CODE OF GOOD PRACTICE FOR RENEWABLE ENERGY IN ROMANIA

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rwea 15 YEARS
Romanian Wind Energy Association

RPIA
Romanian Photovoltaic Industry Association

Our mission:

The ***Code of Good Practice for Renewable Energy in Romania***, initiated by RWEA and RPIA is destined **for all interested public and private actors and parties** and it is meant to open the path for what aims to be the most sustainable wave of investment in renewable energy.

The Code **provides guidance to existing and potential investors** and looks at the process of developing and implementing renewables projects - from licensing to network connections and retrofitting.

Another objective of the Guide is **to expand cooperation with the relevant authorities in this field**, through suggesting means of integrating the energy transition and the EU agenda in Romania's geopolitical and geoeconomic plans and objectives.

Last but not least, ***The Code of Good Practice* looks at future-proof technologies** and how to attract new players in the national production and service chain.

Foreword

Liviu Gavrilă
Vice President,
RWEA

Andrei Manea
Executive Director,
RPIA

Meeting the energy demands of daily life stands as a paramount challenge and opportunity in the 21st century. In light of the pressing issues of climate change and the depletion of fossil resources, it becomes imperative to seek sustainable and efficient solutions, thus securing a brighter future for both current and forthcoming generations.

For Romania, the current momentum represents a huge opportunity to let its renewable industry drive and support economic growth. An energy system based on green resources, with a developed and digitized grid, smart technologies, and job opportunities, is how the future will look if we continue on the right path. For the companies in the industry, this could be an incredible growth period that will create value for all stakeholders: customers, communities, shareholders, and employees. For the consumers, this will bring empowerment.

Nonetheless, the energy transition is not an overnight occurrence; rather, it unfolds gradually, with each of us playing our designated roles. Industry associations, in particular, bear the crucial responsibility of channeling their collective efforts toward surmounting prevailing barriers. One of the challenges, on which depend the level of national ambitions and the associated benefits, is related to the fact that the national targets assumed through the National Energy and Climate Plan are significantly below the natural potential of our country.

The national contribution to the value chain is limited, with most of the equipment for both wind and solar technologies being imported. Legal predictability remains a challenge; grid development is not accelerated enough to bring all the electricity from the wind and solar power plants to consumers; finding a qualified workforce is still a difficult task. All these challenges are putting Romanian climate change ambitions at risk.

What if we transform all these challenges into opportunities using the free, unlimited, and green resources of the sun and wind which are abundant in our country? The following years represent the perfect moment for us to start making the most of the energy transition leveraging the current geoeconomic and geopolitical opportunities.

With all this in mind, let's not forget the main goal set in the first ***Code of Good Practice***: to build a world where we will not think about "renewable" energy but just about energy, because all the energy will be green.

Summary

1 Regional highlights: opportunities and challenges in the new geopolitical context

Solar and wind energy in Romania and in the region

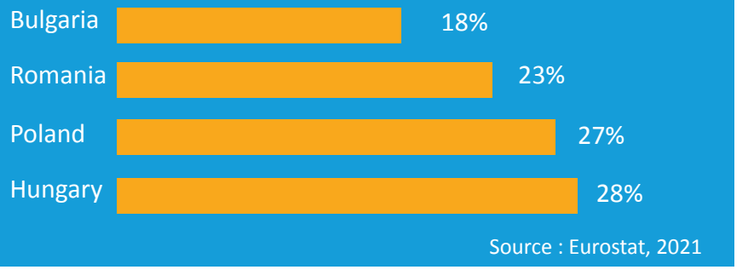
Renewable energy sources (RES) are of critical importance for achieving Europe's goals of reducing dependence on fossil fuel imports and decarbonizing by 2050, at a geopolitical juncture where EU interests in energy security and climate change prevention have become fully aligned.

In response to energy market difficulties caused by the war in Ukraine, the EU has advanced REPower EU (2022), following the European Green Deal approved in 2020. The RePower EU targets aim to install 600 GW of solar energy and double wind capacity to at least 480 GW by 2030. To this end, Member States will designate zones for accelerating the deployment of these technologies, so-called "acceleration areas" for RES. On the same note, the revision of the Renewable Energy Directive includes the EU target of 42.5% of total gross energy consumption in 2030 coming from renewable energy sources, with the aim of reaching even 45%.

This principle has a domino effect in EU Member States, including Romania and Eastern European countries such as Poland, Hungary, or Bulgaria, which are in the process of updating the National Energy – Climate Change Plans and, implicitly, the RES targets.

At regional level, Romania had in 2021 the second lowest share of solar and wind in the total installed capacity - 23%, below Poland (27%) and Hungary (28%).

Share of RES (solar and wind) in total installed capacity (%), 2021



Source : Eurostat, 2021

In terms of net installed RES capacity, in 2021 Romania ranked second in the region (4,409 MW) after Poland (14,383 MW). However, as a share of RES in the total installed power generation capacity, Romania ranks third, after Hungary and Poland.

There is an obvious need to review the elements that have blocked, for several years, investments in RES in Romania and to accelerate the process of attracting these investments, particularly as the decarbonization objectives for 2030 require new solar and wind capacities ranging between 10 and 17 GW.

A number of steps have recently been taken in Romania, including:

1. **amendment to the Law 18/1991 on the land fund** (2022) on the development of RES projects on agricultural land,
2. **amendment to the law on authorizing construction works (Law 21/2023)**, eliminating the requirement to obtain urban planning documentation (PUZ) for RES projects built outside the locality built-up area,
3. **financing projects through European funds**, including from the National Recovery and Resilience Plan (NRRP),
4. **the Long-Term Strategy proposal aimed at installing new RES capacities** of approximately 10.6 GW, respectively 6.6 GW (solar) and 4 GW (wind),
5. **the Contracts for Difference (CfD) proposed scheme**,
6. **the proposed wind energy law**, involving a target of at least 3 GW installed by 2035,
7. **the Hydrogen Strategy proposal**, which aims to install 3.9 GW of water electrolysis capacity and 7.9 GW of RES capacities.

Some results are already visible. For example the evolution of prosumers between 2021 and 2023, with an increase from 13,000 installations in 2021 to an anticipated 140,000 for 2023 and an installed capacity of 1 GW, respectively (for more details, see page 41). On the other hand, a limiting factor is represented by the challenges posed by the transmission and distribution systems. For example, according to Transelectrica's forecast by 2026, 2,500 MW of new solar and 500 MW of new wind could be installed, given ongoing projects.

Power capacities installed in RES

The overall picture of the Central and Eastern European region shows significant differences between countries, both in terms of installed capacity and technology mix. In general, there is a correlation between cumulative capacities installed and country size. Romania maintains a leading position at regional level, with clean energy sources installed representing just over 59% of the country's total capacity, according to data provided by the National Energy Regulatory Authority (ANRE).

Technologies

Various strategies have been developed over time and various geopolitical and economical factors shaped a particular mix of RES technologies for each country: Romania and Bulgaria favoured the hydropower technology, due to their generous hydrographic network, while Poland and Hungary turned to solar and, to a lesser extent, wind.

Support schemes dedicated to the renewable energy production sector

A support scheme based on green certificates combined with mandatory quotas was opened, in Romania, to projects commissioned until 31 December 2016. No other support schemes are currently available, except for European financing under various funds (Recovery and Resilience Fund, Environmental Funds). A new CfDs support mechanism has been announced and it is expected to have the first auction launched soon (however, no legislation has yet been adopted).

In Poland there several different support schemes dedicated to the RES sector: (i) RES auction system (the most popular support mechanisms for wind and photovoltaic electricity generators), (ii) funding from the National Fund for Environmental Protection and Water Management, (iii) excise duty exemption for electricity generated from RES, (iv) lower grid connection fee and (v) corporate power purchase agreements (cPPA)-based funding.

In Hungary, as of 2017, METÁR, a new subsidy system, was introduced to support renewables-based electricity generation. Power plants which intend to apply for METÁR green subsidies submit bids on the regular auctions organized by the Hungarian Energy Authority. The METÁR subsidy is the difference between the subsidized (bid) price (specified by developers of renewable projects) and the reference price, where the reference price is the hourly market price on the HUPX (Hungarian Power Exchange) day ahead market.

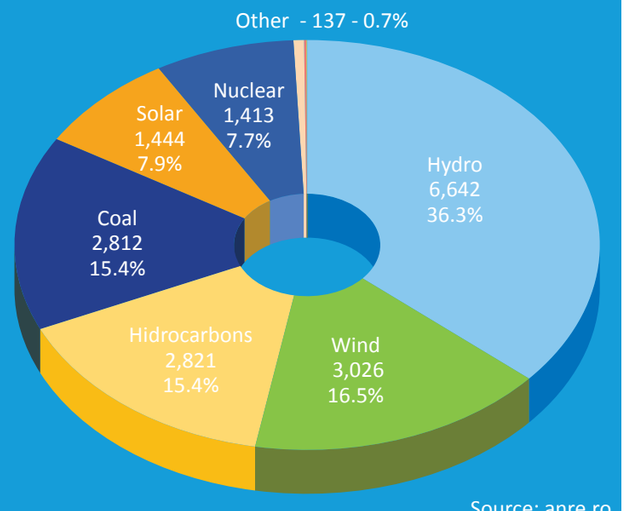
In Bulgaria, RES commissioned after 1 January 2021 are released from the obligation of paying the 5% of their income contribution to the Energy System Security Fund.

Breakdown of installed capacities in Romania 30.07.2023

Other	
Biomass	106
Biogas	21
Waste	6
Residual heat	4
Geothermal	0.05

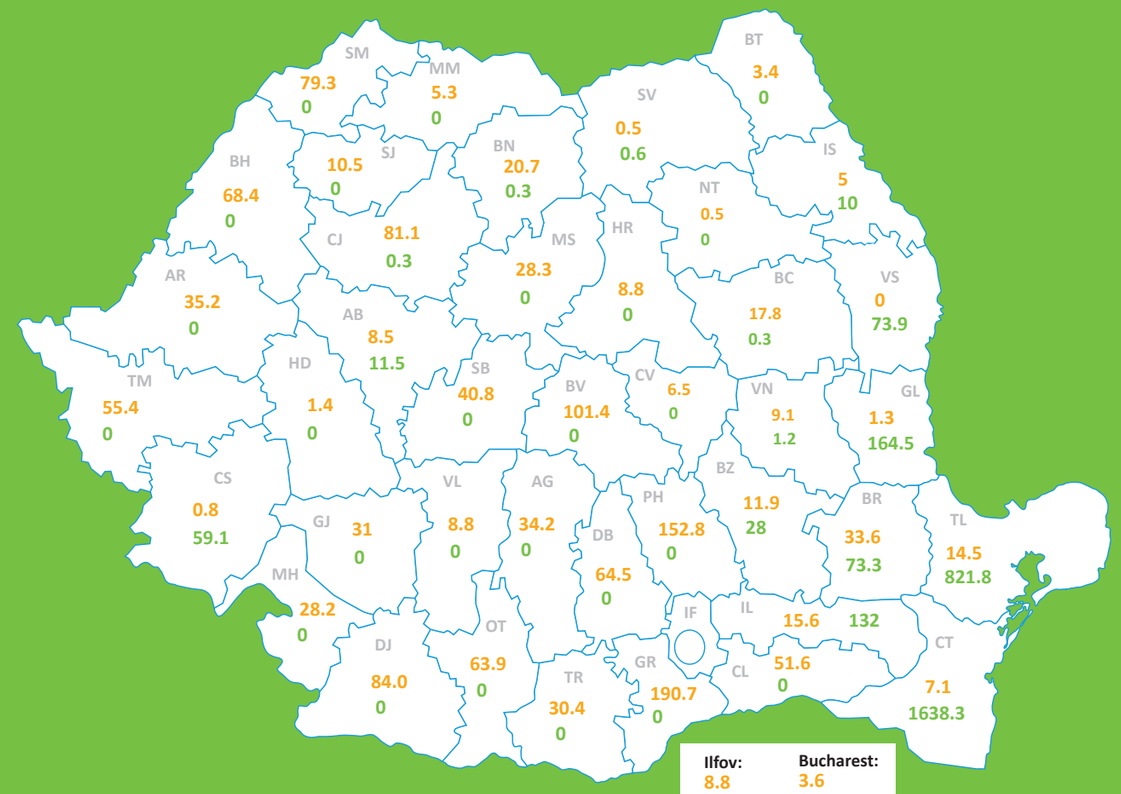
Installed power in electricity generation capacities - **18,298 MW**

Installed power in clean energy capacities - **11,239 MW**



Source: anre.ro

The map of wind and solar power generation capacities installed in Romania



Total installed capacity from solar source at the end of April

1,425 MW

Total installed capacity from wind source at the end of April

3,015 MW

Data on installed capacities until the end of April 2023, Transelectrica

Mechthild Woersdoerfer
Deputy Director-General responsible for coordination of the just and green energy transition

Romania needs to set more ambitious national targets and accelerate the development and commissioning of new renewable energy capacity. The current revision of the **National Energy and Climate Plans** *is the perfect opportunity for this. The Commission encourages Romania to review its contribution to be in line with the increased EU 2030 renewable energy target and to put in place policies and measures that are sufficient to achieve this revised national target.*

For more information, see
https://energy.ec.europa.eu/index_en

Statement

DG ENER: Romania needs more ambitious targets for the renewable energy

The global developments we have seen in the last couple of years have made us realize the importance of a secure domestic energy system. Renewables need to be the backbone of this energy system to enhance our energy security without compromising our energy and climate targets.

The *REPowerEU plan*, presented in 2022, clearly recognizes the key role that renewables can play in phasing out Europe's dependency on Russian fossil fuels and puts them at the center of our energy system. As part of this plan, the Commission made a proposal to review the Renewable Energy Directive, on which an agreement between the European co-legislators has recently been reached.

In addition to a new, more ambitious overall EU target for renewables by 2030 - at least 42.5% of the energy mix, with an aspiration to reach 45% (up from the previous 32%) - the new Renewable Energy Directive also introduces sub-targets for sectors: heating and cooling, district heating and cooling, buildings, industry, transport, and bioenergy sustainability. To achieve these new 2030 renewable energy targets, we will need over 1,000 GW of total wind and solar capacity by 2030, which means adding about 1.5 times more wind and solar capacity than we have now by the end of the decade.

To meet these targets, the deployment of renewable energy projects needs to happen at a faster pace. The Clean Energy Package, agreed in 2018, already put forward measures to accelerate and simplify permit-granting procedures for renewable energy projects. The provisionally agreed Renewable Energy Directive also tackles this issue in a comprehensive way through spatial planning, simplification and shortening of procedures. For example, Member States are required to designate "renewables acceleration areas" where permitting procedures will be even shorter. Member States must ensure that, in these areas, renewable energy projects can be implemented quickly without compromising the environment.

Earlier this year the Commission also proposed a targeted revision of the *Electricity Market Design* to cushion the impacts of the energy crisis. The Commission has proposed to reinforce long-term contracts – two-way contracts for difference and power purchase agreements - to decouple the prices paid by consumers from the short-term electricity market, where the price of fossil fuels has a strong and direct impact. Moreover, to help small consumers, the proposal includes measures to allow and encourage widespread energy sharing. These measures, which are still under negotiation by the co-legislators - European Parliament and the Council - will also contribute to accelerating the deployment of renewables.

So, what is the situation in Romania? **The *Commission's assessment of Romania's NECP* showed that Romania's share of renewable energy to contribute to the EU's 2030 renewable energy target (32% at that moment) requires more ambition**. The *Commission's 2023 Country Report* showed that Romania saw a 0.15% growth in renewable energy capacity in 2021 as compared to 2020's capacity, mostly in solar energy and with no new wind installations. **Romania needs to set more ambitious national targets and accelerate the development and commissioning of new renewable energy capacity.**

The current revision of the *National Energy and Climate Plans* is the perfect opportunity for this. The Commission encourages Romania to review its contribution to be in line with the increased EU 2030 renewable energy target and to put in place policies and measures that are sufficient to achieve this revised national target.

To accelerate the deployment of renewables, there are several actions that Romania can take as well as European financial instruments that the country can benefit from.

Ensuring full implementation of the EU's renewable energy legislation is key for this purpose. This means not only timely implementation of the new provisions contained in the newly revised Renewable Energy Directive and the new Electricity Market Directive once adopted, but also fully implementing the *2018 Renewable Energy Directive* and *2019 Electricity Market Directive*. The deadline for transposition for these two has already expired and the Commission has opened infringement proceedings against all Member States.

The Commission, as part of the REPowerEU plan, published a Recommendation and Guidance to Member States on speeding up permit-granting procedures and facilitating power purchase agreements. Both cover issues such as administrative deadlines, the use of one-stop-shops, public acceptance, or practices on spatial planning. Romania can make use of these recommendations, they were designed to allow Member States to implement them within their current legal frameworks.

On European financial instruments, Member States are already benefitting from the *Recovery and Resilience Facility*, the EU's instrument to support the economic recovery from the coronavirus pandemic and build a greener, more digital and more resilient future.

In total, **Romania will benefit from EUR 14,240 million in grants and EUR 14,942 million in loans.**

Approximately 57.2% of these funds will contribute to the green transition in Romania and will allow, amongst other things, for the permitting procedures for renewables to be simplified, at least 3 GW of renewable energy (wind and solar) and 240 MW of new electricity renewable storage capacity to be installed, and green hydrogen to be generated.

Member States are now preparing or have already prepared their REPowerEU chapters to be included in their National Recovery and Resilience Plans, through which the facility will help them make the necessary reforms and investments to phase out their dependence on Russian fossil fuels. High ambition in renewables is of crucial importance to achieve this objective.

Last but not least, climate education is the key to a better understanding of our impact on the planet's resources and the way forward towards economic growth while protecting our environment. We encourage Romania to take advantages of all these opportunities with increased ambition, accelerate the deployment of renewables and, thus, contribute to a successful energy transition.

On behalf of the European Commission's Directorate-General for Energy, I am glad to have the opportunity to provide an overview of the clean energy transition and the key role that renewable energy will play in the future – in Romania and the whole of the European Union. There is a lot happening in the sector and so I welcome this publication of a *Code of Good Practices for renewables in Romania*.

Sebastian Burduja
Minister of Energy

Romania's strategic objectives in the field of energy are to ensure energy security, while trying to reduce dependence on Russian resources, to secure a sustainable price for the consumer and fulfil the commitments in the field of climate change.

Renewable resources and energy efficiency are powerful tools in this regard, but they are not the only ones: for significant investments in new renewable capacity will translate into more investments in the grid infrastructure, storage capacity and other low-carbon technologies such as hydro, nuclear and hydrogen.

In the PNRR, the share of renewables was set to increase compared to the target foreseen in PNIESC, to

34%

Renewable energy, nuclear investment, gas a transition source, green hydrogen and modern transmission infrastructure

I am often asked how I see the energy sector developing in Romania. There is only one answer: the energy transition is happening and it is here to stay. Not only do we want safe and cheap energy, we also want green energy. We are about to witness the largest investments in renewable energy generation capacities with very ambitious targets. In order to ensure its energy independence and security, Romania aims to reach 10 GW of renewable energy by 2030, to enhance the production from other energy sources. As recently announced, investments in offshore wind energy will contribute to this number - we have a huge potential in the Black Sea, of over 75 GWh, according to the estimates of World Bank experts. On an equal footing, we are investing in the transmission and storage infrastructure, in order to balance the energy system. It is also very important to mention the building of the Green Corridor, that will connect Azerbaidjan, Georgia, Romania and Hungary thus contributing to the energy security of Europe. In this context, the ***Code of Good Practice for Renewable Energy*** comes at the right time in order to give a complete perspective of the industry and to support its sustainable development.

Romania has committed to phase out coal by 2032

The national strategy includes converting large coal-fired generation sites into modernized energy hubs for natural gas, solar and ready-for-hydrogen power generation to cut emissions and balance the system, while increasing the share of renewable sources in the national mix. The production and use of hydrogen is also important in ensuring energy security and the decarbonisation of the sectors with the highest greenhouse gas emissions such as transport, industry, etc. The adoption of the Directive of the European Parliament and of the Council on common rules for the internal markets in renewable and natural gases contributes to the creation of appropriate market conditions for the transition in the gas market, while increasing competitiveness, protecting consumers, and achieving climate neutrality.

A very important step for Romania and Europe's energy security is the signature of the Agreement for a Strategic Partnership in the field of green energy development and transmission by the Governments of the Republic of Azerbaijan, Georgia, Hungary and Romania. The start of operations of the "green corridor" – the Black Sea Green Electricity submarine cable - shows that regional cooperation will succeed in diversifying energy supply sources both through the development of new transmission infrastructures and through joint projects for the development of green hydrogen and energy efficiency. The agreement provides the financial and technical framework to complete the submarine cable project, in order to ensure the transmission of electricity from renewable sources between Romania and Azerbaijan, via Georgia and the Black Sea, and subsequently the transmission of this energy to Hungary and the rest of Europe, through the European transmission system.

Key measures to increase the generation and use of green energy in Romania

National priorities in the field of energy focus on the new investments needed to increase the share of renewable energy in the energy mix, including tapping the potential of offshore renewable energy in the Black Sea, large-scale electricity storage and the use of hydrogen to decarbonize hard-to-electrify sectors. Through the PNIESC, Romania proposed a share of energy from renewable sources in the total energy consumption of 30.7% in 2030. Considering the new targets of the European Commission according to the REPowerEU plan, i.e. increasing the share of renewable energy in the total gross consumption at the level of the European Union from 40% to 45% by 2030, Romania is updating the PNIESC, which will propose a new target for renewable energy. A first step was taken through the PNRR, where the share of renewables was higher compared to the target set by PNIESC, namely 34%.

To achieve this target, investments are envisaged in new generation capacities of 950 MW of electricity from renewable sources (solar and onshore wind), with an earmarked budget of 460 million euros. Moreover, the PNRR foresees the introduction of "Contracts for differences" (CfD) as the main way of encouraging investments in new energy capacities, based on clean technologies. The purpose of the mechanism is to ensure revenue predictability to encourage investments in technologies with low carbon emissions. the Beneficiaries will have the certainty of obtaining a certain level of revenue guaranteeing the return of the initial investment.

Considering the need to reach much more ambitious targets than those set at present, on December 30th, 2022 the Romanian authorities pre-notified COM about a CfD mechanism to support the installation of 10 GW in renewable electricity from onshore wind and photovoltaic sources; the Modernization Fund would ensure the necessary liquidity.

The Modernization Fund (MF) will support low-carbon investments in energy systems - at least 70% of FM resources can be used to support "priority investments".

The first call for projects from renewable sources within the FM was recently open for public consultation for a total capacity of

766 MW split in:
153 MW onshore wind
470 MW photovoltaic
55 MW hydro
59 MW biomass
29 MW geothermal

The estimated budget of the scheme:
550 millions of euros

Following the Commission guidelines for the CfD scheme under the Temporary Crisis and Transitional Framework (TCTF) for State aid measures meant to support the economy following the Russian aggression against Ukraine, that enables quick decisions in approving state aid schemes, the Romanian authorities re-examined their approach and pre-notified, at the beginning of this month, the first part of the initial scheme. It covers a capacity of 5 GW, organised in two bidding rounds - in 2023, (2 GW the first bid - consisting of 1 GW solar and 1 GW wind) - and in 2025 (the remaining 3 GW in the second bid, comprising 1.5 GW wind and 1.5 GW solar energy), using the TCTF. The call for projects for the remaining 5 GW will take place after 2025.

