduction, RES and energy efficiency for 2030.

The graph above shows a curious development, according to which the share of RES reaches a maximum of 28.1% in 2025, then enters a slowly declining slope down to 27.9% in 2030. This means that between 2025-

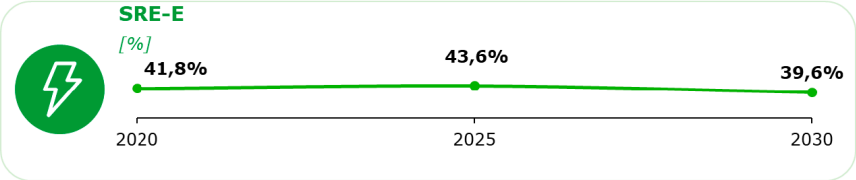
[1] IRENA (2017), *Cost-Competitive Renewable Power Generation: Potential Across South East Europe* – with Joanneum Research and University of Ljubljana, Faculty of Electrical Engineering

[2] We will refer henceforth to these documents, respectively, by the Energy Strategy 2016-2030, and the Energy Strategy 2019-2030.

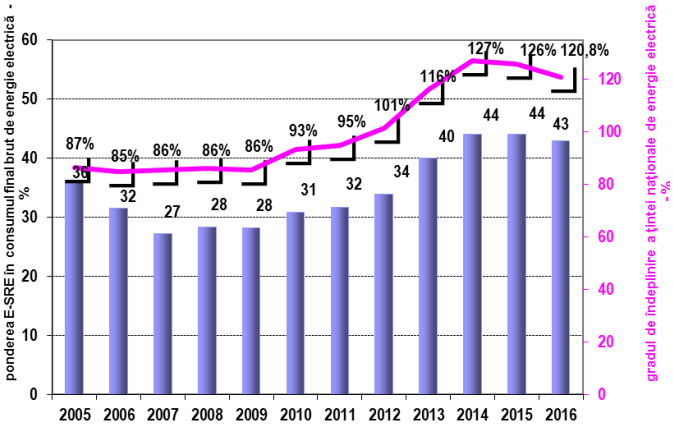
[3] Annex: *Methodology of the quantitative modeling of the Romanian energy sector evolution for 2030 and 2050*, December 2016, pp. 3-4.

2030 the growth rate of RES production stays slightly below the growth rate of the gross final energy consumption.

The trend is also reflected in the projections for the RES share in electricity production (RES-E), for which a maximum of 43.6% is indicated in 2025, followed by a decrease down to 39.6% in 2030:



There is no indication of a technical-economic or policy mechanism to explain this trend. However, it is useful to put it in contrast with the ANRE data (2016, 204), which evince the RES-E evolution target in Romania's gross final electricity consumption between 2005-2016:

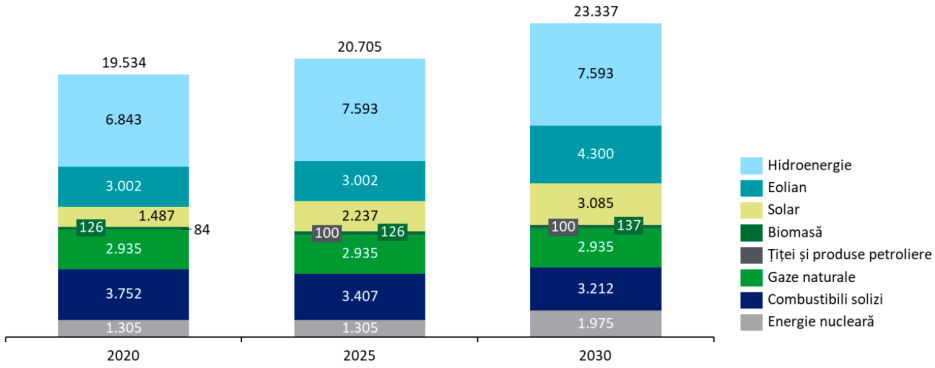


Source: ANRE 2016

The ANRE chart shows a maximum SRE-E share in the final gross energy consumption of 44% in 2014 and 2015, followed in 2016 by a relative decline to 43%, because of to the approaching end of the enrolment period in the RES support scheme. The NECP draft foresees a reduction of RES-E share to below 42% in 2020.

It is relevant to analyze the shares in the electricity mix envisaged in the NECP draft, taking into account the projections of installed capacity between 2021-2030 and the gross final energy consumption. For wind capacities, an increase from 3,000 MW in 2020 to 4,300 MW in 2030 is anticipated, and for PV, from about 1,500 MW to about 3,100 MW – Chart 6, p. 55, whose source is, again, "Deloitte calculations based on the Energy Strategy of Romania for 2016-2030."