As for the transmission system, the first nine financing contracts from the Modernization Fund were signed, in October 2022 with a view to implementing investment objectives of particular importance for the development of the national energy infrastructure. The contracts were signed between the Ministry of Energy and Transelectrica, for the construction of new overhead power lines and their interconnection to the National Energy System, the construction or refurbishment of new power stations, the optimization of overhead power lines, including through the installation of online monitoring systems (Smart Grid), and the digitalization of the electricity transmission grid.

At the same time, the projects financed through the Modernization Fund will contribute to increasing the interconnection with the European energy system, as well as to the development of Romania's electricity transmission grid and to the security, flexibility and adequacy of the National Energy System, providing the premises to commission new renewable energy generation capacities.

The benefits of the investments will be reflected in relevant indicators: increasing the transmission capacity of the grid by about 1,700 MW, installing around 480 kilometres of new overhead power lines, the expansion of 5 stations with a voltage of 400 kV, re-engineering - for the first time in Romania - the Alba Iulia station into a digital concept, increasing the interconnection capacity by 600 MW (cumulative on the borders with Serbia and Hungary), implementing electricity quality monitoring systems in 15 stations, as well as optimizing and monitoring overhead power lines through digital systems.

Current targets for wind and solar energy generation

According to PNIESC, Romania aims to have reached, by 2030, a net installed capacity of

3.7 GW of solar energy
2.3 GW of wind energy

Romania will develop additional SRE capacities of approximately

6.9 GW to reach the ambition target regarding the 30.7% share of energy from renewable sources by 2030.

The PNRR includes an estimated capacity of

3,000 MW electricity obtained from renewable sources (wind and solar) to be installed and connected to the grid by June 30, 2026 based on all available funds (PNRR, Modernization Fund), the introduction of new market instruments (PPA, CfD) and improved legislation.

When will the first MW from offshore wind sources be produced ?

Romania has a medium-speed wind resource that the World Bank's Energy Sector Management Assistance Program (ESMAP) characterizes as having a technical potential of 76 GW (22 GW using fixed foundations on the seabed and 54 GW using floating foundations). The report explores the impact of two different possible offshore wind growth scenarios, chosen to cover realistic options for Romania in the context of its future electricity needs, covering a reasonable range of possible paths, based on understanding other emerging and mature markets in terms of wind energy. The purpose of the scenarios is to be able to take into account the industry's effect on costs, consumer benefits, social and environmental considerations, economic benefits and other aspects in a quantifiable way.

Based on the experience on other markets, the capacity will most likely be installed as early as 2030, according to two scenarios:

1. **Low growth scenario** - wind power development in line with the existing Government's intention concerning renewable energy sources, where 3 GW covers 16% of Romania's electricity needs by 2036.

2. **High growth scenario** - 7 GW of installed wind power, where offshore wind supplies 37% of Romania's electricity needs by 2036.

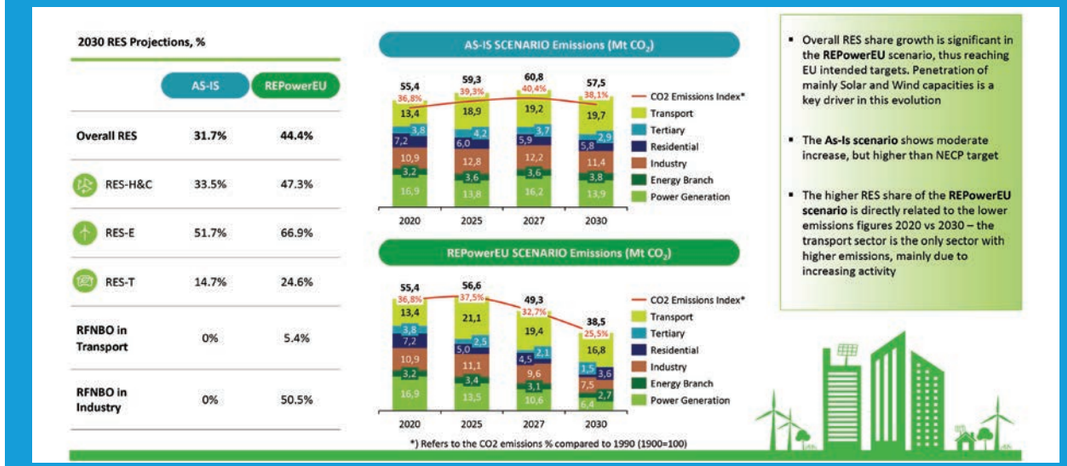
The low growth scenario includes 5 projects. In the high growth scenario, new capacity is installed each year, reaching an average installation rate of 1.5 GW per year by 2035.

The targets Romania should take on for 2030

As an EU member state, Romania should align to the efforts of the community block to reach carbon neutrality by 2050 by contributing to the targets set at European level. The most recent goal is included in the RePowerEU programme and stipulates a target for renewable energy in the final gross consumption of the EU of 42,5% in 2030. At the moment, according to the data included in the PNRR, Romanian authorities are planning on a percentage for renewable energy in the total mix of 34% in 2030, an increase compared to 30.7%, the level established in PNIESC. The target is not ambitious enough, as shown by the Deloitte study commissioned by RWEA and RPIA. According to its results, Romania should reach a level of 44.4% renewable energy in 2030 in order to contribute to the REPowerEU plan.

The calculations in the study are based on two scenarios: one where Romania follows its own Energy and Climate Change Plan (also called the a AS IS scenario) and one where the renewable target for 2030 is set at 44.4% of the final gross consumption of power, in line with the REPowerEU guidelines (called the RePowerEU scenario).

Study Results – Renewable Shares

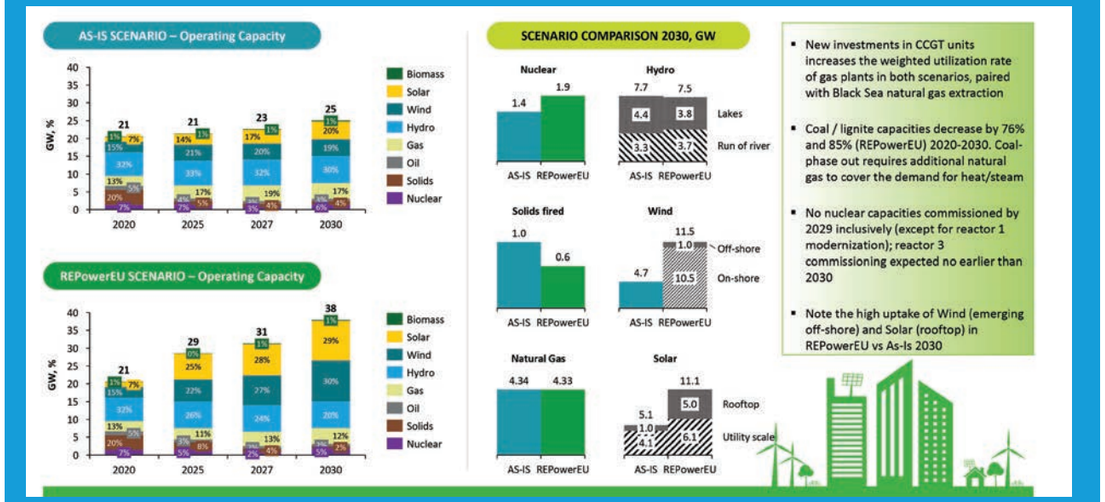


Source: Deloitte&E3M – Renewable Energy in Romania – Roadmap to 2030 – report for RWEA&RPIA

Thus, whereas the AS IS scenario contemplates a total installed capacity of around 25 GW, the RePower EU scenario takes into account the need to decarbonise several economic and residential processes, where electrification plays an essential role: the installed capacity for electricity production of the grid should reach 35 GW in 2030. Moreover, whereas PNIESC indicates a target of 4.7 GW installed in wind capacity, the RePower EU scenario points to the need of an installed power of 11.5 GW, out of which 1 GW offshore. At the same time, while PNIESC mentions a target of 5.1 GW installed in photovoltaic capacity in 2030, (out of which 1 GW in "rooftop" solutions) the Repower EU scenario points to a need of 11.1 GW installed in photovoltaic sources, out of which 6.1 GW in"utility scale" solutions and 5 GW in "non-utility" solutions, mostly rooftop.

There are no figures for the capacity that needs to be installed to power with green energy the electrolyzers necessary to produce hydrogen, as part of the effort to decarbonise transport, "hard to abate" industrial processes and other similar applications.

Study Results – Electricity Supply

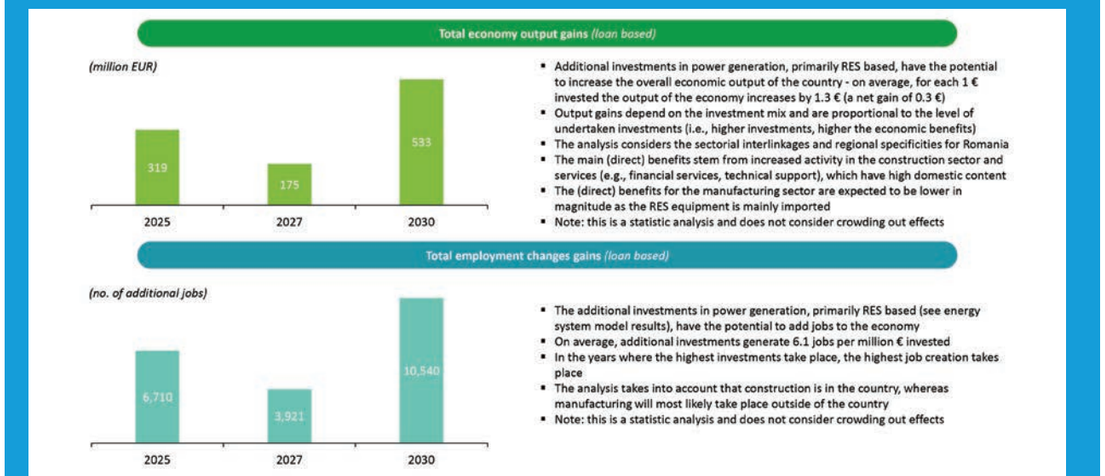


Source: Deloitte&E3M – Renewable Energy in Romania – Roadmap to 2030 – report for RWEA&RPIA

The results of the Deloitte study show that if Romania follows the REPowerEU scenario, then it will become a net electricity exporter. In the AS IS scenario, the country will still depend on imports in order to cover domestic consumption. Moreover, additional investments in generating electricity, mostly from renewable sources, will translate into overall economic growth and jobs. The Deloitte report shows that, on average, for every invested euro, the economic production goes up by 1.3 euros (a net increase of 0.3 euros).

Moreover, additional investment in electricity produced mainly from renewable sources will lead to a greater potential of generating jobs in the economy. On average, every invested million euros will generate 6.1 jobs..

Yearly economic gain between 180 and 520 m€ and 4-10,000 jobs could be achieved



Source: Deloitte&E3M – Renewable Energy in Romania – Roadmap to 2030 – report for RWEA&RPIA

The renewable energy value chain in the region

Giles Dickson
CEO WindEurope

"Romania has the right qualities for an even bigger supply chain there. Your workforce has the right profile, and you have the right ambitions for expansion.

The Romanian Government needs to ensure all the future projects will go ahead to facilitate the expansion of the supply chain there too.

European jobs in the industry need to grow from
300,000 to 450,000 by 2030

The European Union wants a massive expansion of renewables. And wind energy is crucial for that. Without it we cannot reach Europe's energy security and climate targets. Wind should provide 43% of Europe's electricity consumption by 2030 – up from 17% right now. To achieve this we need to build 28 GW of new wind farms each year.

Romania contributes to this with its 3 GW of wind energy capacity already. Your wind farms generated 12% of the country's electricity demand last year. And although there has been a standstill on the market for several years projects are being developed again. The Government is planning to move forward with auctions using Contracts for Difference soon. They are working on a legal framework for offshore wind too. And the Government intends to raise the 2030 RES electricity target from 30.7% in their current National Energy and Climate Plan to between 34% and 38%. With over 1.6 GW of new projects in the pipeline between now and 2027 the country is heading in the right way.

So, Romania is getting back on track. This is great news. Apart from putting more green electricity into the system, wind also contributes to the economy in other ways. It can potentially reduce electricity prices by almost a third in the region. Each new turbine generates €13m in economic activity. And the industry provides new job potential.

There already are factories across the country that produce bearing systems, generators, control systems, gearboxes, tower sections and more. But there is potential for even more production sites and more jobs. Initiatives such as the reskilling of coal miners in the Jiu Valley to work in the wind industry are therefore great initiatives.

The European Commission also wants to ensure that the wind turbines of the future are produced in Europe. Earlier this year they proposed the Net Zero Industry Act (NZIA) which aims to support investments in manufacturing capacity in 'net-zero emissions' technology in Europe. And they relaxed the State-Aid Guidelines for national investments in clean tech manufacturing. This is only temporary, but Governments are allowed to support CAPEX investments in their national clean tech supply chains.

Romania can also benefit from this and expand what you've got right now. Nearly all wind farms Europe has built up until today use turbines made in Europe. But we need to work to keep the existing supply chain healthy and expand it to reach our targets.

Some countries in Central and Eastern Europe already created a steady job flow by developing their wind industry. Poland for example started developing their first offshore wind farms recently. Industry also followed. Vestas is now building a new nacelle factory at the Polish coast creating 700 new jobs. The support of public authorities was a huge boost for Vestas to build a factory here. Polish developer Orlen will also build an offshore wind installation port.

Your neighbor Hungary on the other hand does not have any ambitious wind targets. They are not building any wind farms and as a result they don't have any wind energy industry in their country either. Bulgaria is in a similar situation. It does not have a lot of renewables capacity and therefore no big supply chain either. The supply chain does go there where a lot of wind farms are being built.

The Romanian Government can't make the same mistakes they have in the past. The introduction of the price cap last year was a big error. It was toxic for the investment climate. It generated mistrust and undermined the financial ability for companies to invest in new projects.

Grid expansion will also be a major challenge. Transelectrica needs to take a flexible approach to the award of grid connection permits so the new wind farms can feed more green electricity into the grid. And although permitting is relatively quick in Romania compared to other countries, it is also crucial that the principles from the new Renewable Energy Directive get implemented and transposed to local level as soon as possible for an expansion that is as quick as possible. If Romania gets it right, you will benefit greatly from more wind in multiple ways.

The importance of developing the renewable energy supply chain in Romania

The development of RES entails socio-economic benefits through the creation of jobs in production, construction, operation, and maintenance, with a multiplier effect on other sectors, in addition to the role of clean energy supply and maintaining energy security.

Accelerating RES development among EU Member States poses several challenges both with regard to the value chain and in terms of the human resources needed, with demand growing much faster than supply. Therefore, governments should prioritize evaluating the enduring impact of RES and devise effective strategies to entice investors across the competitive facets of the RES technology value chain.

As mentioned in the previous article, countries such as Poland have managed to attract investors on the component side; for example, Danish company Vestas is building a factory on Poland's Baltic Sea coast that will create a development of nacelles for wind turbines and generate 700 jobs. Similarly, Orlen Group will build the first wind plant installation terminal in Poland.

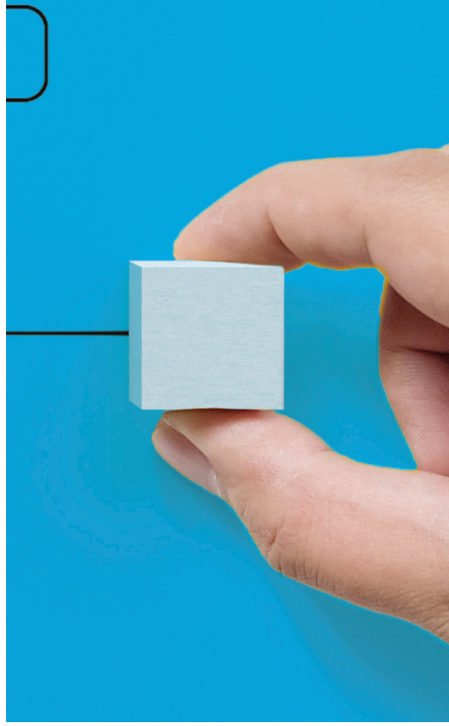
In Romania, a trend of development of the value chain for PV panels was noted in the first wave of investments in RES, namely the period 2010-2013/2014, but the initiatives were timid. With the change in the regulatory framework for developing new capacities, investors' appetite for the value chain has also tempered.

However, several notable public announcements have been made in 2023 on investment projects in the renewable energy supply chain and energy transition technologies. Thus, the German company AE Solar announced in March 2023 an investment of 1 billion euro in a solar panel factory in Romania, with an initial capacity of 2 GW/year that will increase to 10 GW/year after full integration of production flows – one third of total European demand.

There is also an increased investment interest in the battery sector for the automotive industry. Although with an indirect impact on the development of new RES capacities, it is important to point out Romania's competitive advantage in terms of automotive components and the potential to stimulate the RES value chain. The announcement made by German-Canadian company Rock Tech Lithium about the construction of a factory worth 400 mil. euro for refining the raw material for lithium-ion batteries for the automotive industry, and that of the Belgian company Avesta Battery which intends to invest 1.4 billion. euro in a car battery factory in Galati serve as examples.

Even if Romania has initiated through PNRR calls for financing the production of batteries and photovoltaic panels, this appoach must be accompanied by a Romanian authorities' proposal to create an attractive investment ecosystem for segments of the value chains for clean technologies. A strategic approach can be developed through cooperation between InvestRomania and the Department for Industrial Policy and Competitiveness subordinated to the Ministry of Economy, together with the industry represented by RWEA, RPIA and other relevant associations.

Another decisive factor of attractiveness for investments in the value chain is the development of consistent local demand for RES technologies. In this respect, planning clarity in energy policies and public investment support schemes plays an important signal role for investors.



2 Policies and Practices in the Renewable Sector

European legislation

The last two years have been marked by important changes in the national energy legislation, driven also by changes in European regulations. The unprecedented challenges encountered in the recent period have spurred each Member State to prioritize energy independence, coupled with the pursuit of ambitious renewable energy goals. It is expected that, through the NECP (PNIESC), Romania will increase its objectives in order to support the new targets agreed at Union level. In this context, the implementation of tangible legislative measures aimed at streamlining and expediting the expansion of renewable power generation capacities becomes imperative.

Accelerating European renewable energy targets

Combating climate change and promoting sustainable development have been (and continue to be) fundamental objectives of the member states, essentially representing the main considerations in defining EU policies in relation to the evolution of the energy sector and, implicitly, the European targets regarding the reduction of greenhouse gas emissions and increase of renewable energy's share in the gross final consumption mix. However, the unprecedented challenges that the European energy sector has encountered recently have brought to the fore a new essential objective for the member states, namely ensuring energy independence, thus fully justifying an even greater acceleration of the European targets in the field of renewable energy.

Thus, the objective established by Directive 2018/2001 regarding the promotion of the use of energy from renewable sources (RED II Directive), namely the achievement of a renewable energy share of at least 32% of the EU's final gross energy consumption mix, at the level of 2030, although considered ambitious at the time of its introduction in 2018, it has been the subject of several proposals for increases in recent years, initially up to 40% through the proposal for a Directive to amend the RED II Directive, published in 2021, and later up to 45%, through the RePower EU Plan, proposed by the European Commission in May 2022. Recently, the European Parliament and the Council reached a provisional political agreement to increase the mandatory target established by the RED II Directive to 42.5% by 2030, with the commitment to pursue a target of up to 45%.

The implementation of these new commitments at the level of European regulations is expected in the next period as part of the RED II Directive review process, and at the national level, Romania has the obligation to present a proposal to update the National Energy and Climate Plan (NECP) to the European Commission until June 30, 2023, and a final updated version until June 30, 2024. Thus, it is expected that the national objectives established by the NECP will also be increased to support the new targets agreed at the Union level, hence the adoption of concrete legislative measures for simplifying and accelerating the process of developing energy production capacities from renewable sources becoming fundamental in this context.

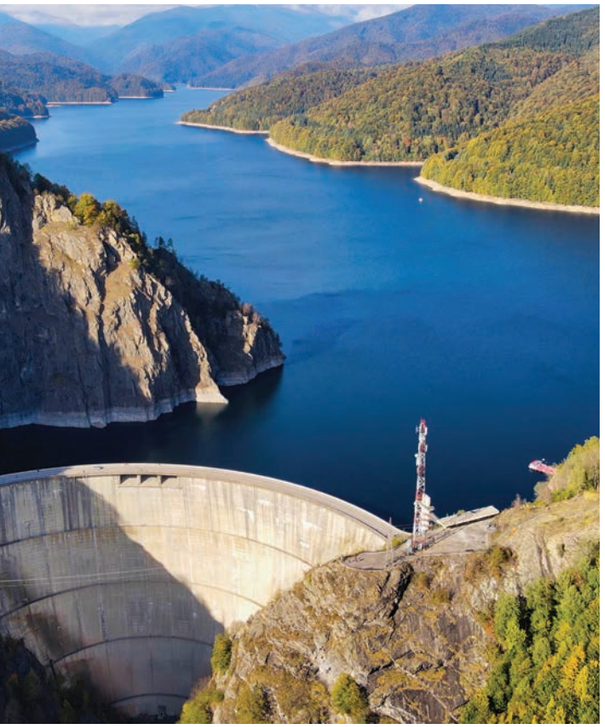
Community regulations and commitments – at the vanguard of the energy transition at European level

1.	**The European Green Deal**	presented for the first time at the end of 2019, it represents a set of policies and commitments anchored around the main objective of achieving climate neutrality at the EU block level by 2050.
2.	**Regulation (EU) 2021/1119 of the European Parliament and of the Council establishing the framework for achieving climate neutrality (European Climate Law)**	implements at the legislative level the commitments assumed under the European Green Deal, including the achievement of climate neutrality by 2050 and reducing net greenhouse gas emissions by at least 55% by 2030 compared to 1990 levels (as an intermediate target).
3.	**RePower EU**	the EU plan to reduce dependence on fossil fuels imported from Russia, within which accelerating the energy transition to replace conventional energy sources with renewable sources is one of the main objectives.
4.	**RES Simplify**	the initiative of the European Commission to carry out a detailed analysis of the main causes that delay or block the development of renewable projects in the member states (as well as Norway and Iceland); an interim version of the report was published last year, and the final version is expected later this year.
5.	**Council Regulation (EU) 2022/2577 laying down a framework to accelerate the deployment of renewable energy**	establishes temporary measures (applicable for a period of 18 months) for member states, in order to accelerate the authorization of renewable projects (including those for repowering operational assets); until 31 December 2023, the European Commission will re-examine the imposed measures and their effects, being able to propose an extension of the application period.
6.	**The RED II Directive (in the process of revision)**	as we stated previously, the expected changes to the RED II Directive would increase to 42.5% the target for the share of renewable energy in the gross final energy consumption mix of the EU, at the level of 2030 (from 32% currently), along with additional measures for specific sectors (transport, industry), as well as providing the necessary levers to achieve these objectives by accelerating the authorization procedures for renewable projects.

Romanian legislation & regulations

Recent developments in energy legislation

The last two years have been marked by major changes in national legislation in the energy sector, fueled in no small measure by Romania's obligations to ensure the compliance of the national legislative framework with EU regulations. As we well know, the main normative act that anchors the legislative framework in the energy sector is the Electricity and Natural Gas Law no. 123/2012 (Energy Law), an act to which considerable changes have been made in recent years, the most notable one being the set of amendments introduced by the Government of Romania through an emergency ordinance adopted in the last days of 2021.



Aiming mainly at the implementation of Directive (EU) 2019/944, this set of changes had a considerable effect on the subsequent evolution of the renewables sector, in particular by:

- clarifying the uncertainties in relation to allowing the conclusion of directly negotiated bilateral contracts for the purchase of electricity (PPA);
- supplementing the incentives offered for prosumers;
- expanding and clarifying the obligations of the transport and system operator, as well as the distribution operators, in relation to drafting and updating of development plans for the electricity grids they operate.

Although the general spirit of these changes was to emphasize the liberalization of the energy market, simultaneously with their adoption and implementation, the energy sector went through a period of increased volatility, exacerbated by the major changes in the geopolitical context since the beginning of last year, with considerable economic implications on the European states, including on Romania. What was called the "European energy crisis" led at the national level to the adoption of a package of emergency legislative measures, with the main purpose of protecting end consumers from the effects of the skyrocketing prices of electricity and natural gas. These emergency interventions, which began at the end of 2021, were later extended, and will be applicable according to the regulations currently in force until 31 March 2025.

Although it can be said that these regulations have had a positive impact by limiting the effects of the energy crisis on end consumers, the method chosen to secure part of the funds necessary for their implementation was the establishment of a mandatory contribution for electricity producers (including those in the renewables sector) – in general terms, the amounts due as a contribution are determined according to the difference between the monthly sale price of the delivered electricity (calculated according to regulated formulas) and a reference price of RON 450 / MWh, this difference being subsequently multiplied by the quantity of actual energy delivered in the month of the calculation, with the result due as contribution. It should be noted, however, that this contribution is not due for capacities put into operation after 1 April 2022.

Overview of the authorisation process

The authorisation legal framework has been changed recently in a significant manner, with the declared purpose of facilitating and speeding-up the permitting process for renewable energy projects. While the recent changes are indeed a well needed step forward, the unclear wording of some provisions and the inconsistent implementation in practice by the authorities still generate hiccups for the investors. As a result of such changes, for renewable energy projects, irrespective whether they are located outside the built-up area or located within the inside built-up area of a locality, the authorisation process can commence directly with the building permit procedure with no prior urbanism documentation (e.g. Zonal Urbanism Plan - PUZ) being required.

Nonetheless, for projects exceeding the limit of 50 hectares located outside built-up area which need to be transferred within the inside built-up area of a locality a Zonal Urban Plan - PUZ for introducing the land within the built-up area of the locality would still be necessary.

The starting point of the new legislative framework can be viewed as being the change of the Land Law 18/1991 in July 2022 (Law 254/2022), which ended a grey area period questioning the possibility to develop renewable projects in the outside built-up area of a locality. At that moment, the Land Law 18/1991 was changed to clearly provide that

Permitting steps diagram:

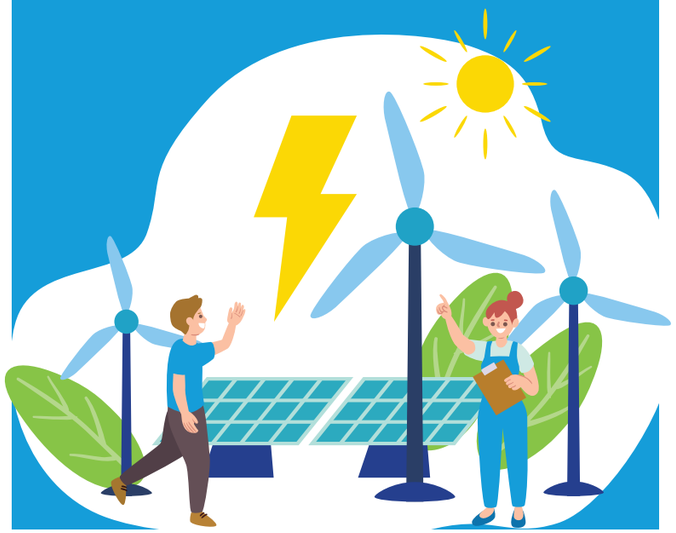
Step 1
Urbanism certificate to introduce land inside the built-up area for projects exceeding 50 hectares limit located in the outside built-up area, followed by obtaining the relevant endorsments and obtaining the Zonal Urban Plan

Step 2
Following the approval of urbanism documentation in step 1 or for projects within the 50 hectares limit located outside the built-up area or projects located within the built-up area of a locality which do not need urbanism documentation – urbanism certificate for the building permit

Step 3
Obtaining endorsements from the various authorities, special attention to environmental authority, ministry of defence and air authority (for wind farms)

Step 4
Obtaining the building permit

Step 5
Commencing construction works – authorities to be notified including some of the endorsing ones such as air authority



renewable energy projects can be developed on agricultural land located in the outside built-up area up to a limit of 50 hectares. The land available for such projects comprise agricultural land of the 3rd, 4th and 5th quality classes, having the category of arable, pasture (newly introduced in Land Law 18/1991 and regulated also through separate pieces of legislation), vineyards and orchards, as well as those arranged with land improvement works. While the legal provision does not detail how the 50 hectares surface should be considered – whether the full size of the land plots or only the affected areas of the land plots (e.g. the areas removed from the agricultural circuit) –, it seems logical and reasonable to apply the limitation to the affected area removed from the agricultural circuit, which will no longer be used for agricultural purposes. This approach would be in line with the purpose of the Land Law 18/1991, namely, to protect the agricultural land. Although no express legal provisions were in place in that respect, as the law did not comprise any restrictions or interdictions on multiple developments outside the built-up area, for larger surfaces of land intended for development of renewable energy projects, an investor could consider structuring its development in separate 50 hectares projects which should, nonetheless, be permitted and operated as standalone capacities independent from each other.

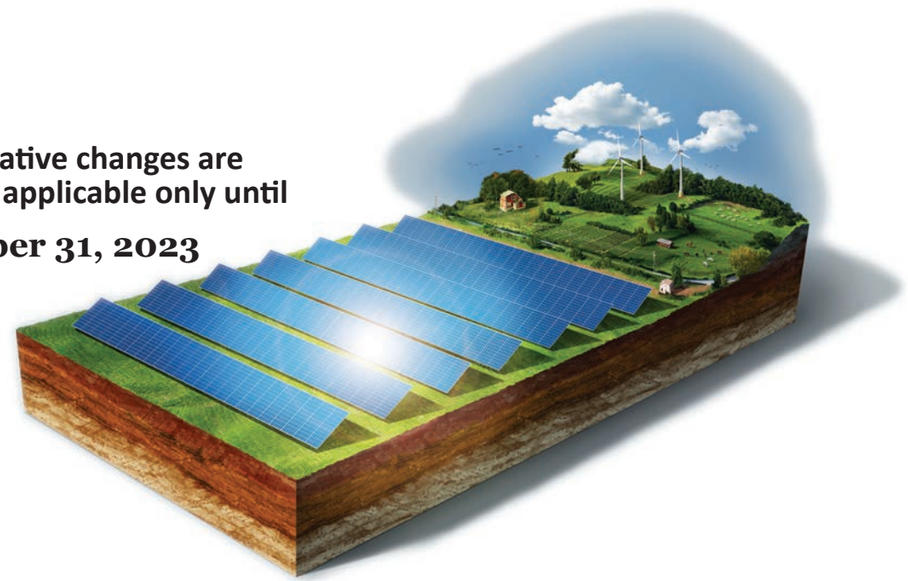
A new concept of "dual use", generally known as **"agrivoltaic"**, was introduced through the same law in July 2022. Except for land with the category of arable use, from a legal perspective, the land needed for the development of renewable projects can be used in a dual system, both for agricultural production and for production of electricity from renewable sources. In these cases, the definitive or temporary removal from the agricultural circuit can be done only for the land surfaces occupied by these investment objectives, the rest of the surface remaining in the agricultural circuit. Thus, not only that the dual use concept concomitantly serves the agricultural and the energy production needs but the tax related to the removal of the land from agricultural circuit will be reduced by being applied only to the project blueprint.

Pursuant to another law that entered into force as well in July 2022 (Law 262/2022), investment projects that can be erected on land located outside the built-up area (which include projects in the field of renewable energy) must start the specific works in less than 5 years from the date of the decision approving the removal of the land from the agricultural circuit. Otherwise, the land is reinstated, by effect of law, in the agricultural circuit.

Subsequently, in January 2023, the construction legislation has been also amended (Law 21/2023)

The legislative changes are currently applicable only until

December 31, 2023



to remove the requirement of obtaining an urbanism documentation (PUZ) for the renewable projects built in the outside built-up area of a locality. Consequently, the permitting process for the 50 hectares projects developed in the outside built-up areas of the localities could commence, as of that moment, directly with the building permit procedure, thus reducing the overall permitting process with a period ranging between 6 and 12 months (the period normally needed to obtain a PUZ) and saving the PUZ preparation, endorsement and approval related costs.

In turn, the renewable energy projects exceeding the 50 hectares limitation did not fall within the projects that can be developed in the outside built-up area. For such projects, a PUZ to introduce the land inside the built-up area and regulate the construction parameters was still necessary. Although, currently, the authorities refuse to endorse this option in practice, we note that none of the legal changes or the existing legal provisions should be viewed as limiting this approach (which was also used before July 2022). As a matter of principle, the refusal to endorse the PUZ to introduce land inside the built-up area and regulate the construction parameters on the basis that only projects up to 50 hectares can be developed is unlawful and could be censored by the courts of law.

The latest legislative change occurred in June 2023 (Law No. 166/2023). As of that moment, no urbanism documentation such as a zonal urban plan (PUZ) is necessary for the permitting of renewable energy projects, irrespective if they are located inside the built-up or outside the built-up area of a locality. Another change brought by Law 166/2023 provides that, if several investment objectives can be developed on one plot of land, an investor can obtain separate building permits for each of the objectives based on only one urbanism certificate. Considering that no limitations or carve-outs are provided on the type and location of the investment objectives that can be developed on one plot of land, it seems that this could be a legal implicit recognition that multiple and separate standalone renewable energy projects, each within the limit of 50 hectares, could be indeed developed on the same plot or on neighbouring plots located outside the built-up area of a locality.

Take note!

With the support of the authorities involved in the various stages of the permitting process, a building permit could be reasonably obtained within a range of one to two years, which is quite competitive, considering similar procedures in other countries. Although still in the early stages of having a fully coherent and comprehensive legislative framework, Romania is making decisive steps towards facilitating a straightforward permitting process for renewable energy capacities.

Aspects regarding securing land

Securing land for renewable energy projects

The lands necessary for the development of projects for the production of energy from renewable sources can be secured in one of the following ways, by concluding:

- a sale contract that leads to obtaining the ownership right over the land,
- a superficies contract that leads to obtaining a right of use and construction or
- a concession that leads to obtaining rights similar to superficies rights.

Additionally, an easement right can be secured with respect to certain specific and limited components and needs of a project (a right-of-way, installment of a cable etc.). Each of these options has advantages and disadvantages and, depending on the financial resources and time available, as well as the risks that can be taken, may prove to be more convenient than the others.

All of the above lead to obtaining a real right over the land in question. A lease agreement is not an option in the case of these projects, because the lease rights are not sufficient to obtain the building permit related to the project that is to be built on that land.

Regardless of the contractual method, the real rights are always established by means of a

formal written agreement, authenticated by a notary public (this being a validity condition), and are registered with the public register of real estate publicity, the Land Book, for publicity and opposability.

Sale purchase agreement or superficies over the land ?

As a rule, the two main criteria for choosing between the two options are the price and the time of its payment. A sale contract involves a larger sum payable on the contract date, i.e. at an early stage of the project, when maybe its feasibility is still unclear, while a superficies agreement involves the negotiation of an annual rent payable for the life of the project. In the latter case, there is also the possibility of negotiating payment structures according to which, for example, the rent is not due during the development stage of the project (i.e. obtaining the necessary permits) or is payable in a much lower proportion compared to the annual rent payable in the operational stage or as of the commencement of the construction works.

Comparison between the ownership right and the superficies right

	Ownership	Superficies
Object	**The investor also becomes the owner of the land** (not just of the building), thus being able to use it and conclude any agreements regarding it.	**The investor can own or erect a construction upon or in the underground of the land of another person**, land over which he acquires a right of use; the ownership right over the construction belongs to the investor.
Liability	**The owner is responsible for the effective maintenance of the land**, as well as in the relationship with the public authorities (for example, for obligations to pay property taxes).	**The main responsibility in relation to the authorities, as regards the land, remains with the owner,** including the payment of property taxes with respect to the land. The taxes related to the construction belong to the holder of the superficies right (i.e. the investor).
Period	**Unlimited.**	**99 years** (with the possibility of extension).
Costs	**Approximately 1%** of the contract value.	**Minimum 0.4% of the value established by the notarial grids – Maximum approximately 1% of the value declared by the parties.**

Tips & Tricks

Underrated, but important aspects to consider, other than the most frequently negotiated topics (duration and price)

As opposed to the conclusion of a sale agreement, when the investor is more observant to obtaining all the historical title documents from the seller and covering potential gaps with adequate warranties and indemnities, in the case of establishing a superficies right, the following topics must also be taken into account: the possibility to assign the agreement, the possibility to exercise certain rights without the owner's prior consent, or to carry out merger and demerger operations or the introduction of a break-option in favor of the investor.

For such a long-term investment, a clause regarding a pre-emption right in favor of the investor would also be useful.

Concession agreement

Concession agreements grant rights similar to superficies rights (the right of use and the right to build on the land) and have two main particularities: they can only be concluded with public authorities, following a regulated tender procedure, and the beneficiary has the active obligation to use the land in a certain manner (compared to superficies agreements, where the owners have no direct interest in the project being developed, unless the rent is linked to the project stages, but even in those cases, their involvement in the project is limited or even non-existent).

Although the conclusion of concession agreements involves formalities and costs similar to the superficies agreements, the market is inconsistent in their use, mainly because of the administrative procedures that are more complex in their case. However, we expect to see an increase in their use in the coming years, especially as part of Romania and the EU's green energy commitments and the fact that public authorities own land that can be used to build green energy projects.

Easement right

Another essential aspect of project development, which generally requires the conclusion of an agreement with public authorities, is ensuring adequate access to the project location, both throughout its construction and operation. Therefore, while access to public roads does not require the conclusion of a special agreement (generally it is sufficient for a simple access agreement to be concluded with the road administrator, thus avoiding the costs and formalities related to the establishment of real rights), especially in rural areas in Romania, access may be insufficient or the condition of the road inadequate to allow heavy transport. Investors can therefore undertake either to build a road which shall be subsequently donated to public authorities for a public access regime, or to obtain an easement right over a private property in order to build a private access road.

Easement rights can be also used to secure land necessary for the installation of underground cable routes, as well as to secure flyover areas (in the case of wind turbines).

In situations where they are useful and sufficient, easement rights offer significant time and cost benefits, as Land Book regulations allow for an expedited cadastral procedure for their registration, only the part of the land subject to an easement right being essentially secured (solution which is also more attractive to landowners, as it allows them to freely exploit the remaining part of the land).

Renewable energy from the taxation perspective

The generous energy potential that Romania possesses is constantly placing our country in sight of developers of energy projects from renewable sources, also supported by the favourable tax regime applicable to companies registered at local level.

1. Tax Regimes

From a corporate taxation perspective, companies operating locally may be subject to one of the following tax regimes

A	Tax on profit	B	Tax on the income of micro-enterprises
	involves the application of a **16% rate on the profit** determined as the difference between the total income and the total expenses recorded for obtaining this income, to which the non-deductible expenses are added and the non-taxable income are subtracted.		implies the application of a **1% quota on the revenues** registered by the Romanian company, assuming that certain conditions provided by the Romanian fiscal legislation are met, which must be analyzed in each situation. *Note: this tax regime applies until the level of income registered by the Romanian company reaches or exceeds the equivalent in RON of the sum of EUR 500,000 and there is one registered employee on the said company.*

Considering the two tax regimes, it is important that any local investment also includes a fiscal analysis, to assess the fiscal impact for each stage in the process of developing and operating a renewable project, as follows:

The possibility to carry forward tax losses that generally occur during the investment stage in the development of projects	It is possible only for entities subject to profit tax. Therefore, the application of the specific regime for micro-enterprises (even for a short period of time) may affect this possibility.
Correct application of the rules for capitalization of expenses incurred with the development of local projects	The value of the assets will have an impact on future depreciation expenses and the level of taxes owed to local budgets.
Correct classification of assets from the tax depreciation perspective	Romanian tax legislation provides a set of specific rules on how to determine tax depreciation, different from the rules applicable to accounting depreciation.

2. Transfer prices

Both in the development stage of renewable energy projects and during their operation, it is important to take into account the application of **transfer pricing rules** to transactions with group companies, resident or not in Romania. Romanian tax legislation has specific rules on documenting the compliance with the market value principle for transactions with affiliated entities, and failure to comply with them may trigger fines imposed by the tax authorities and adjustments to the value of transactions with affiliated entities.

3. Taxes owed to local budgets

The operation of wind farms can also attract the obligation to pay significant local taxes, including the building tax due for the value of the wind turbine support pole.

4. Value added tax

From the value added tax (VAT) perspective, the following aspects are specific to the energy field:

1. Since 1 September 2013, **reverse taxation has been implemented for electricity supplies** made by a taxable person on the territory of Romania to a taxable person trader, established in Romania. The measure was taken to prevent the risk of tax evasion and to solve the specific liquidity problems reported by the operators that supplied electricity. The mandatory condition for applying the reverse charge is that the supplier and the beneficiary are registered for VAT purposes, but there are other conditions that must be met to apply this simplification mechanism.

2. Starting January 2023, the delivery **and installation of photovoltaic panels, solar thermal panels and other efficient heating systems, including installation kits, as well as all the necessary components, are operations to which a reduced rate of 5% VAT is applied**, if they are intended for housing or public authority buildings. The measure applies from January 2023 aiming to: (i) accelerate investments in energy efficiency, (ii) stimulate the reduction of electricity consumption and (iii) reduce consumer dependence on the volatility of the energy market.

Take note!

Fiscal aspects should not be neglected in planning a local investment, as they can have a major influence on the operation or sale of locally developed energy projects. This influence can manifest itself through an increase in tax costs or a loss of opportunities to make these costs more efficient.

Mergers and Acquisitions in the renewable energy sector

As the world faces the urgent need to address climate change and transition to clean energy sources, renewable energy projects have become a focal point for sustainable development strategies. The rapid growth of the renewable energy sector has generated a similar dynamic for mergers and acquisitions (M&A) transactions in this industry.

1. General principles in M&A

M&A transactions in the sector of renewable projects involve a need for consolidation of assets and operations in order to optimize efficiency, expand market reach and create synergies that can accelerate the development of sustainable energy. While every transaction is unique, there are some general principles that typically apply:

1. Due Diligence

Any transaction involves a thorough examination of the financial, legal and operational aspects of the target company that owns and operates the renewable energy project.

In this sector, this includes assessing project viability, regulatory compliance and environmental impact.

2. Regulatory

Renewable energy projects are subject to strict regulations, which apply from the project stage through the development stage, including until the works are completed and the project is connected to the national electricity grid.

Thus, in all phases of the project, it is necessary to comply with laws and regulations, to obtain the necessary permits, licenses and authorizations, but also to maintain their validity. Regardless of the stage of the project in which the M&A transaction takes place, special attention is paid to these aspects.

3. Transaction documents

M&A transactions in this sector involve drafting a complex set of documents and contracts that define all aspects of the transaction and detail the obligations and rights of the parties involved.

Also, the complexity of these documents is also given by the moment when the transaction takes place, for example, either at an early stage when the project is only in the phase where it has obtained part of the authorizations and licenses, or when the project is at the ready-to-build stage or completed and brought to the full operationalization phase.

2. Foreign direct investment

An important aspect to consider in transactions in the renewable energy sector is the legislation regarding the screening of foreign direct investments in Romania. Recently, this regime has seen a stricter approach, through the amendments brought by Law 164/2023 intended to implement and amend the Government's Emergency Ordinance no. 46/2022 (the initial legislative framework regarding this field) and which extend the application of this regime to investors from the European Union (previously the regulation only targeted investors from outside the European Union). Therefore, since the field of energy represents a key aspect in Romania's national security strategy, any direct foreign investment or new investment (as these concepts are defined in the legislation) in the field of renewable projects and which has a value of over EUR 2,000,000, carried out by a foreign investor, requires prior approval, ahead of the actual implementation of the investment (stand-still obligation, known in classic M&A transactions in the context of the obligation to obtain the merger clearance) from the Commission for the Examination of Foreign Direct Investments (CEISD). It remains to be seen to what extent EU investors will also be affected by the recent legislative change.

Conclusion:

The appropriate documentation of the transaction, but also the analysis of the need to obtain investment approval from CEISD, ensures that all critical aspects are clearly defined and analyzed, thus minimizing the risk of subsequent litigation and facilitating the efficient implementation of renewable projects.
Specialized consultancy in the field and a deep understanding of the legislative and regulatory context in Romania are essential to successfully complete M&A transactions in the renewable energy sector.

George Niculescu
President of ANRE

According to ANRE data, for photovoltaic and wind, technical connection permits have already been issued for over 8,000 MW, and for about 7,000 MW connection contracts have been signed.

Looking to the future and taking into account the fact that the success rate of these projects is 15 - 20%, I estimate that in the next 2 - 3 years about 3,000 – 4,000 MW in renewables should come into operation in Romania, given that Transelectrica received applications for projects of 20,000 MW.

424,5 mil. euros

nine financing contracts from the Modernization Fund signed for the development and consolidation of the national energy infrastructure

Interview

Romania wants to achieve important decarbonization targets until 2026, including the installation of new renewables capacities. What do you think are the biggest challenges in reaching the renewable energy generation targets in the next 2-3 years?

The EU's energy policy has at its core various measures aimed at achieving an integrated energy market, ensuring the security of energy supply and the sustainability of the energy sector. In this context, the renewables industry is increasingly becoming a segment that corresponds to this European trajectory, at the same time having a major potential to attract investors, who are stimulated by the funds made available through the National Recovery and Resilience Plan and the Modernization Fund. The decarbonization of the energy sector and the increase in the percentage of energy from renewable sources are at the forefront of European policies that project a radical transformation of the sector in the medium and long term, and our country is already rallying to this process.