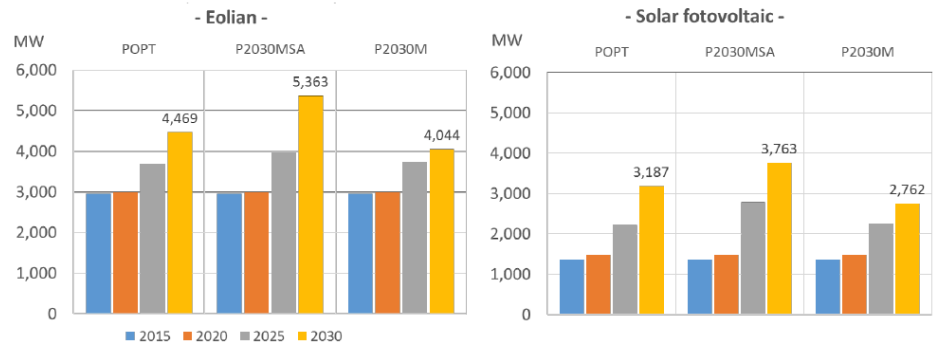
Grafic 6 – Traiectoria orientativă a capacității instalate, pe surse, [MW]



The projected increases for wind and PV capacities are somewhat lower than – but comparable to – those in the PRIMES 2016 projection (POPT), as shown in the Energy Strategy 2016-2030, p. 74:

Installed capacity in wind farms and PV power plants as a function of the capital cost

Figura 17 – Capacitatea instalată în centrale eoliene și fotovoltaice în funcție de costul capitalului



Sursa: PRIMES

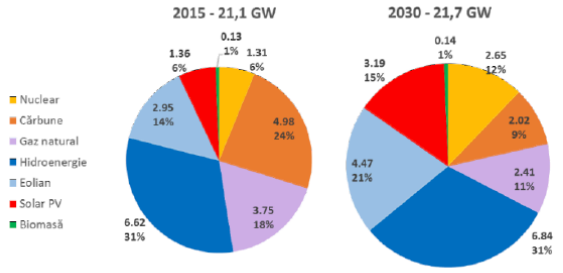
It should be noted, however, that the Optimal Scenario (POPT) was built on the assumption of a 27% EU target for RES in 2030, as demanded in 2016 by the EU Energy Climate Framework of October 2014, and not the current target of 32%. It would have been instructive, in preparing the NECP draft, to quantify a scenario that included the present EU targets for GHG emissions reduction, RES and energy efficiency, in order to have a comparison basis for the energy mix structure, consumption, costs, needed investment, sectorial emissions etc. Unfortunately, this essential kind of information is not provided by the NECP draft.

2.3 The other electricity mix components

The total expected installed capacity in the NECP draft is 23.3 GW for 2030, which is 1.6 GW higher than the PRIMES 2016 projection for 2030 (Energy Strategy 2016-2030, p. 76):

Gross capacity mix installed in 2015 and 2030 (Optimal Scenario, POPT)

Figura 19 – Mixul de capacitate brută instalată în 2015 și 2030 (Scenariul Optim, POPT)



Sursa: PRIMES

Most of this difference is attributed to the coal-fired power generation units: 2 GW in 2030 in the PRIMES 2016 projection, compared to 3.2 GW in the draft NECP's estimation. The total wind and photovoltaic capacities in 2030, according to PRIMES 2016, will be 7.66 GW, in comparison with 7.38 GW estimated in the NECP draft.

In the NECP draft, hydropower capacities are projected to increase by 750 MW until 2030, compared to 6.84 GW until 2020, which appears to be due to the construction of the improbable project of the Tarnița-Lăpuștești pumped storage hydropower plant.

The NECP draft also presents the stagnant tendency of an aggregate capacity for natural gas-based power generation. Although such a stagnation is unlikely, this might be explained through a substitution of the coal-fired units which will be decommissioned by 2030 – a total of about 1,800 MW, according to the Energy Strategy 2016-2030 – with new gas-based units, while maintaining the 2020 level. Indeed, compared to the PRIMES 2016 projection, the NECP draft envisages an increase of about 500 MW of natural gas capacities.

According to the Energy Strategy 2016-2030, the nuclear power capacity would be 2.65 GW in 2030, based on the operation of four 650 MW CANDU reactors, while the NECP draft envisages for 2030 only 1.975 MW, corresponding to the operation of three reactors. The explanation is that the NECP draft assumes that the commissioning of Unit 4 of the planned Cernavodă expansion will take place in 2031. The difference has consequences in terms of the total installed capacity by 2030: if the reference year for projections would have been 2031, the RES share in final energy consumption would have been even lower.