It is important in this context to remember that Romania, through PNIESC, has proposed to build around 7,000 MW of new energy generation capacities from renewable sources by 2030.

Regarding the initiatives undertaken by Romania in order to develop and consolidate the national energy infrastructure, I remind the signing of the first nine financing contracts from the Modernization Fund, in October last year. The non-refundable value of the nine investment projects to be implemented by CNTEE Transelectrica S.A., financed from the funds allocated to Romania from the Modernization Fund, is 424.5 million euros. The contracts were signed between the Ministry of Energy, as the national authority for the implementation and management of the funds allocated to Romania from the Modernization Fund, and CNTEE Transelectrica S.A., as the transmission and system operator of the National Energy System (SEN).

The storage of energy generated from renewable sources is as important as the development of the renewable energy sector. Therefore, I hope that we will issue the necessary regulations in the foreseeable future to ensure the right framework for storage.

Another challenge lies in Romania's ability to develop and improve its distribution grids. It is obvious that the role of distribution operators will change when they'll have to distribute a larger amount of electricity.

In the short term, i.e. in the next 6 - 12 months, as the regulator of the energy market, what measures do you intend to take to facilitate the development of renewables generation capacities?

First of all, I believe that before starting the process of improving secondary legislation and adapting it to the new context in the energy sector, we must take into account the specifics of energy generation from renewable sources and the need to prepare the grids to be able to integrate these new capacities in the national and European energy system.

In an ideal scenario, I believe that the finalization and adoption of an offshore wind energy law followed by specific regulations by ANRE constitutes an important milestone in the context in which decarbonization, until 2050, will be impossible without the offshore electricity generation in the Black Sea.

That's why I will make sure that the institution I lead makes its contribution by means of the regulations and the measures taken to ensure the framework for the development of generation units from renewable sources to be financed through the PNRR.

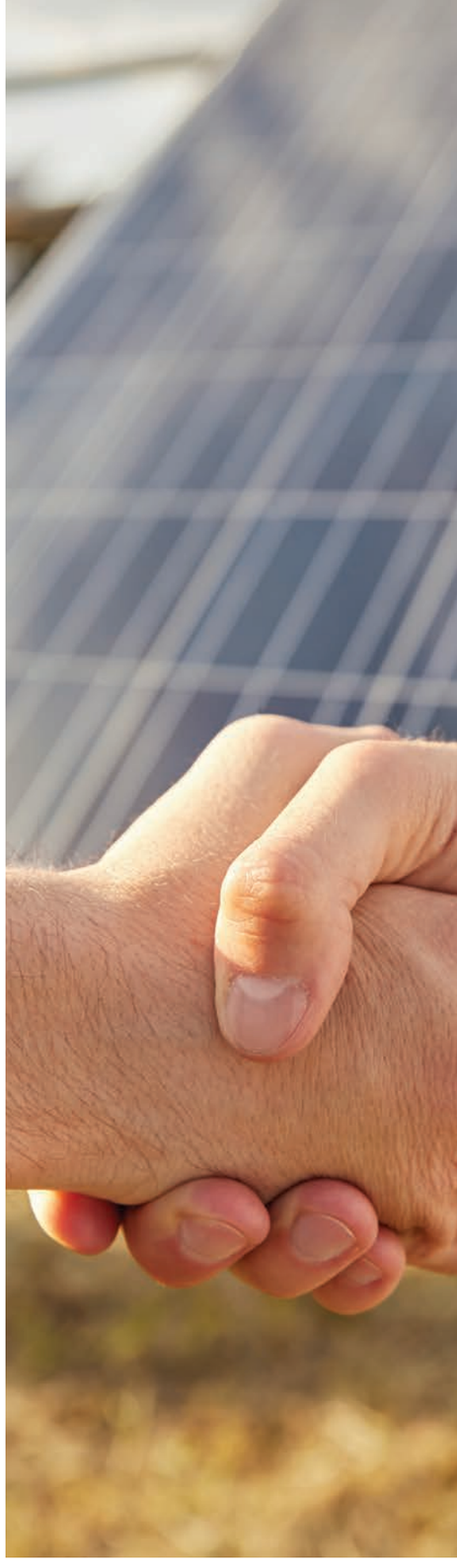
I hope we can also finance energy efficiency projects, because saving energy remains the most effective way to cut carbon emissions, protect the environment and also have an impact on end users in terms of reducing the cost of energy bills.

When do you see the "go to place" concept implemented in Romania and under what conditions?

The **"go to place"** concept was brought to attention by the provisions of EU Regulation no. 943/2019 on the internal electricity market which establishes rules to ensure the operation of the internal electricity market. The concept covers certain requirements related to the development of energy from renewable sources and environmental policy, in particular specific rules for certain types of installations for the generation of electricity from renewable sources.

More precisely, the **"go to place"** concept refers to the establishment of geographical areas where renewables can be installed.

It is necessary to identify at national level, together with the other state institutions with prerogatives in the field, where there is a greater need to install energy generation capacities from renewable sources, so that there are no congestions, as it is happening in the Dobrogea area, for example.



How do you see the current legislation being simplified to allow new renewable projects to be connected to the grid in a shorter timeframe and providing greater cost predictability?

Based on the experiences so far, the main difficulties in connecting producers to the public interest grids were generated by the connection process and, in most cases, by the financing of the development works in the electricity grids, to create the technical conditions necessary for the connection.

That is why the regulatory framework applicable to the connection of producers to the electricity grids of public interest has been continuously improved, both by facilitating the connection process, by reducing its duration and bureaucracy, as well as by adapting it to some situations that arise in practice. In this way, we wanted to unblock the process of connecting electricity generation capacities, especially those from renewable sources.

Regarding the connection of consumption places and renewables generation sites, owned by prosumers, ANRE approved a procedure that simplifies the connection process, avoiding as much as possible the works that involve long terms of execution and bureaucratic barriers. At the same time, ANRE offered those interested a guide that describes the connection process and its stages, the related deadlines and the responsibilities of the parties involved; the information is published on ANRE's website, at: https://anre. ro/consumatori/electric-energy/how-to-become-a prosumer/.

The duration of the connection process is also influenced by the user's actions, which contribute decisively to the progress of this process, completed by putting the generation site under voltage. Applicants can control the estimated cost of the investment thanks to the estimated value mentioned in the technical connection notice. The value of the connection tariff is mentioned here, which includes the value of the works to strengthen the electricity grids, when these are necessary to ensure the technical conditions for the safe evacuation of the electricity generated.

The value of works in the ATR is an estimate. The final price may be influenced by the evolution in the prices of works and services on the market. For large projects, the value of the connection works is set based on an estimate, depending on the connection solution provided in the technical connection notice.

The Ministry of Energy wants to introduce the Contracts for Differences (CfDs) in the coming period. How do you see this tool implemented and with what impact in the market?

In this decade, according to the commitments through the PNRR, Romania would include in the contracts for differences (CfD) energy generation capacities from renewable sources of 10 GW. Romania has committed through the PNNR (National Recovery and Resilience Plan) that it will finance 1,500 MW in wind and solar this year through the CfD scheme. For next year, the capacity is set at 2,000 MW.

As far as the impact on the market is concerned, I believe that the innovative mechanism of contracts for differences will remove the price pressure on the end user.

> *I welcome the initiative of the Ministry of Energy to introduce this mechanism, because it intervenes in the process of replacing old energy generation facilities with non-polluting ones. This initiative is justified and necessary because the infrastructure of the energy system is so outdated that there are already real risks and difficulties in managing electricity imports. It is also important to see the CfD instrument as a transparent and non-discriminatory mechanism that addresses all investments in the field of low-carbon electricity generation.*

There are companies that talk about the implementation of advanced solutions, such as demand-response. To what extent do you see this possible in Romania in the next 2-3 years?

The participation in the market of end users who can act through demand-response is regulated both in the European and national legislation, issued by ANRE, both in the futures markets, PZU and PI, as well as in the balancing market. ANRE, through secondary regulations, encourages the participation of end users in the electricity market directly or through aggregators. In the case of balancing services, the demand-response resources must be qualified in advance by the transmission and system operator according to the procedure approved by ANRE. The implementation of storage projects at end users can have an important role in the future in stimulating the latter to capitalize on demand response opportunities.

Considering that ANRE provides support via secondary regulations, we believe that these solutions can be applied immediately; only adjustments to the operational procedures of Transelectrica and OPCOM are necessary to replace the notion of license holder with market participant, which includes end users.

The number of prosumers is growing rapidly. How do you see the sustainable development of this segment in the next 3 years?

The good news is that in Romania the number of small renewable energy producers who install photovoltaic panels is constantly increasing.

Because the institution I lead is focused on identifying solutions, we have already launched in public debate a draft order with provisions aimed at reducing the time needed to connect prosumers. On the other hand, we are also analysing what other countries have done to integrate these new generation capacities from renewable sources, in order to identify the best solutions for our country.

Regarding the challenges, strengthening the capacity to attract investments in electricity grids, so that more energy generated by small and large prosumers can be integrated, represents an objective with great relevance for the activity carried out at ANRE, since the grid tariffs paid by end users cannot be significantly changed.

According to the data by ANRE, on January 1, 2023, prosumers generated over

400 MW

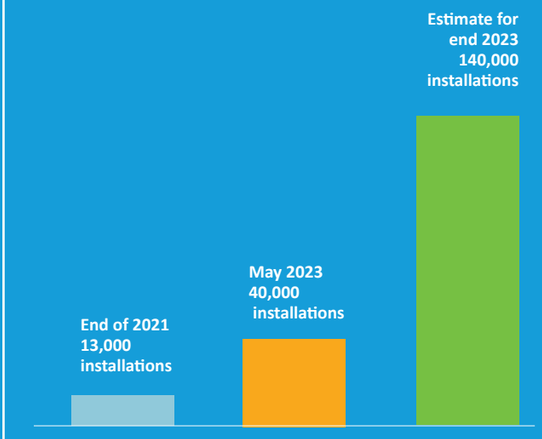
In Romania there are over 40,000 installations with an installed capacity of over

500 MW

Estimate for the end of 2023: 140,000 installations, with a capacity of over

1,000 MW

Installations country-wide:



Bogdan Chirițoiu
President
Competition Council

Romania did a good job in this area. As I said, most energy investments in recent years have been made in the renewable sector and, at present, we have a diversified system.

I think it is very important to learn from our mistakes. And the main thing to learn from the experience gathered so far is that we have to have stability.

We are witnessing a dynamic evolution of renewable projects called „the secod wave of investments in renewables". From your perspective, what measures should be taken to make this period a constant and not a temporary stage, as happened about 10 years ago during the "first wave of investments in renewables"?

Renewable energy has been the fastest growing sector in this industry in recent years, and this is a fact. To maintain this trend, we must have a strategy and a clear and predictable long-term legislative framework. It is the way to encourage investors to come and create jobs and increase the installed capacity in renewables.

Obviously, we need money for the development of the renewable industry, and European funds are the solution. Romania has several sources of funding at its disposal, we must use the money to develop electricity transmission and distribution networks thus helping to achieve the net-zero emissions objective of the European Union, by 2050.

In the coming period, the Government will launch the contracts for difference mechanism (CfD), a support scheme to stimulate the development of renewable power generation capacities - wind and photovoltaics. We are currently working with all parties involved so that subsidies are not excessive, meaning not to give more money than it is worth.

These "waves" exist because industry still needs subsidies. When this industry becomes mature enough and there is no need for subsidies, there will certainly be no "waves".

From the Competition point of view, what are the main aspects you follow in the renewable sector in Romania? Do you see differences between Romania and the other states in the region in terms of implementation of the competition practices?

What we specifically target are the markets at risk of failure (e.g. natural or legal monopolies) in order to identify possible anti-competitive practices (either anti-competitive collusion or abuse of dominant position).

At EU level, competition rules are the same for all Member States. True, there are some procedural differences, generated by the adaptation of these rules to the national legal system of each state.

Thus, regarding the implementation of the legislative framework, we are careful that it complies with Community regulations, but also to possible elements that could unduly distort the competitive environment, for example by establishing discriminatory conditions for companies' activity.

What are the challenges, sometimes even barriers, in the development of wind and solar projects in Romania from the perspective of the analyses on the renewable sector carried out by the Competition Council?

Together with the Romanian National Energy Regulatory Authority (ANRE), we conducted a study on the connection of renewable energy to the national electricity system, that we will soon launch for public debate.

Following this study, we reached similar conclusions to those in 2022, when we published another report for this sector, namely that participants in the grid connection process face legislative and bureaucratic barriers, barriers associated with financing, but also some generated by insufficient development of electricity transmission and distribution networks.

For example, obtaining the necessary permits to commission new renewable energy generation capacity is still a cumbersome and time-consuming process, that discourages potential investors.

In this context, we recommended the implementation of a "one-stop-shop" module dedicated exclusively to obtaining the license in the field of electricity production from renewable sources, as a distinct part of the Single Industrial License project, that was transposed through an Emergency Ordinance in 2022.

We also made recommendations on the location of future renewable electricity generation capacities and the allocation of connection capacity based on a competitive procedure. In addition, we support the adoption of measures to discourage speculative investments and complete the regulatory framework on grid connection, to streamline the process and reduce its duration. That is why we have made some recommendations to both the Ministry of Development, Public Works and Administration (MLDPA) and the Ministry of Agriculture and Rural Development (MADR) to initiate steps to ensure a unitary interpretation at the level of territorial administrative units (TAUs), regarding the documents required for each company to obtain the building permit, as well as to allow the construction of wind farms on agricultural land, located outside the city.

It is true, some steps have been taken to simplify procedures by amending the incident legislation, eliminating both the obligation to introduce land in the urban area and the obligation to amend the Urban Area Plan, but there are still things that need to be improved.

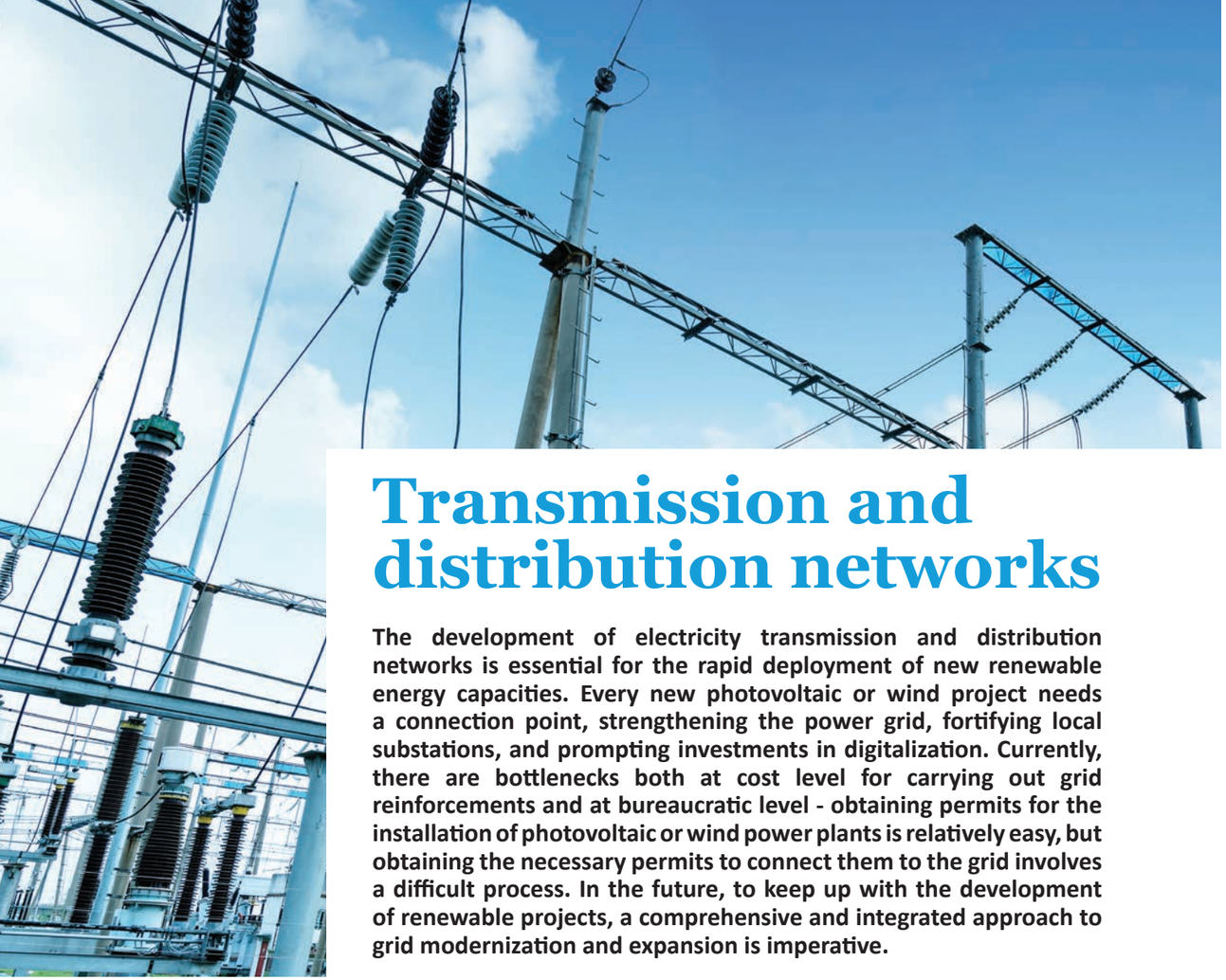
What are those "good practices" registered at European level that you would see implemented in the country in the renewable energy sector?

Romania did a good job in this area. As I said, most energy investments in recent years have been made in the renewable sector and, at present, we have a diversified system.

I think it is very important to learn from our mistakes. And the main thing to learn from the experience gathered so far is that we need to have stability. For example, the green certificate scheme was initially very generous, but then became extremely restrictive.

This type of oscillation must be avoided in order to have stability and, implicitly, a sustained development of this sector, and contracts for difference could be a superior solution to the green certificates used in the "first wave".

3 Connection to the grid



Transmission and distribution networks

The development of electricity transmission and distribution networks is essential for the rapid deployment of new renewable energy capacities. Every new photovoltaic or wind project needs a connection point, strengthening the power grid, fortifying local substations, and prompting investments in digitalization. Currently, there are bottlenecks both at cost level for carrying out grid reinforcements and at bureaucratic level - obtaining permits for the installation of photovoltaic or wind power plants is relatively easy, but obtaining the necessary permits to connect them to the grid involves a difficult process. In the future, to keep up with the development of renewable projects, a comprehensive and integrated approach to grid modernization and expansion is imperative.

Overview on the grid

According to Transelectrica's data, the available grid capacity is very limited at the moment in the Dobrogea region (traditionally the most attractive area for wind projects), as well as in the south-west of the country, but totals approximately 12,000 MW in the rest of the country. At the level of 2025, it is estimated that this will reach approximately 14,485 MW (noting an additional 2,000 MW in connection capacity available in the Dobrogea region), reaching approximately 17,800 MW at the level of 2030.

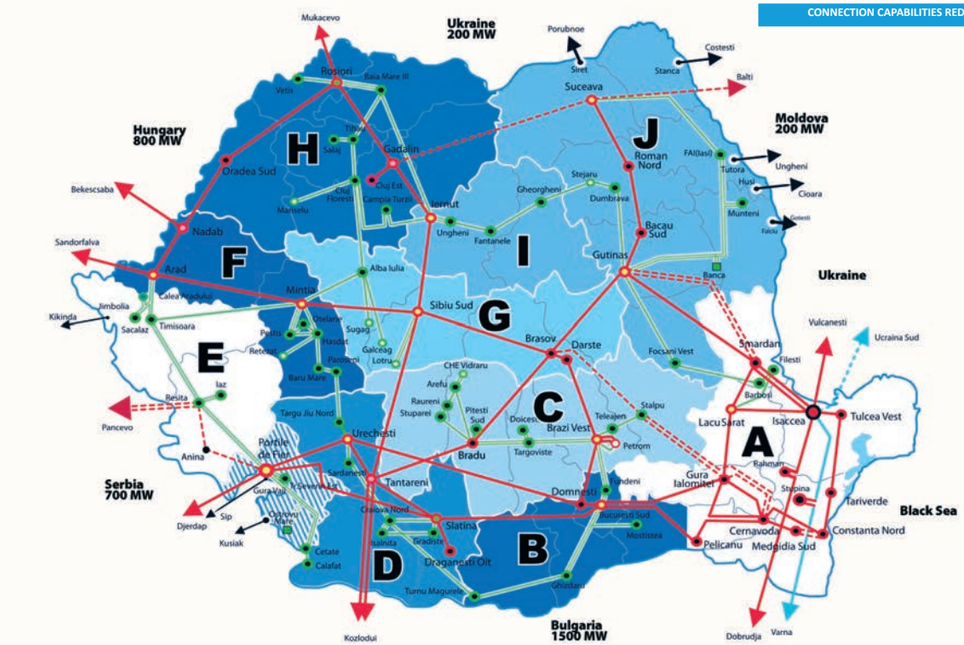
In late 2022, Transelectrica made a historic announcement, securing the largest-ever European funding for the company. They signed multiple financing agreements from the Modernization Fund, totaling around 424 million euros. These funds are earmarked for the advancement of nine pivotal projects aimed at enhancing the national electricity transmission grid.

In this context, the evolution of both the transmission grid and electricity distribution grids stands as a crucial factor in accomplishing the objectives of the energy transition. The importance of this is on par with the task of attracting developers and investors to engage in new renewable energy projects. Given the potential exorbitant expenses associated with grid reinforcement, there exists a risk of diminished project profitability, which could redirect investors' focus toward alternative international opportunities.

Connection capacities available 2023

Zona A	Zona B	Zona C	Zona D	Zona E
0 MW	2200 MW	1305 MW	1200 MW	0 MW
Zona F	**Zona G**	**Zona H**	**Zona I**	**Zona J**
2300 MW	1410 MW	1706 MW	1058 MW	1385 MW

CONNECTION CAPABILITIES RED 110 kV



Total cross-border capacity
3400 MW

Source: transelectrica.ro

Grid connection process

From the initial planning stages, up to the completion of all authorization procedures for a renewable energy project, the grid connection process, regardless of whether we are referring to securing the Technical Connection Approval (ATR) or, subsequently, the conclusion and performance of the Grid Connection Agreement, always finds itself at the top of the developers' list of priorities. This is not a novel approach in any way, as the moment of securing the ATR has probably represented (and continues to be) the transition point between an early stage project and one for which the perspectives of success become visible. Of course, although securing the ATR is a major objective for any developer, the planning subsequent to this stage, including from the standpoint of understanding and taking advantage of the rights, as well as fulfilling the obligations derived from the ATR, in accordance with the applicable regulations, remains just as important.

Steps of the grid connection procedure

1 Preliminary stage of documentation and information

It is optional, with the aim of informing the user in advance about the possibilities of connecting to the grid, the need to obtain a emplacement permit and other procedural aspects;

The grid operator replies free of charge, in writing, within no more than 15 calendar days from the registration of the request.

2 Submission of the connection request and related documentation

- **installed capacity > 50 MW: requests are addressed to Transelectrica;**
- **installed capacity <= 50 MW: requests are addressed to the distribution operator in the project area.**

In general, developers submit the application immediately after obtaining the Urban Planning Certificate for the project;

It should be noted that obtaining the Emplacement Permit from the grid operator follows a separate procedure from that for connecting to the grid, as it is necessary to submit a separate request in this regard (accompanied by the related documentation).

3 Determining and approving the connection solution

It is carried out by the grid operator based on:

- **solution sheet:** for projects under 30 kVA, for those that connect to the low-voltage electrical grid, or to the medium-voltage grid for evacuated capacities of up to 1 MW, where the connection solution is unique and/or obvious;
- **the solution study** (in the other cases).

The solution study is approved by the technical-economic council of the grid operator, according to its own procedures - if several connection solutions have been established, the applicant will opt in writing for one of them within a maximum of 2 months from the communication of the approved solution study.

NEW REGULATIONS! *– The deadline for the establishment of the financial guarantee, when the obligation to provide it is established by the ATR, is now until the conclusion of the Connection Agreement, i.e. a maximum period of 12 months from the date of issuance of the ATR (previously this term was of 3 months from the issuance of the ATR).*

NEW REGULATIONS! *– The user has the obligation to obtain the building permit for the objective by the date of conclusion of the contract for the execution of the connection installation (if it is concluded by the grid operator), but no more than 12 months from the date of conclusion of the Connection Agreement and 18 months from the date of issuance of the ATR (with the consequence of the invalidation of the ATR and termination of the Connection Agreement, otherwise).*

NEW REGULATIONS! *– The solution studies will also analyze connection solutions with the operational limitation of the maximum power that can be evacuated into the grid in the situations/functioning regimes with N-1 elements in operation that have the effect of overloading the network, the grid operator being precluded from refusing the approval of such a connection solution. The operational limitation can be implemented through automation equipment installed in the installations of the grid operator / user, and the situations in which these limitations intervene are only those resulting from the solution study and which will be listed in the ATR.*

4 Issuance of the ATR

The ATR represents the grid operator's offer to the applicant's connection request and reflects the connection solution approved by the operator (and, as the case may be, selected by the user);

It contains the technical and economic conditions for connecting to the grid, establishing among others:

- The total installed capacity and the capacity approved for evacuation (including, as the case may be, their evolution over time);
- Energy data of generating units;
- As the case may be, the description of the works to be carried out to reinforce the electrical grid to ensure the connection conditions;
- The value and form of the financial guarantee that will have to be established by the user (applicable in the event that the ATR approves an evacuated capacity > 1 MW and grid reinforcement works are necessary) - it is established as a percentage of the connection tariff, without exceeding 20% of its value;
- The connection tariff.

5 Conclusion of the Connection Agreement - within 12 months from the date of issuance of the ATR

The Connection Agreement is concluded with the grid operator, at the request of the user (submitted together with the related documentation), representing the contractual transposition of the grid connection offer represented by ATR;

6 Performance of the connection works and putting the connection installation into operation

This stage practically represents the execution by the parties of the obligations established by the Connection Agreement and involves, as a rule, the completion of three categories of works:

- Grid reinforcement works – divided in turn into general reinforcement works (determined as necessary in order to connect several projects) and specific reinforcement works (determined as strictly necessary for the connection of the project that is the subject of the respective procedure);
- Connection installation works;
- Utilisation installation works – this describes all the electrical installations of the user, downstream of the point of delimitation with the connection installation, their performance being exclusively the responsibility of the user.

After the completion of the works related to the connection installation, the reception and commissioning of these installations follows - as a rule, the elements of the connection installation financed by the user through the connection tariff remain in its property, but are being transferred into the administration of the grid operator, based on an agreement concluded between the parties for this purpose.

7 Energizing the utilisation installation for the trial period

This stage is completed only if the Connection Agreement establishes the need for testing to be carried out at the respective production site (in accordance with the applicable technical regulations);

It is carried out by the grid operator, at the request of the user (submitted together with the related documentation), after the commissioning of the connection installation and the completion of the reinforcement works - the completion of the specific reinforcement works is a mandatory condition, and in the case of the general reinforcement works, if they have not been completed, the recalculation of the operating regimes can be performed (the grid operator proceeding to energizing the installation for the trial period only to the extent that the results of the recalculation allows this);

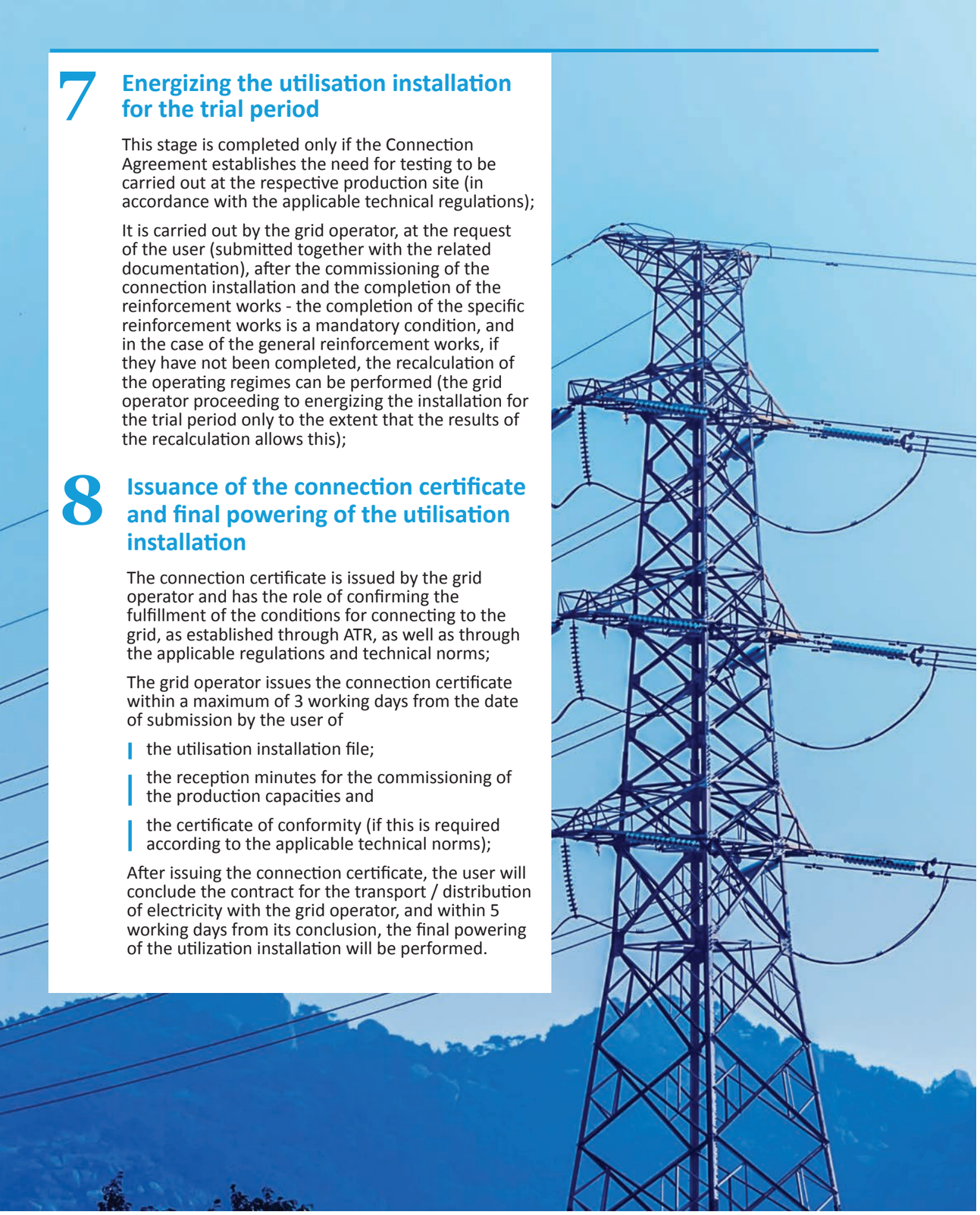
8 Issuance of the connection certificate and final powering of the utilisation installation

The connection certificate is issued by the grid operator and has the role of confirming the fulfillment of the conditions for connecting to the grid, as established through ATR, as well as through the applicable regulations and technical norms;

The grid operator issues the connection certificate within a maximum of 3 working days from the date of submission by the user of

- the utilisation installation file;
- the reception minutes for the commissioning of the production capacities and
- the certificate of conformity (if this is required according to the applicable technical norms);

After issuing the connection certificate, the user will conclude the contract for the transport / distribution of electricity with the grid operator, and within 5 working days from its conclusion, the final powering of the utilization installation will be performed.

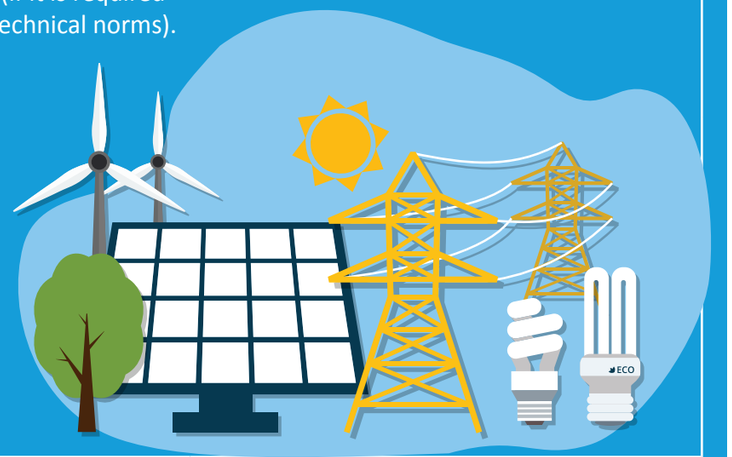


Particularities in the case of repowering existing capacities

Given the considerable technological developments over the past decade, both in PV modules and wind turbines, it is expected that the interest in repowering operational parks will become increasingly greater as the projects developed in the first wave approach maturity.

From the perspective of the relationship with the grid operator to which the wind / solar farm is connected, the repowering process involves, as a first step, the submission of a request for updating the connection certificate, the procedure following one of the these alternative

SCENARIO 1	SCENARIO 2
The requested changes allow the continued use of the electrical grid under the same technical and economic conditions of connection This hypothesis assumes that the repowering does not require additional works or changes in the electrical installations upstream of the delimitation point (respectively changes in the connection installation or additional network reinforcements); The grid operator will issue the updated connection certificate within a maximum of **5 working days** after the user submits: - the new file of the utilization installation; - the reception minutes for the commissioning of the new generating units; and - the certificate of conformity (if it is required according to the applicable technical norms).	**The requested changes involve the fulfillment of additional technical-economic conditions for connection to the grid** This scenario becomes applicable in the situation where, for example, the repowering also aims to increase the installed capacity of the wind / solar park, exceeding the capacity approved for evacuation based on the connection certificate; The applicable procedure in this case will be similar to the one previously described for the connection of new production units, starting with the stage of establishing the new connection solution and issuing the ATR by the grid operator.



Ştefăniță Munteanu
CEO
Transelectrica

In 2030, in Romania,, the power installed in these two types of plants alone - wind power and photo-voltaic power plants - will exceed 15,000 MW, and unless the electricity consumption trend significantly goes up in the next years, the sustainability of power generation sources will be seriously challenged. In this respect the industrial evolution of the Romanian economy plays a crucial role during this transition period.

By 31.07.2023, CNTEE Transelectrica SA has issued connection permits for

6,572 MW in CEE

5,106 MW in CEF

Interview

What is the currently available capacity for energy transmission and how many new kilometers of network will be installed, according to your estimates, in the following 3 years?

At present, the connection capacity available without consolidating the power transmission grid is of around 12,000 MW and it is concentrated mainly in low production or high energy consumption areas. We would like to specify that in the South-East and South-West areas there is no possibility for connection until the grid' s enhancement. For 2025 we estimate an increase in connection capacity by approximately 2,500 MW, and for 2030 by approximately 5,500 MW compared to this year's level.

The current capacity of the power transmission grid and the development projects mentioned before can guarantee the connection of new renewable production units in accordance with the current targets set through PNIESC for the year 2030, namely 5,255 MW in CEE (wind farms) and 5,054 MW în CEF (photovoltaic power stations).

How many electricity connection permits for projects generating solar and wind power have been issued so far and how many MW will have been installed in Romania in the next 3 years according to your estimates?

By 31.07.2023, CNTEE Transelectrica SA has issued permits for 6,572 MW in wind farms (CEE) and 5,106 MW in photovoltaic power stations (CEF). Taking into account the ongoing projects and the restrictions related to the need to reinforce the grid, we estimate that we can install 2,500 MW in CEF și 500 MW in CEE, in the following 3 years, without taking into account the power installed at prosumer level.

The development of renewable energy power stations goes hand in hand with the evolution of energy consumption, which went down the past few years, in the context of the Covid 19 pandemic and the energy crisis, combined with the development of storage facilities.

When considering both existing and anticipated wind farms and photovoltaic power stations within the NECP framework, Romania is projected to surpass 15,000 MW in installed capacity from these sources by 2030. However, unless there is a substantial decline in the trend of electricity consumption in the coming years, the sustainability of electricity production sources could face significant challenges. In this context, the industrial evolution of the Romanian economy assumes a pivotal role during this transitional period. In this respect, the industrial evolution of the Romanian economy plays a crucial role during this transition period.

The power transmission grid development priorities are situated in areas where the integration of renewable sources of energy is limited by the current transmission capacity:

The situation of the transmission grid, in accordance with the Power Transmission Grid Development Plan 2022- 2031

Legend:
- OHL 110 kV:
- OHL 220 kV:
- OHL 400 kV:
(- - - - functioning at 220 kV)
- OHL 750 kV:
(functioning at 400 kV)

PRIORITIES FOR THE EASTERN ZONE OF THE NATIONAL ENERGY SYSTEM

- **Reconductoring OHL 220 kV Stejaru – Gheorgheni and OHL 220 kV Gheorgheni – Fântânele. *To be finalised in 2024.***
- **Reconductoring OHL 220 kV Gutinaș – Dumbrava - The technical documents are under preparation. *To be finalised in 2028.***
- **Reconductoring OHL 220 kV Dumbrava – Stejaru. The technical documents are under preparation. *To be finalised in 2028.***
- **Reconductoring OHL 220 kV Fântânele – Ungheni. The technical documents are under preparation. *To be finalised in 2028.***
- **OHL 400 kV Suceava – Gădălin. *To be finalised in 2030.***

PRIORITIES IN THE SOUTE-WEST AREA OF THE NATIONAL ENERGY SYSTEM

- **OHL 400 kV Porțile de Fier – Reșița. *To be finalised in 2024.***
- **OHL 400 kV dublu circuit Reșița – Timișoara – Săcălaz. *To be finalised in 2026.***
- **OHL 400 kV double circuit Timișoara – Săcălaz – Arad. *To be finalised in 2027.***
- **Reconductoring LEA 220 kV Porțile de Fier – Reșița circ. 1 și circ. 2. *To be finalised in 2028.***
- **Reconductoring OHL 220 kV din axis Urechești – Târgu Jiu Nord – Paroșeni – Baru Mare – Hășdat. *To be finalised in 2028.***

PRIORITIES IN THE SOUTH-EAST AREA OF THE NATIONAL ENERGY SYSTEM

- **LOHL 400 kV double circuit Cernavodă – Stâlpu, with an input/output circuit at Gura Ialomiței station. *Finalised.***
- **Input-output connection of OHL 400 kV Stupina – Varna and OHL 400 kV Rahman – Dobrudja at the 400 kV Medgidia Sud station. *To be finalised in 2024.***
- **OHL 400 kV double circuit (equipped circuit) Smârdan – Gutinaș. *To be finalised in 2024.***
- **Transition to 400 kV of the Brazi Vest – Teleajen – Stâlpu axis. *To be finalised in 2025.***
- **OHL 400 kV Medgidia Sud – Constanța Nord. *To be finalised in 2028.***
- **OHL 400 kV Stâlpu – Brașov. *Finalizare în 2031.***
- **Reconductoring OHL 400 kV București Sud – Pelicanu. *To be finalised in 2024.***
- **ReconductorING OHL 400 kV Gura Ialomiței – București Sud. *To be finalised in 2028.***
- **Reconductoring OHL 400 kV Cernavodă – Pelicanu. *To be finalised in 2029.***

Source of the map: transelectrica.ro

In the context of the offshore wind energy law, what are your plans to develop the grid so as to include Black Sea produced power in the system?

In order to retrieve power from offshore wind stations, dedicated studies are needed to identify new development projects for the power transmission grid. The solutions envisaged are:

- A direct current submarine cable Romania (Constanța) – Georgia, correlated with AC voltage connections between Georgia and Azerbaijan;
- A direct current submarine cable Romania (Constanța) – Hungary and several converter stations direct current - alternative current connected to the existing stations in the Romanian electricity transmission grid;
- Setting up new interconnections with the Republic of Moldova and Ukraine.

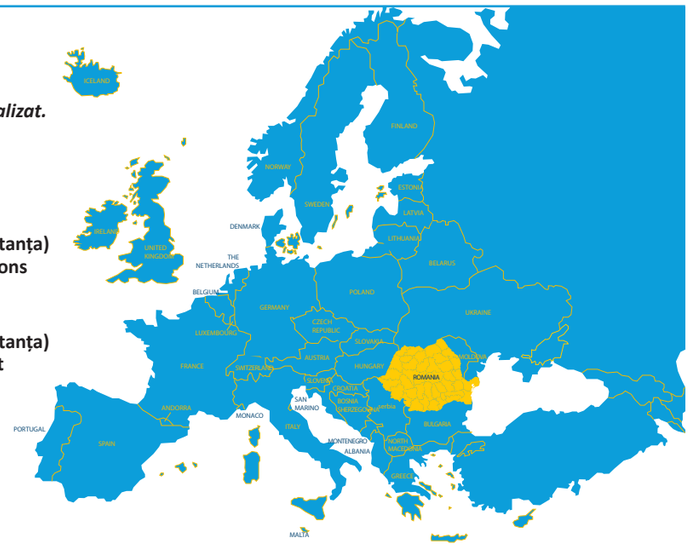
What measures do you envisage so that the increase in the number of prosumers will not affect the safe functioning of the grid?

The safe functioning of the grid will not be directly affected by prosumers-generated production, but there will be a major impact with respect to forecasting consumption and how the reserves will be used to balance the system. Thus, the instantaneous value of aggregated consumption at the level of the national power system is affected by the functioning of prosumers. The absence of real-time production data from these prosumers introduces an element of uncertainty in forecasting the daily total consumption curve, especially when done with a 15-minute resolution. This uncertainty can directly affect the reserves required to balance the system and the analyses conducted to ensure the safe operation of the system.

Prosumers are obliged by law to declare their renewable energy production units at the national Regulator ANRE, and they are working on a database including prosumer installed power, by county. According to the latest information received, in June 2023, the total production capacity installed in photovoltaic panels by prosumers was of around 973 MW. Their cumulated production may vary between almost zero, on heavy rain days covering the entire country, and around 750 MW or more on sunny days. This unmeasured production covers a consumption that virtually disappears from the aggregated curve in the national energy system.

Projects to increase cross-border capacity, others than those mentioned already :

- **OHL 400 kV Suceava (RO) – Bălți (MD).** ***To be finalised in 2030.***
- **OHL 400 kV Reșița (RO) – Pancevo (RS) d.c.** ***Finalizat.***
- **OHL 400 kV Porțile de Fier (RO) – Djerdap (RS) circ. 2.** ***To be finalised in 2029.***
- **OHL 400 kV Oradea Sud (RO) – Jozsa (HU).** ***To be finalised in 2030.***
- **Direct current submarine cable Romania (Constanța) – Georgia, correlated with AC voltage connections between Georgia and Azerbaijan.** ***The project is about to be launched.***
- **Direct current submarine cable Romania (Constanța) – Hungary and several converter stations direct current - alternative current connected to the existing stations in the Romanian electricity transmission grid.** ***The project is about to be launched.***



To reduce the negative impact, CNTEE Transelectrica SA has asked ANRE to provide the data regarding the capacity installed in prosumers' photovoltaic panels and their geographical distribution so as to be able to estimate how much they produce and, implicitly, the consumption that becomes hidden to the system operator. To attain real-time production data from prosumers, distribution operators must actively measure and transmit this data to the system operator, categorized by electrical stations.

To what extent do you think that it is possible to implement the demand response solution in Romania, in the next 3 years?

Including consumers in processes and markets to balance power systems is a method already used worldwide, but which has not reached the intended coverage. The "demand response" principle delivers substantial advantages to the balancing process and the Balancing Market. It amplifies the availability of balancing reserves, thereby reducing balancing expenses. It also guarantees enhanced flexibility in addressing imbalances, grid congestion, and expands the range of balancing products, even for emergency scenarios or when the system faces a shortage of balancing reserves.

The current Romanian legislative landscape allows the implementation of this process at any moment. However, at the moment there is very little interest from participants. ANRE and CNTEE Transelectrica SA, as the system and transmission operator, are contemplating introducing solutions that might stimulate participants (consumers, suppliers) to adopt this principle and include this mechanism in their business portfolio, both for the balancing process as well as for the management of grid congestion (mostly distribution).

On the other hand, we would like to mention that a network code is being drafted at European level, in the area of flexibility (demand response being one of the main objectives). The guidelines were drafted by ACER and sent to the Commission at end of 2022.

The future Network Code will establish, among other things, clear rules that will ensure a unified and coherent approach to the use of demand response resources by network operators, by establishing common rules for technical prequalification and coordinating the procurement process for market flexibility services for congestion management, voltage control and for balancing the system, both between different service markets and between transmission and distribution system operators.

In this context, it is natural to wait for this document to be finalised and approved in order to ensure the best correlation between the national process and the principles and rules to be established in the European process. In this manner a proper general framework will be created to develop national norms and market-based, operational and technical processes to use flexibility resources. This will also avoid the risk of a costly anticipatory national process, which would mean developing in advance IT systems and instruments that might prove noncompliant or insufficiently correlated with the requirements of the European regulation.

What measures can be taken to reduce the cost of balancing the network, costs that remain high in Romania, compared to other states?

One of the measures to diminish the balancing is to install means of storing power that may ensure a higher availability of electricity on the market, both for normal operations and especially when primary sources for wind and photovoltaic stations are unavailable. A significant increase in the quantity of balancing reserves derived from stored resources will naturally result in reduced prices within the market for system services and the balancing market. Additionally, these reserves can be strategically deployed based on commercial profiling, depending on the price for electricity. This would lead to a more effective use (consumption when the price is low, production when the price increases). Power storage solutions ensure special flexibility in operating the national system, with respect to

both quantity and intervention speed in case of voltage variations in the system. Thus, high variations in the system, usually generated by renewable sources of energy, mostly wind power, can be covered through storage means.