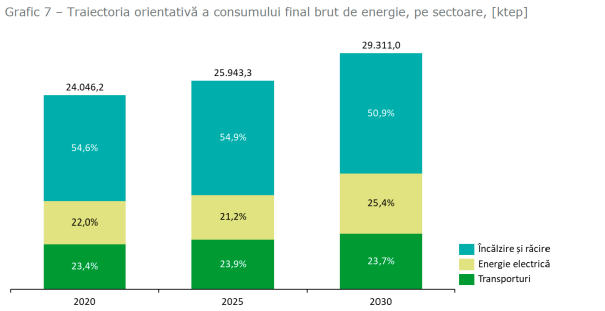
The NECP draft's estimate of the coal-fired capacities that will be decommissioned is very conservative: the 3.7 GW capacity in 2020 is supposed to see a slight decrease to 3.4 GW in 2024 and then to 3.2 GW in 2030. The draft does not lay out the means by which such a high capacity of coal-based capacity will be maintained in 2030, considering that the technical lifetime for no less than 2.4 GW of existing coal-based units will run out until 2030. In addition, at EU level, coal-fired power generation is facing an ever more challenging policy and market environment, in the context of increasing EU ETS prices and more restrictive energy-climate demands,

such as the limit emissions of 550g CO_2/kWh for market capacity access[4] or new restrictions under the European Industrial Emissions Directive (2010/75/EU).[5]

A recent report from the Carbon Tracker Initiative think-tank[6] shows that (i) in 2025 the new wind and PV capacities will be cheaper, in terms of capital and operating costs, than new coal-fired units in all markets all over the world; and (ii) by 2030, all new RES-E capacities in the EU will be cheaper than the long-term operating costs of existing coal-fired power generation units (pp. 23-24). Other recent energy economics studies confirm this dynamic; strategic responsible energy-climate planning is not allowed to ignore it.

2.4 The approach of the NECP draft: increasing of the projected energy consumption

Graph 7 on p. 55 from of the NECP draft presents the gross energy final consumption by sectors in the years 2020, 2025 and 2030:



Sursă: Calcule Deloitte pe baza Strategiei Energetice a României, 2019 – 2030, cu perspectiva anului 2050

It is noticeable that the projection for gross final energy consumption from the NECP draft differs from the PRIMES 2016 projection, as well as from the Energy Strategy 2019-2030 projection of 300 TWh in 2030. The NECP draft is predicting a gross final energy consumption of 29.3 ktoe in 2030, equivalent to nearly 341 TWh. Of this total, the electricity consumption is 25.4%, i.e. 86.6 TWh – considerably higher than the PRIMES 2016 projection of 51 TWh in 2030.

[4] On 18 December 2018 trilateral negotiations (trialogue) between the European institutions regarding the EU internal electricity market regulation were concluded. It has been decided that new generation capacities entering production after the entry into force of the Regulation are not eligible for capacity market payments if they emit more than 550 g CO_2/kWh.

Existing units emitting over 550g CO_2/kWh*yr and 350 kg CO_2/kW*yr will be able to participate in the capacities market only until 1st of July 2025. Existing capacities may still benefit from a grandfathering clause whereby the contracts for capacities until 31st December 2019 can be run until after 2030. However, it will be extremely difficult to make new investments in coal-based generation capacities that will not be completed by the end of 2019.

[5] Joint Research Center (2017), European Union: *Best Available Techniques (BAT) Reference Document for Large Combustion Plants.*

[6] Carbon Tracker Initiative (2018), *Powering down coal. Navigating the economic and financial risks in the last years of coal power*, November

The Energy Strategy 2016-2030, based on the PRIMES 2016 modelling (POPT scenario), projects a total electrical energy generation of 73 TWh in 2030, while the Energy Strategy 2019-2030 predicts that electricity production will be 77 TWh, without indicating a mechanism or calculation to account for the difference.

Table 1 summarizes the 2030 data provided by the three successive strategic documents. The difference between the total electricity production of 73 TWh estimated by the PRIMES 2016 modelling and the total electricity consumption of 86.6 TWh projected by the NECP draft is striking. It would imply that an amount of more than 13 TWh will be imported by the year 2030. On the other hand, PRIMES 2016 indicates an 11 TWh electricity export in the Optimal Scenario in 2030.

Of these three strategic papers, only the Energy Strategy 2016-2030 was based on a full quantitative modelling (PRIMES 2016), while the other two are using selectively, with uncertain additions, the results of PRIMES 2016.

Table 1: Data regarding energy production and consumption in 2030

Year 2030	***Energy Strategy 2016-2030 (PRIMES 2016, POPT)***	***Energy Strategy 2019-2030***	***NECP draft***
Total electrical energy production (TWh)	73	77	77*
Final energy consumption (TWh)	269	300	341
Final energy consumption (TWh)	51	n/a	86.6
Capacity sources			
RES-E (MWh)			
Wind turbine	4,500	4,300	4,300
PV	3,200	3,100	3,100

Sursa: EPG

*The value of 77 TWh for total electricity production is assumed to be implicitly taken over in the NECP draft from the Energy Strategy 2019-2030

There is no rigorous explanation for the discrepancy between PRIMES 2016 and the NECP draft. However, one can propose an intuitive correction that leads to a more realistic level of the final electricity consumption in 2030, even based on the value advanced in the NECP draft.