Storage solutions can also be used effectively by energy producers, enabling them to reduce their own imbalances, which will lead to less imbalance in the system (producers will generate much smaller imbalances at system level) and reduce the need for balancing reserves.

The national power system does not include pumped storage plants, which is a major disadvantage for the balancing process, but in accordance with the targets assumed within the EU through the Green Energy legislative package, an intense process has been launched for developing and implementing storage solutions based on electric batteries. This process is in its initial phase in Romania as well.

Other measures that might lead to lower balancing costs are a result of Romania's participation to European projects aimed at optimizing balancing processes, sharing reserves and developing single balancing reserves markets. Joint platforms have been developed within these projects for:

> The initial offsetting of balances on the IGCC (International Grid Control Cooperation) platform, representing a first stage in optimising secondary automatic adjustments with an impact on diminishing the quantity of reserves used for this adjustment, by offsetting positive and negative imbalances among systems;

> Trading the reserves for resetting the manually activated frequency on the RRFm platform (MARI project);

> Trading the reserves for resetting the automatically activated frequency on the RRFa platform (PICASSO project).

Therefore, a more extensive use of the balancing reserves at European level will lead to:

> Greater flexibility in using reserves from an offer to a demand system, when necessary, and increasing the number of rebalancing offers;

> Incentivizing producing balancing energy suppliers that can trade a higher volume of energy when needed at European level;

> A higher degree of competition among balancing energy suppliers, with an impact on energy prices.

What energy consumption level has been estimated for the following 3 years?

The National Energy Dispatcher makes short term gross consumption forecasts (from 1 day up to 1 ÷ 2 weeks) and medium-term forecasts (for the next months) based on the recent consumption history and on weather forecasts and does not have the necessary tools for long term consumption forecasts.

As for the consumption estimated for 2023, the overall downward trend will continue; the operative data indicate a decrease by 8.84 % for the next six months compared to the same period in 2022. Given the steeper drop in the second half of last year, as a reaction to the significant increase in electricity prices, it is to be expected that the downward tendency will diminish in the second half of 2023, and the overall gross domestic consumption will be of around 53 TWh, around 7% lower than last year. This value might change if outside temperature deviates significantly from the multi annual averages, or if other economic and/or legislative factors intervene, with a major impact on consumption.

For the next 2-3 years, under normal temperature conditions (around multiannual averages) and in the absence of other economic shocks that might have a negative impact, we estimate a progressive recovery of consumption, with likely yearly increases of 2 – 3%.

Hypertension in the grid

Daniela Dărăban,
Executive Director
Federation of Associations of Energy Utility Companies (ACUE)

Causes

Each new renewable energy project needs a new connection point, which in turn requires strengthening the electricity grid and stronger local substations, investing in digitalization and adapting to a different generation and consumption model. More and more consumers become active participants in the market and generate energy for their own consumption, but also deliver it into the grid. Wind and solar parks are multiplying. According to Eurelectric data, Europe alone needs 30-35 billion euros to add smart capabilities to the grid to be able to take over green energy.

Two decades ago, the grid was just a way to get energy. Now the grid is becoming the main way to access new energy sources, being at the heart of the energy transition. At global level, awareness around the challenges related to connecting the "green" generation units to the grid is higher than ever. Alarm signals are being raised on the urgency to make strategic decisions to boost the pace of grid transformation, digitalization, innovation. The pace of making investments in generation is much faster than the one in which the grids can adapt; the reasons are technical, technological, but also related to the limited capacity of the suppliers of goods and services. Last but not least, the mix of funds required to finance an unprecedented level of investment in the distribution sector must ensure both the financial viability of operators and the sustainability of costs for customers.

Romania, in its turn, faces these challenges in electricity distribution, which are related to the modernization of the infrastructure, the optimization of the use of grids and the efficiency of operating costs, but also the increase in the capacity to integrate energy from renewable sources. Investments in grids have increased, but green energy generation has accelerated, and the work required to increase transmission and distribution capacity must be adjusted in line with these projects.

Symptoms

Renewable energy sources such as solar and wind are inherently intermittent and variable. The sun doesn't always shine, and the wind doesn't always blow. This intermittency poses challenges in matching electricity supply with demand as it can lead to major imbalances, grid instability, blackouts, grid congestion. Managing fluctuations and ensuring grid stability are becoming critical tasks for operators.

The distribution system must respond to stability parameters that can be affected by uncoordinated and large volumes connection. Thus, operators are faced with a rather difficult exercise: they have to keep the lights on and develop the grid without significantly increasing costs for consumers.

The connection rate cannot keep up with the "exponential growth" demand from prosumers (households, SMEs, other economic agents) and producers of new renewable energy. Prosumers, in their vast majority, access grants from several government programs. The way grants are awarded makes it difficult for distributors to predict which areas of the grid need to be strengthened as a priority. Connected prosumers are limited during periods of peak generation when grid voltage fluctuations occur for safety reasons. Practically, many projects were launched without the authorities taking into account the synchronization with the necessary investments in the grid to allow integration.

Treatment

Energy distributors, members of ACUE, have invested 13,5 billion lei in the distribution of electricity and natural gas in the last 6 years. However, to be able to anticipate development needs, to be able to plan the necessary investments, we need legislative predictability. I think that legislating the concept of "free connection to the grid" does more harm than good to users. That is why we insist on collaborating with the relevant institutions to establish a grid development plan, optimally calibrate investments and anticipate customer needs.

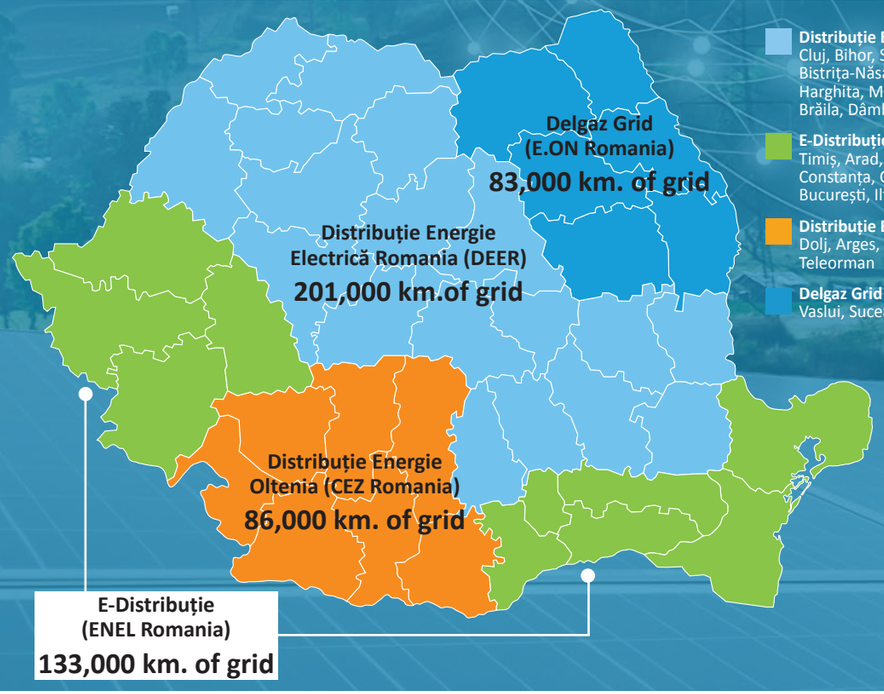
Technically, investing in grids cannot be done overnight. Much better planning and synchronization with the pace of transformation is needed. The authorities must put on the table all the options that energy consumers have and a cost-benefit analysis.

Moreover, every leu invested in grids now must serve the energy transition, the transition to a sustainable economic and industrial model. The investment required for the transition is huge and the implementation time is short. The European Commission estimates that about 584 billion euros are needed in the European grid by 2030. Distribution operators are prepared to mobilize important funds in the coming years, but also to attract large amounts of European funds.

We see many studies at European and global level showing that grids seem to be the forgotten giant of decarbonisation and there is serious concern over the huge investment required, renewables accommodation, storage , cost affordability for consumers, etc.

To be able to satisfy the needs of customers, prosumers and producers, the following are needed: a strategic direction for the development of the grids; a flexible regulatory framework to stimulate the transformation of the sector, which can only be established through a real dialogue, between the industry and the authorities.

Distribution grid in Romania



Distribuție Energie Electrică Romania (DEER): Cluj, Bihor, Satu Mare, Maramureș, Bistrița-Năsăud, Sălaj, Alba, Brașov, Covasna, Harghita, Mureș, Sibiu, Prahova, Buzău, Galați, Brăila, Dâmbovița și Vrancea

E-Distribuție (ENEL Romania): Timiș, Arad, Hunedoara și Caraș-Severin Constanța, Călărași, Tulcea și Ialomița București, Ilfov și Giurgiu

Distribuție Energie Oltenia (CEZ Romania): Dolj, Arges, Olt, Gorj, Valcea, Mehedinti, Teleorman

Delgaz Grid (E.ON Romania): Iași, Botoșani, Vaslui, Suceava, Neamț, Bacău.

ACUE members allocate significant funds for grid investments

13,5 billion lei

investments in electricity and natural gas distribution in the period 2016-2022

With the help of Norwegian funds and from own sources, Distribuție Oltenia is installing photovoltaic panels in substations for cost efficiency and carbon footprint reduction. **Distribuție Energie Electrică România** has a similar plan for the next 10 years.

Delgaz Grid is preparing to attract 700 million euros in European funds by 2030 to finance grid digitalization and automation, along with expansion, modernization and strengthening works necessary to integrate prosumers and producers of clean energy. Also, the company is adopting and implementing LST technology in the works on electricity grids; one of the benefits is that there will be no need to interrupt the energy supply to customers, as it happens in the classic system.

E-Distribuție companies have implemented the Global Repository & 3D Modeling solution, through which the grid operated is digitally recreated, and reflects the characteristics of the original grid. The main goal is to facilitate access to the grid, especially in hard-to-reach areas, to perform virtual inspections and thus correct any anomalies before they lead to outages.

Electrica, Enel, CEZ, Engie and E.ON offers household and non-household consumers advanced consumption efficiency solutions and green energy generation solutions for self-consumption.

Are you thinking of developing a renewable project in Romania? Start with the grid assessment!

The connection to the electrical grid is the foundation of a renewable energy project. It is the most important stage in the development of a project and should start even before the acquisition of the land, through a detailed evaluation of the possibilities for connection, whether it be through a substation or overhead lines, in the vicinity of the identified land for acquisition, proportionate to the capacity of the prospective wind or photovoltaic project. It is recommended to conduct a feasibility study for grid connection, carried out by a specialized consultant, before securing the land, in order to avoid subsequent risks.

Currently, the connection to the national power system of renewable energy projects represents an essential aspect in the sustainable development of the energy sector in Romania. In recent years, there has been a significant increase in the development of wind or photovoltaic projects, motivated largely by ambitious decarbonization objectives and the diversification of energy sources, as well as the availability of European funds allocated to the sector.

The current state of the electrical grid in Romania presents challenges in terms of the efficient integration of these renewable projects into the national energy system. The existing infrastructure requires modernization and expansion in order to accommodate the increased production of renewable energy that will be injected into the system in the coming years.

Additionally, it should not be ignored that the development and adoption of electric vehicles by the population has increased, which imposes an additional demand for energy infrastructure. Charging systems for electric vehicles need to be available and accessible in key locations, such as charging stations along highways and in urban areas.

Another important factor is the continuous increase in the number of prosumers who require an adapted infrastructure to be able to inject surplus electricity into the national grid.

Daniela Dinescu
Managing Director
PNE Romania

To address these challenges, significant investments in energy infrastructure are needed. These investments should focus on improving distribution and transmission networks to ensure their capacity and reliability in managing energy flows from renewable sources.
Additionally, the development of energy storage systems is important to compensate for fluctuations in renewable energy production.

PNE has a project portfolio with a capacity of over 2,000 MW, encompassing various renewable energy technologies

To address these challenges, significant investments in energy infrastructure are needed. These investments should focus on improving distribution and transmission networks to ensure their capacity and reliability in managing energy flows from renewable sources. Additionally, the development of energy storage systems is important to compensate for fluctuations in renewable energy production.

Furthermore, efficient coordination is necessary between authorities, grid operators, energy companies, specialists and renewable energy associations to ensure proper planning for the development of renewable energy projects and related infrastructure. This involves adopting clear and coherent policies and regulations, as well as ensuring a stable and predictable legal framework and an investment-friendly environment in the renewable energy sector.

Investments in upgrading energy infrastructure will bring long-term benefits, both in terms of boosting Romania's economy and energy security, as well as protecting the environment and ensuring a sustainable future for future generations.

PNE is one of the renewable energy pioneers in Romania. For over ten years, we have continued to be among the top companies in the field, bringing innovation and sustainability to the development and implementation of clean energy solutions. Currently, we have a project portfolio with a capacity of over 2,000 MW, encompassing various renewable energy technologies.

PNE
pure new energy

At a global level, as early as the first quarter of 2023, the PNE Group was already developing renewable energy projects, including onshore and offshore wind farms, as well as photovoltaic projects, with a total capacity of 16,500 MW

The internationally operating, listed PNE Group is included in the SDAX as well as the TecDAX. For more than 25 years, it has been one of the most experienced project developers in the field of onshore and offshore wind farms.

The focus is on the development of wind power and photovoltaic projects worldwide as well as on electricity generation with its own wind farms. Its portfolio covers all project planning phases, from site investigation and the implementation of the approval procedures, through financing and construction, to operation and repowering.

As a clean energy solutions provider, the PNE Group also offers services for the entire life cycle of wind farms and photovoltaic plants. The PNE Group is a sought-after partner to industry for solutions for the refinement of electricity via power-to-X technologies.

4 Financing opportunities

Funds allocated for green projects in Romania

There are billions of euros allocated to Member States, including Romania, for Europe to reach its decarbonization targets. National funds, credit lines allocated by the international financial institutions and by the commercial banks to support "green projects" come on top of them. All should translate, over the next decade, into new MW installed in renewable energies, clean technologies and smart systems for electricity generation and storage. Below, the complete picture of national and international funding programs in Romania.

The financing opportunities for the renewables sector in Romania are strongly connected with the country's ambitions towards climate neutrality. Currently, the National Energy and Climate Change Plan (NECP) sets out a RES share of 30.7% in Romania's final energy consumption in 2030. This target translates into an additional capacity of renewables required to reach the 2030 objective, particularly 2.3 GW of wind and 3.7 GW of solar.

Recently, Romania's 2030 RES ambitions have increased towards a 36.3% share, based on the National Long-Term Strategy (which describes the pathways to achieve Romania's climate neutrality by 2050). As such, the additional required capacity of solar and wind at 2030 level has increased significantly (approx. 5 GW of wind, respectively 6.8 GW of solar).

However, RWEA in collaboration with Deloitte and E3-Modelling developed in May 2023 the "Renewable Energy in Romania – Roadmap to 2030" study in the context of REPowerEU plan. The Study highlights the gap that Romania will have to close in order to reach the REPowerEU 45% RES share target in 2030, which is further translated in 8.4 GW additional wind capacity and 9.8 GW additional solar capacity (considering also the demand for green electricity for the generation of green hydrogen).

With the right mix of financing instruments, Romania has the potential to accelerate large-scale deployment of renewable energy as a key driver for economy and electricity sector decarbonisation. Financing opportunities currently address 2030 NECP targets, with various grants and incentives available for investors, presented below.

Livia Kicsi
Manager, Sustainability Incentives
Deloitte

"The study developed in May 2023 by RWEA in collaboration with Deloitte and E3-Modelling highlights the gap that Romania will have to close in order to reach the REPowerEU 45% 1 RES share target in 2030, which is further translated in 8.4 GW additional wind capacity and 9.8 GW additional solar capacity (considering also the demand of for green electricity for the generation of green hydrogen). With the right mix of financing instruments, Romania has the potential to accelerate large-scale deployment of renewable energy as a key driver for economy and electricity sector decarbonisation.

Deloitte Analysis

Funds with shared management

The National Recovery and Resilience Plan (NRRP)

The NRRP is a temporary recovery instrument based on performance, fulfilment of agreed milestones and targets towards achieving the reforms and investments in the plans will unlock regular payment.

Romania's plan is to support the installation of new renewable power production capacity through an investment aid mechanism with the objective of installing **950 MW of renewables power production capacity by June 2024** and install additional **1,500 MW by June 2026** with the introduction of contracts for difference.
On **31st of March 2022 under measure I.1** a competitive bidding procedure was lunched for new electricity generation capacities from renewable wind and solar energy sources, with or without integrated storage facilities, with a total **estimated budget of EUR 595,010,000**.
744 projects had been submitted and according to the last list of projects published in August 2023 the budget covers approximately 150 projects with capacity over 1 MW and 380 projects with capacity between 0.2MW and 1MW.
The new REPower EU chapter proposed by Romania, provides a transfer of 460 million euros to supplement the investments approved by measure I.1.

The measure I.4-3 aims at supporting investments in electricity storage facilities for an aggregate installed capacity of **at least 240 MW** (or 480 MWh) by December 2025.
The competitive bidding process was open between 28 November 2022 and 28 March 2023 and 26 beneficiaries submitted projects.

The measure I.2- 2.2 supports investments in building green hydrogen production capacities in electrolysis plants. With a total **estimated budget of EUR 148,752,500** the state aid aimed at promoting investments in building capacities of at least 100 MWH2out in electrolysis facilities, with an estimated generated quantity of at least 10,000 tons of renewable hydrogen per year due by December 2025.

The first competitive bidding procedure that was opened between 29 June 2022 and 31 August 2022, 7 financing contracts had been signed by 31 March 2023. Due to a series of aspects of administrative nature identified by the Audit Authority and the European Commission the contracts had amicable terminated and on 21 July 2023 the bidding procedure was relaunched

Romania is negotiating with the European Commission the Component 16 of the NRRP, the **REPowerEU chapter, with a total budget of EUR 3.04 billion**. The reforms and investments contained in the final form will be implemented largely through calls for projects.

The Modernisation Fund (MF)

With an expected budget of about EUR 15 billion in 2021 – 2030, the MF is one of the key funding instruments aimed at achieving the 2030 climate objectives, funded from revenues from the auctioning of allowances under the EU Emissions Trading System (EU ETS).

MF shall be implemented through key programs as defined in GEO no. 60/2022, developed based on the priority sectors.

Key programs:

- **Key program no. 1 - Renewable energy sources and energy storage**
- **Key program no. 2 - Replacing coal and balancing the network**
- **Key program no. 3 - Modernization and construction of new sections of energy infrastructure**
- **Key program no. 4 – Green hydrogen**
- **Key program no. 5 – High efficiency cogeneration and modernization of district heating networks**
- **Key program no. 6 – Nuclear energy**
- **Key program no. 7 – Energy efficiency in industrial installations covered by the EU-ETS**
- **Key program no. 8 – Biofuels**

In **October 2022**, the Ministry of Energy published for public consultation, under key program no. 1 the guidelines and state aid schemes for generation and use of electricity from renewable sources including for self-consumption.

Also, in **October 2022** within key program no. 3 a non-competitive procedure was launched, for investments in electricity distribution network with continuous submission until 30 June 2024.

In **March 2023** European Commission approved the schemes to support investments in new production capacities of electricity produced from renewable such as sources wind, solar, hydro biomass, biogas, geothermal, including self-consumption for enterprises and large enterprises in the agricultural and food sectors.

In **August 2023**, the Ministry of Energy published for public consultation, within the key program no. 1, the guideline for supporting investments in new renewable electricity generation capacity for self-consumption for applicants from the public sector.

Sustainable Development Program (PDD)

PDD will contribute to adapting to climate change by increasing energy efficiency and developing smart energy systems, storage solutions and the energy system, but also improving water and wastewater infrastructure, circular economy, conservation of biodiversity, air quality, decontamination of polluted sites.

Action 4.1. - Improvement of energy efficiency with a budget of EUR 23 mil. for renewable energy addresses small and medium enterprises (SME) and large enterprises that register energy consumption greater than 1,000 toe/year for investments achieving energy savings by replacing the equipment, refurbishment / modernization, monitoring and optimizing energy consumption, as well as the use of energy produced from renewable sources.

Action 4.4. - Promoting the use of renewable energy sources with a budget of EUR 50 mil. promotes the use of geothermal or biomass/biogas renewable energy and targeting administrative territorial units (ATU's) mature/approved projects from POIM 2014-2020.

Just Transition Fund (JTF)

Over the 2021-2027 period, JTF is a key tool for providing tailored support to six counties: Dolj, Galaţi, Gorj, Hunedoara, Mureş and Prahova, that most negatively impacted by the transition to a climate-neutral economy.

With an estimated budget of EUR 417 mil., JTF supports the investments in small-scale renewable energy capacities with a goal of achieving a total capacity of 285 MW that directly benef it ATUs (county, municipalities, cities, communes) and individual households.

Funds directly managed by European Commission

Connecting Europe Facility (CEF) for Energy

The CEF Energy is focusing on cross-border cooperation to optimise national efforts for the deployment of renewable energy and thus increase the security of the energy supply.

The call and application processes for cross-border renewable (CB RES) energy projects are implemented annually and are managed by the European Climate Infrastructure and Environment Executive Agency.

After receiving the CB RES status, it is eligible for funding for studies and works, and could also benefit from higher visibility, increased investor certainty and stronger support from EU countries.

Other financing instruments

Contracts for Difference (CfD) mechanism

CfD are an effective policy instrument to support renewable energy projects by assuring a stable revenue stream and providing a guaranteed price for the electricity generated.

CfD involve a two-way support payment as difference between the strike price and market reference price: the generator will be paid by OPCOM when the market reference price is below the strike price. Conversely, the generator pays OPCOM when the market reference price is above the strike price.

Funding of the CfD scheme is expected to come from Modernisation Fund resources, subject to approval of Investment Committee for Modernisation Fund and a CfD levy on the consumers.

The CfD scheme will involve two rounds of auctions, each with separate tenders for eligible generation technologies:

first round to be held by the end of 2023 for 1 GW installed capacity for the production of electricity from onshore wind and 1 GW installed capacity for the production of electricity from solar photovoltaic sources, and

second round to be held in the first half of 2025 for 1,5 GW installed capacity for the production of electricity from onshore wind and 1,5 GW installed capacity for the production of electricity from solar photovoltaic sources.

Project requirements:

- The project must be implemented in Romania.
- The project's proposed installed capacity must entirely comprise new electricity generation capacity and utilise only onshore wind or solar photovoltaic eligible generation technologies in order to produce and inject the generated electricity into the National Power System.
- The project's proposed installed capacity is equal to or greater than 5MW.
- The project must have at least the grid connection permit (Acord Tehnic de Racordare – "ATR") and the target commissioning date must not exceed 36 months from the anticipated date of signing of the CfD (i.e., December 2023 for the first round of auctions).

Power Purchase Agreements (PPA)

PPAs play an essential role in promoting RES, particularly wind and solar energy. PPA's can also be used as a financing instrument by securing a long-term revenue stream for developers. PPAs ensure predictable cash flow at fixed or indexed prices enchanting thus project bankability enabling developers to use PPAs as a warranty for bank loans.