Considering an energy production of 77 TWh in 2030 (as in the Energy Strategy 2019-2030 and implicitly assumed in the NECP draft), a consumption of 86.6 TWh would imply an annual import of almost 10 TWh, which cannot be a strategic priority for Romania. With the assumption that an annual energy export of 8-10%, comparable to the present level, could be maintained until 2030 (when, according to NECP draft, there will not be four nuclear units in operation, as assumed in the POPT scenario of the Energy Strategy 2016-2030, but just

three of them, so the export will probably not reach the 11% projected in PRIMES 2016), let us briefly analyze the effects of a 60-70 TWh final electricity consumption in 2030.

The reasoning is as follows: the share of RES-E projected for 2030 in the NECP draft is 39.6% of 86.6 TWh, corresponding to almost 49% of a 70 TWh consumption. Hence, a share of RES-E is 9.4% higher than the target of the NECP draft in 2030. As a percentage of gross final energy consumption, given that RES represents 25.4% of the total, the additional 9.4% comes down to 2.3% of the total. Thus, we get a RES share of the final gross energy consumption of 27.9% + 2.3% = 30.2% in 2030.

Table 2 summarizes the results of this reasoning for a final consumption of 70 TWh, 65 TWh and 60 TWh – all of them significantly above the final consumption projection of the PRIMES 2016 modelling. It can be also noticed that, based on the RES-E capacities projected in the Energy Strategy 2016-2030 (POPT), total RES-E production would account for 51% of the total final electricity consumption, which would be reflected in a RES share of 27.9% + 2.9% 30.8% in 2030.

Table 2: The relationship between RES share in 2030 and final electricity consumption, according to the assigned percentage in the NECP draft

Final electricity consumption in 2030 (TWh)	RES-E share in the electricity mix in 2030	RES share in final energy consumption in 2030	RES share in final energy consumption in 2030, according to the PRIMES 2016 projection for RES-E
70	49%	30.2%	30.8%
65	52%	31.0%	31.5%
60	57%	32.2%	32.8%

Source: EPG

It is noticeable that by simply bringing energy consumption to more realistic proportions, the RES target for 2030 can achieved without having to implement any additional RES support mechanism.

Of course, such calculations, which are mixing elements from different scenarios, are rather heuristic, indicating only trends. For a more rigorous quantitative argumentation, it is necessary to model these variants of consumption as sensitivities. Even so, it is obvious that the NECP draft it is relying on a massive increase in final energy consumption in Romania by 2030, well above the projection of the PRIMES 2016 modelling (POPT). The problem is that this estimate of substantial increase of the final energy consumption is not well-grounded analytically.

In any event, the NECP draft can thus accommodate the multiple tensions that result from the inevitable competition in the energy mix between different forms of primary energy, especially in the context of the energy policies that are increasingly penalizing CO_2 emissions. But the analysis must also take into account the likely contraction of the coal-fired electricity sector, much more than the estimate in the NECP draft, which will make more room for RES-E in the electricity mix. We will add more on the topic in section 4.

2.5 Other tools to support RES: CfD and PPA

As a means of promoting RES, the Ministry of Energy is considering using contracts for difference (CfDs) to tender new wind and PV power capacities. However, the NECP draft mentions at pp. 76-77 the year 2025 as a deadline until which "studies are expected to be developed in order to allow at least 10 development areas for wind and PV power plants on the national territory, each one with specified limits and maximum renewable capacity that can be installed."

But such a protracted timeframe is incomprehensible and unacceptable. It raises the suspicion that CfDs can be used as a means of discriminatory support for certain types of low-emission energy sources (such as nuclear power) and deliberate delay of others (such as RES). There is no technical or administrative reason why such a national-level study cannot be drafted by the Ministry of Energy and publicly debated during the year 2019, so that no later than 2020 the first capacity auctions for SRE be organized based on CfDs. For example, Poland has just achieved this successfully in November 2018 for a 182 MW wind farm, showing unequivocally the applicability of this approach, which also has the virtue of introducing a needed element of competitiveness in the support of green energy sources.

In order to stimulate investment in RES and lower the cost of their integration, legislative adjustments are needed in order to allow the introduction of Power Purchase Agreements (PPAs) in Romania, agreements that have proved necessary in all regions with a high level of RES development. PPAs must be available for all participants to the electricity market, along with additional norms and instruments to mitigate contractual risks, such as the counterpart risk. In the absence of PPAs, the bankability of investment is limited, and the electricity market is confronted with a tendency to concentrate transactions on short terms, with negative effects on self-correcting mechanisms, whereby prices are formed at a fair level.[7] In addition, restricting the centralized energy market in Romania often puts electricity producers in a situation of losing financial value through the impossibility of direct bilateral contracts with external buyers.

The NECP draft approaches the issue of the PPAs in Chapter 3, page 80, with reference to a recent ANRE Regulation draft on how to conclude bilateral electricity contracts using products that can ensure long-term trading flexibility. The draft regulation envisages the creation of a new type of trading on the centralized market for bilateral electricity contracts (CMBC), called *CMBC-flex,* according to which the contracts are awarded through extended auctions, with the use of products to ensure the flexibility of long-term trading.

According to the draft ANRE regulation, in the *CMBC-flex* trading model, the daily delivery profile may have an hourly power variation of up to +/-25%, subject to mutual notification of the amount of electricity in the contract, and the time interval of the delivery profile may vary by +/-1 hour, provided that the number of hours in the range is constant. However, it remains to be seen if the *CMBC-flex* trading will pass the market test and will be assimilated to PPAs.

[7] The possibility of illegal use of directly negotiated bilateral contracts, which in Romania justified the imposition of the obligation of full trading on the centralized market, is presently limited by the adoption at EU level of the REMIT Regulation (EU) 1227/2011 on the integrity and transparency of the wholesale energy market, and of Regulation (EU) 1348/2014 on data reporting. It is thus mandatory to report about the transaction initiator, the duration of the trading order, price, delivery profile, etc.

3. The other objectives of the NECP draft, according to the Energy Union dimensions

Energy efficiency

According to the NECP draft, "Compared to the 2030 primary energy consumption forecast, as calculated in the PRIMES 2007 scenario for Romania, respectively 58.7 Mtoe, the WPM scenario indicates a 37.5% drop in 2030." However, in the absence of a methodological clarification, it is unclear how the WPM scenario operates and how the calculations were realized. For the buildings sector, the NECP draft uses data like the maximum annual energy consumption reduction, specific to the different types of buildings in Romania (residential, offices, schools, hospitals, hotels), from the *Strategy for mobilizing investment in the residential and commercial buildings renovation, both public and private, at national level* (MDRAP 2017).

Energy security

In addition to affirming the objectives of increasing diversification of the internal and external energy sources and reducing import dependence, the goal of "integrating energy storage systems with batteries into the National Electricity System (SEN) at a level of more than 400 MW, in particular for the purpose of flattening the load curve and providing an operable reserve in the form of ancillary services (STS) – secondary and fast tertiary regulation" (p. 60). However, there is no reference to legislative measures to facilitate this.

It would also have been useful, under the objective of increasing the flexibility of SEN, for the NECP draft to address within the energy security dimension the increasing role of demand-side response, digitalization, prosumers and interconnections – issues that, in fact, are presented in the context of the Internal energy market dimension, in subsection 2.4.3, "Market integration." However, the time horizon announced on p. 77 for completing smart metering – namely 2028 – is inadmissibly long compared to the calendars assumed by most EU Member States. The aim of installing a power of at least 750 MW by 2030 in the form of capacities owned by prosumers is mentioned on p. 63, in subsection 2.4.3, "Market integration."

Internal energy market

The interconnectivity of power grids, the energy transport infrastructure (with the introduction of the main projects of grid development supported by the TSO, Transelectrica) and markets integration are also discussed.

Regarding the integration of markets, "one strategic action remains the integration in the single day-ahead and intra-day coupling markets (SDAC and SIDC)." However, it remains to be seen how the viability of this "strategic action" is impacted by the recently introduced new regulations of GEO 114/2018.[8]

[8] Government Emergency Ordinance (GEO) No. 114/2018 on the introduction of measures in the field of public investments and fiscal-budgetary measures, issued on 21 December 2018, sets a price cap of RON 68/MWh in the contracts based on natural gas extracted in Romania for the 01.04.2019-28.02.2022 period, with the reinstatement of a mixed "basket" of

Energy poverty

The policies and the measures to combat energy poverty are addressed in section 3.4.4. The operational actions taken into account are of both financial and non-financial nature.

The non-financial policies consist in the adoption of a clear political and legislative framework (with the remark that "presently, the incomplete definition of the *vulnerable consumer* in Romania has a negative impact on the measures' effectiveness..." – p. 95), and the improvement on the collection and monitoring of the poverty and energy vulnerability data, the possibility of payment in installments of the energy bills, the implementation of the National Digital System of Social Assistance.

The financial measures consist in subsidies granted to vulnerable consumers, according to the Law 196/2016 on the minimal inclusion income, respectively potential payments from a solidarity fund for the financial support of vulnerable consumers, that can be constituted under the Law 123/2012 of electricity and natural gas, art. 201, par. (3), based on the revenues collected from the state budget through "additional taxation of the unexpected profits of producers and suppliers of electricity and natural gas resulting from favorable market conditions and/or conjunctural transactions."

Research, innovation and competitiveness

Section 2.5 outlines the goals listed in the National strategy for research, development and innovation for 2014-2020, without a target for 2030.

Chapter 3 of the NECP Draft, "Policies and measures to achieve the goals," puts the five dimensions of the Energy Union in line with the operational objectives (OPs) listed in Chapter 1. Generally, the measures are correctly identified and formulated. However, occasional vague statements can be found, which should be stated in a more applied and concrete manner in the next version of the draft. Thus, for the decarbonisation dimension, as a measure for the reduction of GHG emissions and noxious emissions, the draft mentions for the transport sector the "introduction of strong economic incentives for an ecological transport system through price instruments" (p. 70), with no further clarification. On tourism and recreational activities, "Adaptation to, and protection of the seaside tourism in terms of infrastructure from climate change" is proposed as a measure on p. 73.