Since 2021, according to GEO 143/2021, for amending and supplementing Law 123/2012 the participants in the wholesale electricity market are allowed to conclude PPA's bilateral contracts negotiated directly for the purchase of electricity for new investments in new capacities.

The NRRP reform aims to encourage the conclusion of bilateral PPA's by all renewable energy producers, outside the centralized market, freely and directly negotiated with final suppliers or consumers and with the possibility to be signed before the start of construction.

Florian Neagu
Deputy Director,
Financial Stability
Directorate, **NBR**

"The degree of bankability of many firms active in the field of renewable energy is satisfactory based on good liquidity and capitalisation indicators, which facilitates their access to bank financing. Financing the high level of investments needed in the field of renewable energy can improve through a more balanced structure of the liabilities side of the balance sheet and the banking sector in Romania could contribute have a decisive contribution in this direction.

Banking exposures in the renewable energy sector are of around

400 million lei

Accounting for

0,2%

of all loans granted to all firms in the economy

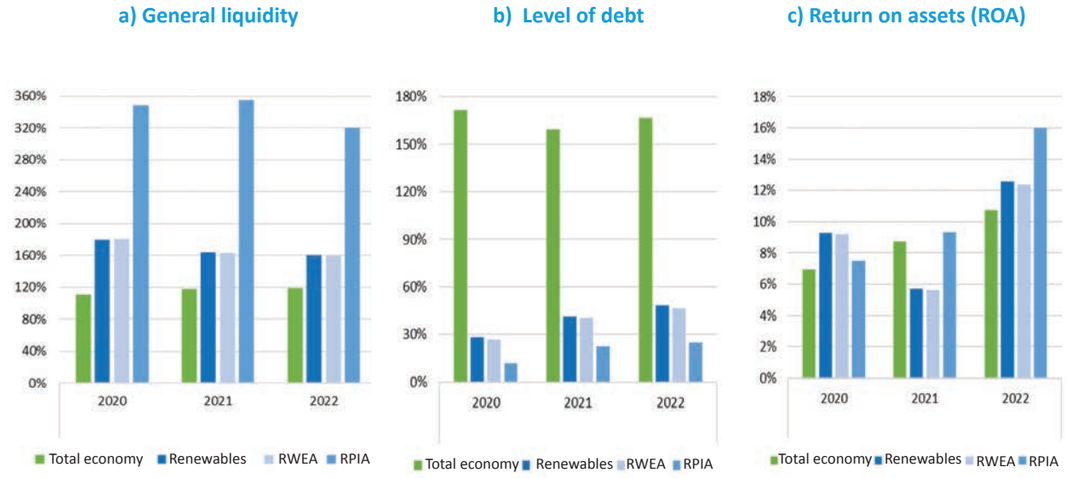
The economic and financial performance of the renewable sector has improved and conditions are met for a better management of energy shocks in the future

The economic and financial performance of the renewable energy sector[1] has increased between 2020 – 2022. These companies have a good liquidity position and their debt level, in spite of slight increase in the past few years, is significantly under average levels in the economy.

1. General liquidity in the renewable energy sector has slightly deteriorated beginning with 2020 (when it stood at 180.3%, compared to 160% in 2022), but it is significantly higher than that of the overall economy (118.9% in 2022, Fig 1.a). From this perspective, photovoltaic firms (RPIA) are characterised through a higher degree of liquidity, significantly above that registered by the companies which make up The Romanian Wind Energy Association (RWEA);
2. The degree of indebtedness, calculated as the ratio between debt and equity continued to increase in the past few years, reaching 48% (Fig 1.b), a figure situated well below the level of the economy in the tree years analysed (166.7% in 2022). The very low indebtedness level, although increasing, may reflect the fact that there is room for improvement of the balance sheet liability structure;
3. The return on assets (ROA) corresponding to this sector went up in 2022 to 12.6%, 2 percentage points above the average level in the economy (Fig1.c). The return has fluctuated in the past few years (ROA had a significant drop in 2021, to 5.7%, 3 percentage points under the overall economy level), especially following the increase of assets included in the balance sheet.

[1] This analysis takes into account Romanian companies that are members of RPIA and RWEA.

Economic and financial performance indicators in the renewable energy sector compared to the economy overall



Source: MF, NBR calculations

Financing sources used by companies in the renewable sector

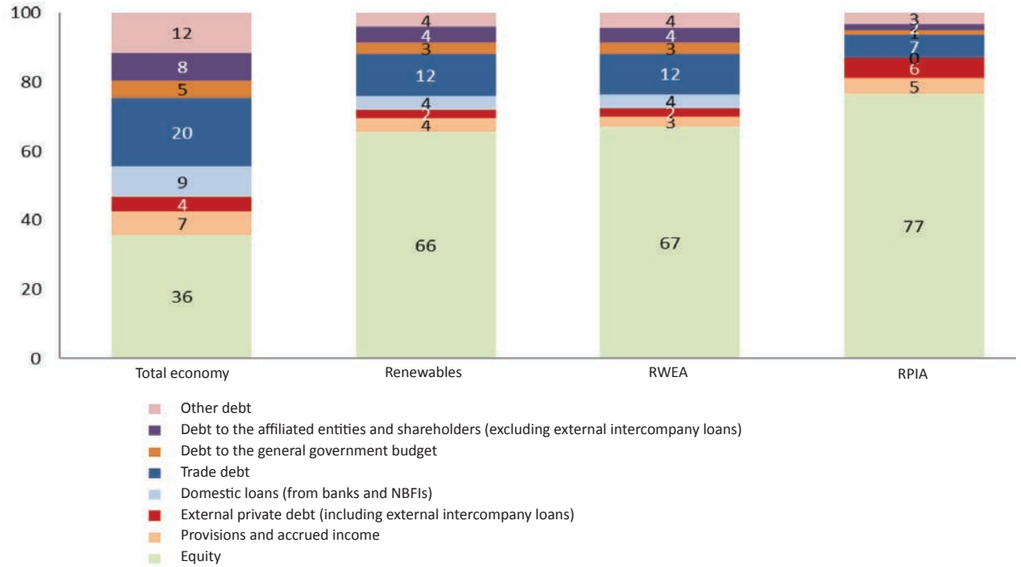
There was not much bank financing for the renewable energy sector in Romania during the analyzed period (T1/2021 – T1/2023), being oriented on short and very short term needs.

Considering the low level of banking loans for the renewable energy sector, a more detailed look at the financing structure shows that companies in this sector use , to a significantly greater extent compared to the rest of the economy, resources under the form of equity in the liabilities side of the balance sheet (66%, compared to 36% for the entire economy (December 2022, Fig 2). Another important financing source for this sector is represented by commercial debt, up to the level of 12% of their liabilities, lower than the economy average, where this source of financing represents approximately 20% of the liabilities (December 2022). The photovoltaic industry companies (RPIA) rely even more on equity resources (77% compared to 66% within the renewable energy sector), while commercial debt accounts for a lower percentage in the financing structure (7% vs. 12%, December 2022).

NBR Conclusions: the degree of bankability of many companies in the renewable sector is satisfactory, which facilitates their access to bank financing

The evolutions mentioned regarding the economic and financial performance of the sector point to two preliminary conclusions. First of all, the companies in this sector have an adequate capacity to face possible unfavorable evolutions and, therefore, to not translate them to their own customers. These are premises for a better management of energy shocks which also lead to temper inflation along the channel of energy prices. In counterpart to this effort that could be covered by renewable energy companies, authorities could ensure predictability in the legislative framework applicable to this area, so as to avoid repeating the problems of the last decade, as shown by the analysis of the CNSM working group (National Committee for macro prudential Supervision).

Financing structure for renewable energy companies compared to total non-financial companies 2022



Second of all, the degree of bankability of many companies active in the field of renewable energy is acceptable, based on good liquidity and capitalisation indicators, which facilitates their access to bank financing. Financing the high level of investment needed in the renewable energy sector may improve through a more balanced structure of the liabilities side of the balance sheet, and the banking sector in Romania may have a decisive contribution in this direction.

Promoting financing for green projects and supporting implementation of the European climate change agenda are topics that were considered important by the CNSM in the past few years.

In this respect *6/2021 CNSM Recommendation*[1] regarding green financing explicitly includes provisions to stimulate loans for the renewable energy sector, including to increase energy security. Monitoring the financial evolution of the renewable energy sector is a constant concern for CNSM.

[1] This analysis takes into account Romanian companies that are members of RPIA and RWEA.

George Gkiaouris
Regional Head Energy,
Energy Europe,
BERD

In order for Romania to realise its renewable potential it requires an investor friendly renewable climate, one that allows faster permitting approval procedures, that removes grid connection bottlenecks and provides a revenue stabilisation mechanism such as the proposed CfD scheme that is currently under implementation. In addition, reforms that will allow the transferability and export of Certificates of Origin could also provide broader routes to market for investors.

On the necessary measures to accelerate investments in renewables in Romanian

Interview

Given the current geopolitical and geoeconomic context, what structural solutions should Romania envisage to reach its decarbonisation targets and become a „game changer" in the region?

Romania needs to accelerate the phase out of coal and gradually reduce its dependence on natural gas and promote more investments in the renewables, grids and in storage solutions in order to meet its next-zero target. The Restructuring Plan of CE Oltenia approved by the EU Commission sits at the core of Romania's Decarbonisation Strategy and implementing it on time is essential. Moreover, harnessing its offshore wind potential in the Black Sea could make Romania a game changer in the region and through leveraging the grants from the Modernisation Fund and RRF that encourage the deployment of new renewable production capacities, Romania should be able to attract the investments needed to achieve carbon neutrality by 2050.

What measures do you see as necessary to accelerate investments in renewables and how can the Romanian economy increase its benefits from renewable energy development?

In order for Romania to realise its renewable potential it requires an investor friendly renewable climate, one that allows faster permitting approval procedures, that removes grid connection bottlenecks and provides a revenue stabilisation mechanism such as the proposed CfD scheme that is currently under implementation. In addition, reforms that will allow the transferability and export of Certificates of Origin could also provide broader routes to market for investors.

Which are the main opportunities and challenges for financing renewables in Romania? Are there any concerns that you encounter when assessing the projects to be financed? Is a long-term power purchase agreement a prerequisite for financing renewable projects?

Romania is one of the countries with a very strong potential to further develop renewables. With good wind and solar resources to develop large renewable projects. Romania has a liquid electricity market, well interconnected with its neighbours. Grid capacity remains one of the main challenges for realising this potential, together with the limited availability of corporate PPAs. Regarding the question on PPAs, as any financier, we take comfort from having one covering a significant portion of the energy output and it helps to improve the banking terms. Lately, we have also started reviewing project proposals that do not have a PPA yet and are exposed to merchant risk.

What are the financing programs run by EBRD to support renewable energy investments in Romania in the coming years? What criteria applicants need to meet for accessing the financing?

EBRD offers a wide range of financing instruments that are available for financing renewables projects ranging from project finance debt, corporate loans, to capital market investments in bond issuances and equity investments. We also finance renewables indirectly though lending to partner banks and through participating in equity funds focusing on energy and infrastructure. The criteria investors would need to meet are aligned to those of other financiers. However, EBRD puts a lot of emphasis on supply chain transparency and integrity (especially for PV projects) to ensure zero-tolerance to forced labour, as well as on ensuring the projects meet high environmental and social standards.

Hydrogen: a nice-to-have or must-have project on Romania's path to energy transition?

Hydrogen produced by clean electricity, is expected to play an increasingly important role in the energy transition, both as an energy vector and feedstock, particularly supporting sectors that are not easy to electrify (fertilizers, chemicals, refineries, steel, long-distance transport). Countries with high potential for producing renewable energy at low cost have the opportunity to produce and export low-cost hydrogen or low-cost hydrogen products. We therefore believe that given Romania's high renewable potential, hydrogen is an important opportunity that Romania should not miss.

World Bank
about financing solutions in renewable energy in Romania

Structural solutions that Romania should envisage to reach its decarbonisation targets and become a „game changer" in the region

The main actions include the removal of various legislative and regulatory barriers to investments in new electricity (and gas) production. The current market conditions (declining electricity generation as obsolete capacities are being closed, declining gas production, increasing demand, including from neighboring countries) provide strong incentives for such investments in normal market terms. Legal and regulatory barriers include the legislation to protect consumers (with regulated producer prices until 2025) and windfall taxation, as well as the frequent changes to such legislation and regulations. Additional challenges consist of difficulties connecting to grids and red tape in the approval process for new projects (construction permits, land use restrictions). Energy efficiency is also particularly important. The return to market prices in the energy market would facilitate market-driven energy efficiency measures for both households and industry. Well-targeted support from public funds (including EU) is needed for vulnerable consumers.

Necessary measures to accelerate investments in renewables and how can the Romanian economy increase its benefits from renewable energy development

The top priority is the elimination of legal and regulatory barriers and the full implementation of EU directives and regulations which provide for a well-functioning, competitive energy market. Investments from public funds should be prioritized to the modernization and digitalization of electricity grids (transmission and distribution). The investment plans of grid operators must also be consistently implemented. Significant EU funding from the Operational Programs, NRRP, and the Modernization Fund are available for such projects. The state aid to accelerate investments in renewables must be targeted at areas where the market does not provide incentives after all other non-market barriers have been removed. State aid for electricity generation (subsidies, support schemes etc.) needs to be competitive, available to all market players - state or private, and technology-neutral, provided they achieve the same public benefit such as reduction of emissions.

The main opportunities and challenges for financing renewables in Romania. The concerns encountered when assessing the future financed projects. The long-term power purchase agreement is a prerequisite for financing renewable projects

The financial viability and bankability of a project are in general prerequisites for financing energy projects. Long term power purchase agreements are one of such means to guarantee a financier that a renewable project will earn a steady flow of revenues over a longer period. There are also other possible instruments, such as guarantees of origin tradable within the EU, but also financial PPAs or contracts for differences.

Hydrogen: a nice-to-have or must-have project on Romania's path to energy transition

Hydrogen can be an important part of a country's energy mix, but it depends on the potential to source it and on a clear plan for its use. Different countries considered different roles for hydrogen, starting from the potential of green hydrogen and the needs for infrastructure to bring it to consumers. Most countries intend to use hydrogen for large industrial consumers and certain types of transport. The possible integration in existing gas networks depends very much on the types of consumers connected to the grids (industrial or households) and may be particularly challenging. To identify the adequate role for hydrogen, Romania needs to prepare a strategy and a plan how to produce or import green hydrogen and how to best use it.

Lara Tassan Zanin
Head of EIB Group Office in Romania
European Investment Bank

There are many opportunities for financing renewables in Romania, among which abundant resources, wind, solar, hydropower, and biomass, a regulatory framework building up, significant EU funds and resources to support the sector (the European Structural and Investment Funds, the European Green Deal, the Just Transition Mechanism, the Modernization Fund). The market growth potential is huge, and now it is time to deliver on both public and private sector projects, otherwise the potential will not materialise soon and fast enough, to the detriment of Romania's competitiveness in the region and in Europe.

About main opportunities for financing renewables in Romania

Interview

Given the current geopolitical and geoeconomic context, what structural solutions should Romania envisage to reach its decarbonisation targets and become a „game changer" in the region?

The EIB is strongly committed to support Romania in delivering green growth, including affordable and secure green energy to its citizens and businesses. EIB stands ready to assess investments for renewable energy **new capacity** production, **smart transmission** grid and **storage** facilities, and **energy efficiency** measures for households, public buildings, and industries.

In Romania, firstly renewable energy development must be focused on:

1. **expediting solar and wind projects**
2. **expanding transmission and storage facilities, and**
3. **promoting energy efficiency to consume less and better.**

Moreover, the cross-cutting priority to enhance regulatory framework and de-bottleneck permitting and licensing processes, remains critical to unlock Romania's renewable energy potential.

Secondly, Romania should continue fostering the availability of green finance and alternative financing by working closely with financial institutions, including the EIB, to facilitate access to funding for green infrastructure and equipment. A smarter use of EU funds including under the Modernization Fund would be beneficial to Romania, i.e. designing financial instruments to de-risk private sector investments in renewables and energy efficiency measures.

Additional measures streamlining energy efficiency across sectors—buildings, industrial processes, and transportation—can significantly contribute to decarbonization. Promoting energy-efficient technologies, conducting energy audits, and offering incentives for energy-saving investments are crucial steps. Electrifying transportation through tax breaks, subsidies for electric vehicles, and expanding charging networks is imperative.

Education plays a pivotal role, by raising awareness about climate change and how people's behaviour can mitigate it. Romania's ICT vocation can contribute reducing emissions by developing apps to promote and reward electric public transportation and cycling among the population. This cannot be achieved without the right support to sustainable urban investments, including in smart city solutions to optimize resource usage. A circular economy approach—recycling, waste reduction, and resource efficiency— and eco-design using new pollution-reducing materials in the construction industry are key.

To become a renewable energy and decarbonisation game-changer in Europe, Romania needs to progress on all the above domestically, while remaining mindful of its international role in the region, as EU border towards Russia, and of its potential contribution to position European's principles in Ukraine and Moldova. To do so, Romania needs to produce more green energy and be better interconnected – for example via more cross-border projects like the Black Sea power cable project with Georgia - in view of becoming a net exporter of green energy. Romania should continue to collaborate with neighbouring countries and international partners to promote regional energy integration, develop cross-border renewable energy projects and exchange best practices. This includes cooperation on research and development, that will lead to technological advancements and innovation in decarbonization.

What measures do you see as necessary to accelerate investments in renewables and how can the Romanian economy increase its benefits from renewable energy development?

As mentioned before, strengthening the grid's capacity to integrate the increasing production of renewable energy is crucial for the acceleration of investment in renewable energy. In addition, streamlining the approval processes for licenses and permits required by renewable energy projects and the introduction of subsidized power price support schemes will also contribute to boosting investments.

There are several measures that can help Romania accelerate investments in renewables and it is about targeting a right mix. Some key actions that the EIB emphasizes are regarding the regulatory framework, financial instruments, risk mitigation, project development, Public-Private Partnerships (PPPs), expanding and smarting the grid, and develop jointly with the universities the green skills and jobs demanded in the market in Romania and in Central and Eastern European region.

A stable regulatory framework is expected to boost long-term investors' confidence. Clear policies, including feed-in tariffs and renewable energy targets, will attract new private capital. Private sector involvement is crucial, public-private partnerships should be encouraged as they harness private expertise and capital, and private sector involvement can be promoted with the use of EU funds programming, from Modernization Fund to Resilience and Recovery Plan, to Just Transition Mechanism. Finally, tailored financial instruments i.e. risk-sharing facilities, will effectively support projects taking off the ground. Records say that financial instruments have bigger leverage than grants (with 1 EUR of EU funds, for example, 7-8 EUR of investments are mobilised) and have higher chances to bring good projects to life, as project promoters demonstrated to be more reliable when they have to repay a loan, instead of implementing grants.

The EIB plays a decisive role in providing financing through loans, guarantees, and equity investments; creating dedicated funds or facilities that focus on renewables that can help leverage additional private sector investments. The investment risks associated with renewable energy projects need to be identified and mitigated upstream: this can be achieved through mechanisms such as risk-sharing agreements, insurance schemes, and the provision of technical assistance to project developers. Reducing risks and improving project bankability can attract more investors and lenders. Also, the EIB offers project development assistance and technical assistance to facilitate the preparation and implementation of green energy projects, namely feasibility studies, capacity building, and knowledge sharing to enhance project quality and bankability. The EIB collaborates with public entities and local financial institutions to structure products that attract private investments and share project risks.

Investing in training programs and education to develop a skilled workforce for the renewable energy sector will create employment opportunities, enhance local expertise, and increase the economic benefits for the Romanian economy.

Which are the main opportunities and challenges for financing renewables in Romania? Are there any particular concerns that you encounter when assessing the projects to be financed? Is a long-term power purchase agreement a prerequisite for financing renewable projects?

There are many opportunities for financing renewables in Romania, among which abundant resources, wind, solar, hydropower, and biomass, a regulatory framework building up, significant EU funds and resources to support the sector (the European Structural and Investment Funds, the European Green Deal, the Just Transition Mechanism, the Modernization Fund). The market growth potential is huge, and now it is time to deliver on both public and private sector projects, otherwise the potential will not materialise soon and fast enough, to the detriment of Romania's competitiveness in the region and in Europe.

Romania aims to expand its wind and solar energy capacity in the coming decade, supported by a revised legal framework allowing long-term power purchase agreements (PPAs). These developments enhance the appeal of renewable energy projects to investors by reducing the need for significant equity investment, and, in turn, this enables capital to be reinvested in additional renewable projects, expediting capacity growth. However, Romania's PPA market is still in its early stages, not fully aligning with the potential for renewable energy expansion. The upcoming contract-for-differences (CfD) scheme could bridge this gap, offering further support to renewable projects, yet uncertainties about the CfD program's terms and implementation timing have caused delays and hesitancy among investors. The prolonged licensing and permitting process, averaging lengthy durations, also contribute to delays in finalizing critical contractual terms and project readiness. Additionally, the evolving but untested legal and regulatory framework necessitates thorough legal and regulatory due diligence, potentially causing further delays for investors.

Challenges vary depending on the project type and funding source, and if the project is public or private. Technical issues include project maturity including land acquisition, permitting/licensing readiness, lack of solid off-take agreements. On the financing, availability of sufficient equity from project sponsors is often an issue: while the EIB and commercial loans can complement sponsor funds, they cannot replace them. Finally, a clearer regulatory guidance and a streamlined approval process are essential to boost investor confidence and deliver Romania's new renewable energy capacity.

What are the financing programs run by EIB to support renewable energy investments in Romania in the coming years? What criteria applicants need to meet for accessing the financing?

In line with its Energy Lending Policy, EIB offers long term financing to renewable energy projects, via direct and intermediated loans. Loans can be extended directly to corporates promoting renewable energy projects or to special-purpose vehicles (SPVs) under a non-recourse/limited recourse basis. In addition, financing for renewable energy can be provided via the intermediation of partner banks. EIB financing can cover large amounts of the project costs (i.e. 50% of eligible project costs) and can come with a fixed or floating interest rate.

There are several EIB/EIF financing programs to support renewable energy investments in Romania. To mention a couple:

> **The EIB's Climate Action and Environment Facility (CAEF) aims to support climate change mitigation and adaptation projects, including renewable energy investments.** It provides long-term financing, technical assistance, and expertise to eligible projects.

> **InnovFin Energy Demonstration Projects targets innovative renewable energy demonstration projects.** It offers tailored financial products, such as loans, guarantees, or equity investments, to support the development and commercialization of cutting-edge renewable energy technologies.

Renewable energy investments are also eligible under many other products deployed by the EIB (senior and mezzanine lending, project finance, investment funds) and EIF (SMEs intermediated guarantees or equity funds of funds) under InvestEU or under the Resilience and Recovery Facility (PNRR in Romanian). To access financing from the EIB or its programs, applicants need to meet general and specific eligibility requirements, some of the which are:

1. technical and economical project viability aligned with the EIB's environmental and sustainability requirements,
2. sustainability and financial viability, demonstrated by comprehensive financial information, including cash flow projections, investment costs, and revenue streams,
3. environmental and social sustainability,
4. national and EU legal and regulatory compliance,
5. track record and expertise.