Further, as a measure to increase energy efficiency, the "Effective use of biomass, modern heat generation systems, especially for rural heating" is proposed (p. 83), although this in itself is a national energy policy objective, complex and difficult to achieve. Simply mentioning it in a desiderative manner is not very helpful.

With regard to the energy security dimension, OP8 ("Replacement of electricity generation capacity that will come out of exploitation with new, efficient and low-emission capacities by 2030") is to be achieved by "Ensuring the financing mechanisms for investments in new generation capacities without GHG emissions,

indigenous and import gas for non-domestic consumers; it requires ANRE to regulate the household electricity price by between 01.03.2019-28.02.2022; it imposed a "money contribution" of 2% of the turnover rate of the companies operating in the electricity industry. These regulations are fundamentally contrary to the EU's single, liberalized and competitive market principles, massively limiting the transition to a modern, low emissions energy sector. A rigorous quantification of the regulation effects requires a quantitative modelling that would include them in the reference scenario for 1.01.2020-28.02.2022 period.

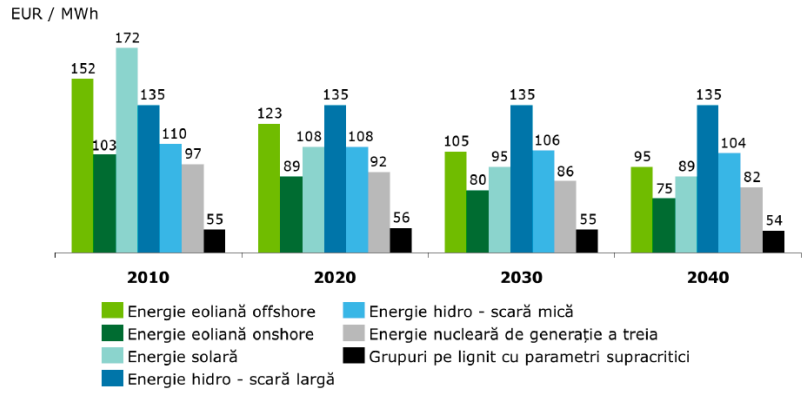
under economic efficiency." Once more, developing such funding mechanisms is a challenge in itself. How will they be assured? The NECP draft must indicate more concrete elements.

4. Analytical basis

Chapter 4 of the NECP draft, "Current situation and forecasts in the context of existing policies and measures," makes forecasts for GDP and population growth by 2030 and 2035. Subsection (ii) "Sectorial changes expected to have an impact on energy and GHG emissions," presents a series of data on the contribution of different economic sectors to GHG emissions, according to the *National Climate Change and Economic Growth Strategy based on low carbon emissions for 2016-2030*: energy, transport, industry, agriculture and rural development, waste management, water sector and water resources, forestry.

Significant for the quantitative foundation of the objectives and measures of the draft NECP is Graph 12 on p. 107, which delineates the expected evolution of the cost for different technologies:

Grafic 12 - Evoluția preconizată a costului diferitelor tehnologii



Sursă: PRIMES 2016 scenariul de referință al Uniunii Europene, „EU Reference Scenario 2016"

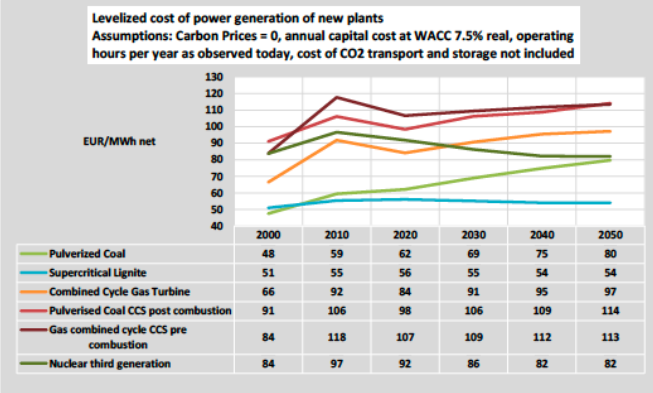
It is striking that the supercritical lignite groups stand out as the cheapest among the power generation technologies, with a big difference from rival, renewable and non-renewable technologies. This estimate of the cost of technology is based, according to the NECP draft, on the EU Reference Scenario, which was quantified in 2016 for the European Commission using the PRIMES model suite.[9] The data shown in this graph suggest that lignite-fired supercritical units are, in terms of cost, the most efficient form of power generation. It would then follow that the approach of the NECP draft, favorable on the long-run to coal-based capacities, is well-founded.

Nevertheless, while the NECP draft specifies only that the above graph is realized under the assumption of a capital cost (WACC) of 7.5% and a number of annual operating hours "according to current data," the projections of the EU Reference Scenario include other key conditions. The following charts, which show the levelized cost of energy (LCOE) for non-RES and RES technologies – based on which Graph 12 was compiled –

[9] European Commission (2016), *EU Reference Scenario 2016. Energy, Transport, and GHG Emissions – Trends to 2050*

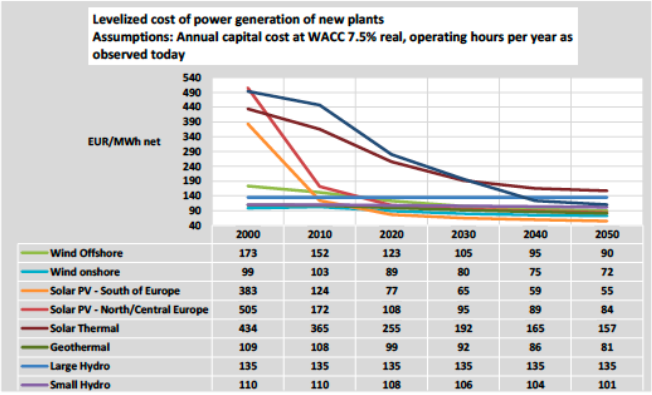
are made under the additional supposition of a null carbon cost and without including the cost of transporting and storing the CO_2.

FIGURE 10: INDICATIVE LEVELISED COSTS FOR NON-RES TECHNOLOGIES



	2000	2010	2020	2030	2040	2050
Pulverized Coal	48	59	62	69	75	80
Supercritical Lignite	51	55	56	55	54	54
Combined Cycle Gas Turbine	66	92	84	91	95	97
Pulverised Coal CCS post combustion	91	106	98	106	109	114
Gas combined cycle CCS pre combustion	84	118	107	109	112	113
Nuclear third generation	84	97	92	86	82	82

FIGURE 11: INDICATIVE LEVELISED COSTS FOR RES TECHNOLOGIES

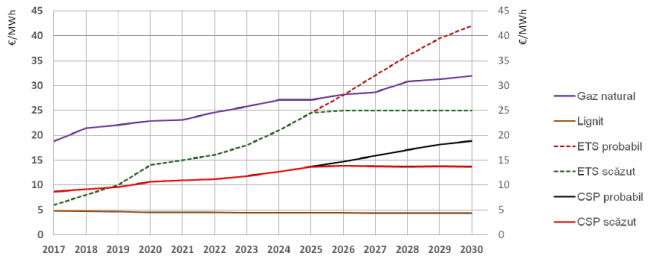


	2000	2010	2020	2030	2040	2050
Wind Offshore	173	152	123	105	95	90
Wind onshore	99	103	89	80	75	72
Solar PV - South of Europe	383	124	77	65	59	55
Solar PV - North/Central Europe	505	172	108	95	89	84
Solar Thermal	434	365	255	192	165	157
Geothermal	109	108	99	92	86	81
Large Hydro	135	135	135	135	135	135
Small Hydro	110	110	108	106	104	101

Source: EU Reference Scenario (2016, p. 44)

The EU ETS price is the main growth driver for electricity prices on the EU's wholesale markets in the coming decades. Therefore, the LCOE profiles will look quite differently for fossil fuel capacities, with growth curves if calculated by internalizing the ETS cost, given the obligation of coal and natural gas capacities to purchase EUAs for every emitted CO_2 ton. The biggest impact will be felt by the lignite-fired units and, to a lesser extent, the natural gas-based ones. This differentiated impact of the ETS cost on coal and gas was quantified in the Energy Strategy 2016-2030 by calculating the gas price level at which the gas replaces lignite in the merit order on the electricity market (coal switching price):

Figura 21 – Prețul estimat al gazului natural (CSP, *coal switching price*) la care acesta devine mai competitiv decât lignitul în mixul de energie electrică

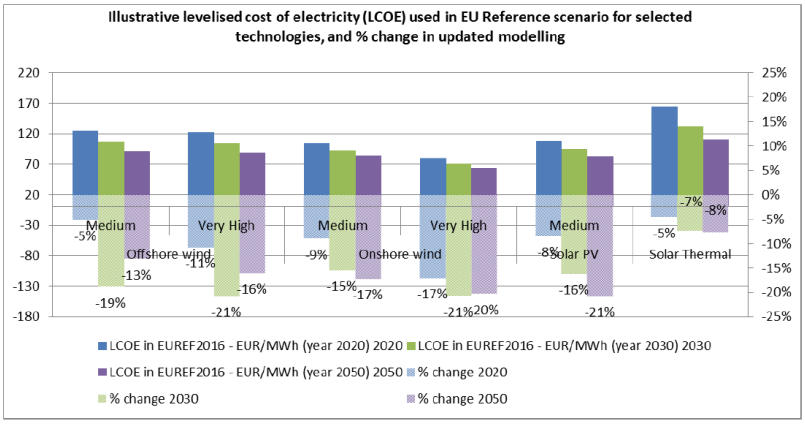


Sursa: Ministerul Energiei, pe baza datelor PRIMES

For an ETS price of €40/CO_2 ton equivalent in 2030, the gas price at which lignite replacement is to be made, according to PRIMES 2016, is €19/MWh.

Apart from this, Graph 12 neglects that, according to the EU Reference Scenario, the PV power plants from southern Europe were projected to have costs of €65/MWh in comparison with €95/MWh for those in Central and North Europe in 2030. However, given the geographical concentration in Dobrogea of the Romanian solar potential, South-European data are more relevant for Romania than the Central and North European ones.

Furthermore, the EC's Directorate-General for Energy (DG ENER) published in 2018 a non-paper updating the PRIMES modelling for the 2016 EU Reference Scenario, which significantly reduces the cost of RES technology, based on the most recent International Energy Agency (IEA) data (see chart below).



Source: DG ENER 2018

The LCOE for onshore wind of medium natural potential is projected for 2030 to be 15% cheaper and medium-level PV solar 16% cheaper than projected in 2016. In other words, in 2030, 1 MWh produced by onshore wind turbines will cost €68, compared to €80 in the projection from 2016, while 1 MWh produced by PV power plants in southern Europe will cost about €58 in comparison with €65 in the 2016 projection.

Thus, the "learning curve" of RES technologies, which reduces costs over time, as they their installed capacity continues to grow, has evolved in recent years more rapidly than deemed in the EU's 2016 Reference Scenario. But above all, the rising costs of CO_2 emissions will make RES and gas-based power plants substitute the coal-fired units in the electricity mix. The other restrictions on coal-based generation (the BAT/BREF on NOx and SOx emissions, as well as the limit of 550 g CO_2/kWh in order to participate on the market capacity) add, as seen in 2.3 section, to the economic difficulties of the European coal sector. Contrary to the image suggested in Graph 12, for most of EU's coal-fired capacities, 2021-2030 will be the last decade of operation.

Of course, the regulations introduced by the GEO 114/2018 have a massive impact on the coal-based electricity generation, yet they also affect all the other types of electricity generation. For a rigorous differentiated assessment on the medium-run, a quantitative modelling is required.

5. Recommendations

To improve the NECP draft, we make the following recommendations:

- The NECP draft must be accompanied by a detailed methodological annex that presents transparently and rigorously the source of the data, the modelling tools, the scenarios and their assumptions. The charts and figures resulting from calculations other than a quantitative modelling must come with clear indications on the underlying data and assumptions.
- Since the NECP draft, as well as the Energy Strategy 2019-2030, are based on the results of the PRIMES 2016 modelling realized in the making of the Energy Strategy 2016-2030, more clarity and rigor are needed in establishing the correspondences between the scenarios run for Romania with the PRIMES model suite in 2016, and those insufficiently specified of the NECP draft (WEM and WPM). Otherwise, confusions, misleading analogies and suggestions, as well as unwarranted conclusions regarding the optimal policies and programs can be generated. These can go as far as improper prioritization, on erroneous cost considerations, of energy mix components that are, in reality, inefficient, polluting and clearly contrary, in the long-term, to the EU's energy and climate policies.
- Policies and priority actions advanced in support of the different operational objectives should, as far as possible, be linked to concrete action plans. Also, the existing legislation and regulation framework in which they are embedded must be accompanied by evaluative analyses, indicating the risks and the difficulties in the energy sectors, as well as opportunities and development potential. Such elements can be collected and systematized on a qualitative level through public consultation sessions with experts and stakeholders. Substantive public consultation should become a common practice both in the making of the NECP, and the following progress reports.
- Since the EU's RES and energy efficiency targets for 2030 have been significantly increased in 2018, and because there have been major legislative and regulatory changes in the Romanian energy sector, the NECP project to be completed in 2019 must be based on a new, dedicated quantitative modelling, based on the latest statistical data and scientific results. Thus, even the recent changes by GEO 114/2018, which will be in force until March 2022, are so extensive that it is fully justified to include them in the reference scenario of a new quantitative modelling for 2021-2030. The results of an energy-climate modelling adapted to the new EU policies will allow for a much more convincing support of the strategic position adopted by Romania in the consultations on NECP with the EC and the neighboring EU member states.

About EPG

The Energy Policy Group (EPG) is a Bucharest-based non-profit, independent think-tank specializing in energy policy, market analytics and energy strategy, grounded in 2014. EPG's regional focus is Eastern Europe and the Black Sea Basin, yet its analyses are informed by wider trends and processes at global and EU levels. It relies on the best specialized data sources, as well as its own research concerning energy security and strategy, technology, markets, geopolitics and political risk.

EPG promotes a technologically advanced, secure, sustainable and socially acceptable energy system. The views it defends are self-standing and evidence-based. EPG seeks to facilitate informed and impartial dialogue between public decision-makers, energy companies and associations, and the broader public. It looks at governmental energy policies and their effects, at market events and tendencies, and at broader strategic processes with economic, security, and environmental impact.

EPG partners with think-tanks, universities, research institutes, associations, foundations, and media platforms in order to more efficiently participate in the construction of a smart, cooperative, mutually beneficial, resilient energy system in Romania and the region, anchored in the EU energy and climate policies.

www.enpg.ro, office@enpg.ro