Hydrogen: a nice-to-have or must-have project on Romania's path to energy transition?

Hydrogen can be considered a "must-have" project on Romania's path to energy transition; hydrogen is emerging as a promising energy carrier and a potential solution for decarbonizing sectors that are difficult to electrify, such as heavy industry, long-haul transport, and district heating solutions. Hydrogen is seen as important for its decarbonization potential, , for its easy-storing, and for its balancing role in enhancing grid stability in periods where production from other renewable sources goes low.

While the above remain true, it is worth noting that hydrogen deployment needs to be balanced with other decarbonization options and that the EIB emphasizes a technology-neutral approach, promoting a mix of solutions tailored to specific contexts and considering the cost-effectiveness, environmental sustainability.. Therefore, from the EIB's perspective, hydrogen can play a crucial role in Romania's energy transition journey, but it should be assessed in conjunction with other renewable energy sources and energy efficiency measures to ensure the most effective and sustainable pathway to decarbonization. Hydrogen can definitely attract further investments, including private capital, related to hydrogen production, distribution, and utilization. Hydrogen can bring secondary positive economic effects as it offers prospects for innovation and clean tech developments, as well as job creation.

To conclude, **hydrogen is a space that must be watched in the green energy transition, particularly for countries like Romania, rich in water that is heavily requested to produce hydrogen with the currently available technologies.** The hydrogen technology though is still a moving target with some concerns on performance and on circular economy considerations (water consumption). Each country including Romania should follow closely hydrogen technology evolution so to adapt timely national and industrial strategies and capitalise the best gains for its own economy, depending on other domestic factors such as alternative sources, energy mix, resource availability, industry demand etc.

Commercial banks' contribution to a greener economy

We are already on an irreversible path of energy transition, with a clear agenda adopted at EU level to reach „net- zero" emissions in the following decades, and commercial banks play an extremely important role in this process. In essence, through the financial products offered, they set the course for the projects where the flow of capital will go for a greener, more sustainable economy. In turn, banks have their own targets for "green loans". For the year 2023 alone, in Banca Transilvania, the target for financing renewable energy and energy efficiency projects exceeds 100 billion euros.

The banks' financing products are aimed both at small, prosumer projects (producing energy from renewable sources for own consumption) or EPC, as well as big projects, through project finance structures adapted to the renewables market. The latter are meant for projects with a minimum financing need of over 2 – 2,5 million euro, with installed capacities exceeding 5 MW.

The separation among types of banking products has to do with investor typology and matching the investment need with the typology of the product. Until this moment, the largest share of financing was oriented towards corporate customers, who opted for the production of energy for own consumption, not in order to sell it on the market. We are currently working on a portfolio for large "green" projects. We are already working on three such products that we hope will come to fruition.

Current financing conditions compared to the first wave of investment in renewable energy

Whereas during the first wave of investment in renewable energy the legislation was not adapted, things have become clearer in the meantime, especially with respect to public private partnerships - here is where we can see major changes. Nevertheless, for reasons that are related more to market mechanisms and price volatility, this mechanism did not work. Our main concern was investors and consumers' fear of getting stuck in long term projects at a fixed price, in the context of price volatility. This feeling of reluctance will persist until the balance between demand and offer on the market stabilises on the medium and long term.

Romulus Andrei
Director Structured Financing
Banca Transilvania

"Those who will manage to implement the projects announced for the period 2023 – 2025 are those who will manage to stay on the market and they will be interesting players. Those who will not be able to seriously implement in the next 2-3 years either will sell or will give up because they will not have managed to ensure the financial or technical capacity needed to take the project to fruition.

The bank's financing products are aimed at smaller projects (prosumers or EPC) and large projects with a minimum investment need of

2-2,5 million euros

and an installed capacity of

5 MW

At this moment, there are clear signs that private public partnerships are beginning to be used and complementary financing instruments are being developed. Banca Transilvania has also revised its initial policy, going for for several options, such as bridge PPAs, agreements through which, for a period of 2-4 years, the customer continues delivering energy on the spot market, relying on the cash flow generated there. We are also looking at the possibility of accepting 100% of the cash-flow generated by the spot market, as well as options such as 50% spot market - 50% PPAs or PPAs with a progressive price throughout the duration of the loan.

Financing costs

We cannot say that there are specific financial costs for such renewable energy projects. In general, those who become prosumers obtain financing through the traditional corporate finance products. Those who want to produce and sell energy on the market and not for own consumption fall under project finance, where the risks are higher. The margins applied there are similar to those applied for other types of projects: for bilateral financing, the margin is between 3 and 3.5% plus EURIBOR, plus a commitment fee. For a club loan or syndicated loans, we have additional fees. The lending period is of 10-12 years.

Financing challenges

Certain challenges have to do with the energy system itself : there are more and more prosumers - including the big energy consumers who want to access credit lines for investments in own consumption power stations - and a transmission and distribution network that already struggles to absorb energy and balance the system. Others are related to bureaucracy: the grants offered by the Romanian state through financing programmes such as PNRR could use improvements. Banca Transilvania, together with other financial institutions in the country, has been actively involved in this process, for the last year and a half, by issuing comfort letters for PNRR funds. It is disappointing, including for investors, that these efforts have not yielded any results yet: instead of leading to cofinancing, in some situations, such as the Hydrogen pillar, new comfort letters need to be issued and the analysis process must be resumed.

How much is opportunity, how much is sustainable investment in energy

According to official figures, the projects announced (especially those related to photovoltaic stations) are if we look at the power to be installed, much higher than the capacity of the transmission and distribution grid can take over and distribute to the end consumer. Many of these projects are motivated by opportunity and don't stand many chances of becoming reality. Then there is the ready to build market, projects that are brought to this stage and then sold. The aim of the developers is to bring the project to the ready to build stage and then cash in. The construction and operation are left to companies who have the financial capacity and knowledge in this field.

Many projects have been announced, there is a bubble tendency on the market. Only Banca Transilvania has been contacted fo investment projects that easily exceed 3 GW. But few of these will materialize. Those who will manage to implement the projects announced for the period 2023 – 2025 are those who will manage to stay on the market and they will be interesting players. Those who will not be able to seriously implement in the next 2-3 years either will sell or will give up because they will not have managed to ensure the financial or technical capacity needed to take the project to fruition.

Banca Transilvania does not intend to finance these opportunistic investors. We want to finance groups and companies that have experienced shareholders, qualified management or who will manage to attract the necessary experience to develop and operate such power plants.

Dan Drăgan
Secretary of State
Ministry of Energy

I estimate a minimum installed capacity of 2 GW in renewables in the next 2-3 years, including household and industrial prosumers.

With hundreds of billions of lei made available through national and European programs and dozens of new projects announced, green energy is once again the "star" of investments in the Romanian energy sector. The key year will be 2026 when new renewable capacities should come into operation to cover also the gap left by coal-fired units which, according to the law, must be closed, explain Dan Drăgan and Elena Popescu, representatives of the Ministry of Energy, in a interview to the Code of Good Practice.

Interview

What is the development strategy for the renewable sector in the next 2-3 years in Romania and what are the key investment projects in this area, in order to reach the assumed decarbonization targets?

Dan Drăgan: There are two strategies that we pursue in the central plan to decarbonize the national energy system: the development of renewable generation, and here we are talking about all sources of renewable energy and the medium- and long-term creation of generation capacities based on nuclear technology and the use of gas as a transition fuel. If we are to refer strictly to renewables, apart from the fact that we are now working on revising and updating the PNIESC and, consequently, the targets that will result from the aligning with long-term strategies, we also have concrete steps taken in this direction through the PNRR and the Fund for Modernization.

Through the PNRR, we have a target of 950 MW installed in renewables through the two technologies, solar and wind, with an allocation of 600 million euros; we already had a call for projects. The requests were more than double the amount available and we are now analysing the projects and naming the winners. We are convinced that more than 950 MW will be achieved. We had Q2 2024 as the implementation deadline, but we are currently discussing moving the deadline by one semester.

On the other hand, in this direction, but not necessarily related to renewables, we have the contracts signed for high-efficiency cogeneration for urban heating and the heating agent generation, and electricity as well, through some new, flexible plants. Contracts were signed with municipalities, for example, from Constanța, Arad. Next is Craiova, which is under analysis. All these capacities, apart from being very efficient and flexible, also give greater gearing and the possibility to connect new renewable sources through the flexibility they bring to the system.

At the same time, for the development of new renewable capacities, we must also have a grid, and **contracts for new transmission lines with Transelectrica, lines and stations worth 430 million euros were signed last year through the Modernization Fund**. **A 1.1-billion-euro distributor scheme has also been developed, with 200 million euros co-financing.** Projects have been submitted; they are under analysis. We hope that in the shortest time we can sign the contracts for the submitted applications, the first 100 million euros.

A very important thing is the restructuring plan of the Oltenia Energy Holding, which provides for the creation of generation capacities from renewable sources of photovoltaic type, of 730 MW in 8 SPVs and, at the same time, of capacities of 1,325 MW in combined cycle: 475 MW at Turceni and 850 MW in Isalnita.

We are in the final form stage of the financing contract for these SPVs, I am convinced that we will sign the contracts in the shortest time and the implementation I think will take place at a fast pace, in 2-3 years because they have land, they have evacuation , they have all the infrastructure.

There are also initiatives by some companies to develop new renewable capacities. For example, Hidroelectrica has expressed desire to build significant capacities of floating panels on lakes, of over 1.5 GW.

Elena Popescu: We are now working on finalizing the regulatory framework necessary to implement the **Contracts for Difference** mechanism, to support investments in low-carbon technologies. We are already in talks with the European Commission, with DG Competition, about the state aid scheme for the development of 10 GW of capacity from renewable energy sources. We made the pre-notification in December 2022.

Within the new State aid Temporary Framework for Ukraine, we intend, as indicated, to split the CfD scheme - 10 Gigawatts until 2030 - into 5 GW by 2026 and another 5 GW by 2030, the latter entering the standard State aid assessment procedure.

The CfD scheme will involve two bidding rounds, each with separate bids for eligible power generation technologies – onshore wind and solar photovoltaic – with a total capacity of 5,000 MW.

The targeted capacities are:

2,000 MW

Installed capacity of 1,000 MW for onshore wind power generation and 1,000 MW for solar photovoltaic electricity generation, both as a result of the first round of auctions to be held by the end of 2023 ("CfD 2023 auction"); and

3,000 MW

Installed capacity of 1,500 MW for onshore wind power generation and 1,500 MW for solar photovoltaic electricity generation, both as a result of the second round of auctions to be held in the first half of 2025.

There are many projects and programs focused on the renewable sector, but is the transmission infrastructure ready to take over the entire energy generated?

Dan Drăgan: The connection part is very important and there are tools made available to the electricity transmission company and to distributors to strengthen their grids: from the construction of grids and stations to digitalization and monitoring and digitalized transmission systems. If necessary, the funds can be supplemented.

Transelectrica also plans to increase the interconnection capacity to 5,000 MW by 2027, so there will definitely be times when we will be exporters, times when we will be importers of electricity, depending on the production from renewable sources.

It is very important to develop the strengthening and the expansion of the grid in accordance with the new generation capacities, probably smaller, more dissipated. If we take the distribution grid and the Transelectrica grid, there are two billion euros available now.

What installed renewable energy generation capacities do you expect in the next 2-3 years?

Dan Drăgan: On the renewable energy side, I expect, through all the programs carried out in Romania, an installed capacity of around 2 GW; it also includes household prosumers, industrial and independent producers. I know that there are capacities under construction that do not benefit from any support scheme, we are talking about several hundred MW. So I estimate a minimum of 2 GW of renewable energy in the next 2-3 years connected to the grid. On the other hand, to balance them, we have to see that next year Romgaz will put into operation the Iernut plant, there are 430 MW on combined cycle, to help the capacities from renewable sources.

How do you see the positioning of Romania at the regional level from the point of view of the renewables sector, including the value chain?

Dan Drăgan: Through PNRR, when we built the renewables part, we also thought about bringing as much as possible from the production part, of added value, to Romania. We have a call for projects to produce batteries, for example, and the production of photovoltaic panels. These calls have been closed and the evaluation part follows, depending on the discussions with the European Commission.

Elena Popescu: Romania's position in the region also depends on investors who resort to financing programs, if they move at the pace they should, because by accessing these funds they have the obligation to meet deadlines. We know that there are difficulties on the value chain because everyone wants to develop renewables now, not only Romania, especially since the whole of Europe has extraordinarily ambitious targets for 2030. They are now working on even more ambitious targets for 2040. For 2030, negotiations have not yet been finalized, but it is clear that there at least 40-42% renewables are envisaged at European level.

How do you see the evolution of the legislative and taxation framework in the coming years, both for the development of photovoltaic and wind projects (onshore and offshore)?

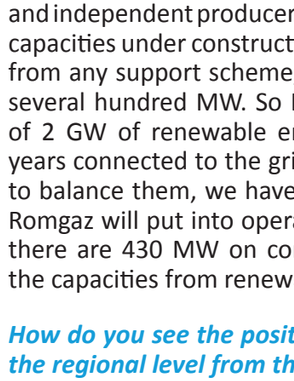
Dan Drăgan: At the moment, I don't see any changes because there is a strong desire to support renewable energy. It is also important that these financing instruments are granted taking into account CAPEX, they will not be borne by the end user, like it happened in the case of green certificates, therefore the pressure on the end user and probably the need for additional financing on the price variation will be lower. So I don't see significant changes at the moment, for investments in new capacities.

As for the legislation on exploiting offshore wind energy, we hope it will be adopted in the current legislature and we want the development of a pilot project in the Black Sea by 2025-2026. Hidroelectrica would like a partner to develop a pilot project, to test what the evolution would be and what it would involve, but that requires a primary regulatory framework and, after that, a secondary regulatory framework. There are all kinds of aspects that need to be clarified.

What are the "Good Practices" of the renewable sector at the local level that you think should be multiplied in the coming years?

Dan Drăgan: We saw a major interest, including in the last call for projects for storage. There are many large industrial consumers who want to install significant capacities, tens of MW, in both technologies, which pleases us from two perspectives. Firstly, they will have increased productivity through lower energy costs, since they will only have depreciation and maintenance costs for the respective capacities, they will no longer pay all the regulated taxes (before they represented 60% or even more of the energy price), they will no longer be exposed to very high volatility in the market. Secondly, the storage is important.

Elena Popescu: I often hear "Romania has potential and does not use it". Indeed, there is potential, but it must be used not only in a certain area because this creates congestion, network problems, issues that can lead to blocking the development of new capacities; the investors should explore the potential for renewables across the country. Now we also have the offshore wind opportunity in the Black Sea. It is good that we have so many investment opportunities, but the most important is to implement them in order to achieve our targets and ensure the necessary electricity in the energy system. Coal-fired capacities are shutting down as we have an obligation through the decarbonization law, an important milestone in PNRR, Unit 1 from Cernavoda enters refurbishment at the end of 2026... If the investments mentioned above are not made on time, we will have big problems of adequacy, of ensuring the necessary energy in the country and at the regional level.



In my opinion, 2026 seems to be a key year for the energy sector in Romania because we have investments that must be made on time and in the allocated budget. Most of the coal-fired capacities are shutting down, Unit 1 from Cernavoda enters refurbishment starting January 1st, 2027, so another 680 MW disappears from the system for two years. The investments we have programmed in PNRR and the Modernisation Fund must be implemented so that the energy system can meet the demand and challenges in the coming years.

Elena Popescu
General Director
Ministry of Energy

5 Route to market
Selling electricity from renewable sources

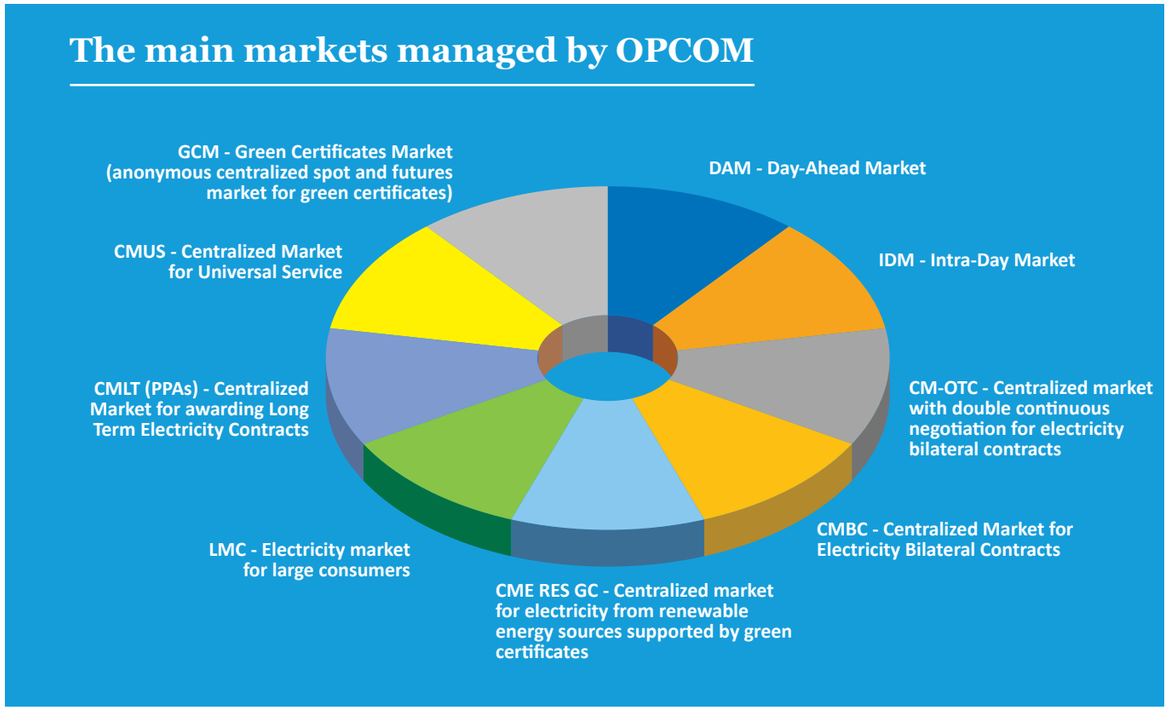
Centralized market mechanisms

Volatility and Liquidity. These are the two words that have dominated energy markets over the past two years, not only in Romania but also in Europe, amid high energy prices and the war in Ukraine. Locally, over 50% of electricity volumes are traded on a single market (Day-Ahead Market, DAM) - managed by OPCOM - well above the European level, maintaining the most liquid energy market. Looking forward, we are expecting diversification of trading instruments, thus part of these traded volumes will move from DAM to bilateral transactions. In this context, it is important to know which trading instruments a producer can use to trade electricity.

The producer may sell electricity on the wholesale electricity market through (i) transactions concluded on organized electricity trading markets or (ii) bilateral transactions directly negotiated.

The main energy market is the one managed by Societatea Comercială Operatorul Pieţei de Energie Electrică - OPCOM S.A. (OPCOM), established in 2000 as a subsidiary of Transelectrica S.A. and fully owned by it. OPCOM administers a number of trading mechanisms for electricity on the spot or term markets but it also has trading mechanisms dedicated to the electricity from renewable sources, to green certificates or system services.

The Day-ahead and the Intra-Day markets in Romania have gone through various stages of coupling with the regional and European energy markets, and now they operate coupled with the energy markets at the European level, at the Day-Ahead market level, and in a regime coupled with 24 states at the Intra-Day Market level.



The Centralized Market for electricity from renewable sources supported by green certificates is a combined market, where electricity is traded together with green certificates as a single product. Only holders of electricity production licenses from renewable energy sources who benefit from or have benefited from the promotion system through green certificates can register as sellers on this market, including natural or legal persons who, according to the legal provisions, can carry out activities in the electricity sector without holding a license granted by ANRE.

Starting with 30 March 2022, the Romanian Commodities Exchange was also licensed as an administrator of the wholesale electricity market, announcing in June 2022 the launch of futures contracts trading with electricity as an asset.

Long-Term power purchase agreements (PPAs)

Directly negotiated bilateral transactions (outside of centralized electricity markets) were banned in Romania in 2012 and partially re-allowed in mid-2020 (only for new capacities commissioned after 1 June 2020) and, in full, starting from 1 January 2022.

These directly negotiated bilateral transactions involve the negotiation and conclusion of long-term power purchase agreements (PPAs). The main advantage of this type of contract consists in ensuring a stable source of income, over a long period of time, thus allowing the realization of an appropriate business plan and mitigation of risks related to the investment in production capacities from renewable sources. These contracts are also considered an essential condition for access to financing in order to develop projects from renewable sources. The offtaker is usually an electricity supplier with good financial standing, which is also an important advantage for the producer and the financial institution financing the project.

Aggregation

A relatively new way of trading electricity (as of 2020) is through an aggregator.

An aggregator is an entity - natural or legal person - that combines the loads of several customers or the electricity produced from several sources in order to sell, buy or bid on any electricity market and that licenses itself for the activity of aggregation.

From the producer's perspective, the advantage of trading electricity through an aggregating entity is the possibility of offering more attractive products (from the point of view of production sources, capacity, term etc.) but also a reduction of the costs related to trading on centralized markets, given that the aggregator joins the market and assumes all related obligations on behalf of all the producers it aggregates.

Lately, there has been a growing trend of interest from large consumers in energy-intensive sectors (e.g. heavy industry and technology) to enter into such contracts for the purchase of green energy ("corporate PPAs"), the purchase being usually mediated by a supplier who intervenes in the producer-consumer relationship. This trend can also be found in Romania, where we can see the interest of large consumers in having access to instruments that ensure a fixed price of electricity for a certain period of time, as well as access to green energy through the purchase of guarantees of origin.

There are two main types of long-term power purchase agreements (each with a number of variants), respectively (i) those involving the physical delivery of electricity and (ii) financial or virtual contracts - "financially settled (virtual) PPAs" -, the latter not involving the physical delivery of electricity, being financial and risk management instruments (hedge) for the electricity prices.

Contracts are usually structured according to the delivery profile so that there are contracts with fixed quantities – a fixed quantity based on a predetermined hourly profile, or fixed monthly, quarterly or annual quantities – and contracts with variable quantities – an agreed percentage of production at a fixed price or at a reference price based on the spot market price without the obligation to deliver a fixed quantity.

The tenor of the contract varies depending on the liquidity of the market and its degree of maturity. In more mature markets, such as those in the Nordic countries, we see long terms, even reaching 15 or 29 years, while in the less developed markets in this sector we see shorter terms, the typical one being around 10 years. In Romania, based on the transactions announced in the last two years, the term is approximately 7 years, with shorter terms in the case of corporate customers.

Guarantees of origin

Guarantees of origin are electronic documents with the unique function of providing a final consumer with proof that a share or quantity of energy has been produced from renewable sources (RES). Guarantees of origin are issued by ANRE at the request of an electricity producer for the electricity produced from RES and delivered to the electricity grid and are transferred electronically through the unique Register of guarantees of origin. At this tiFor the moment, the guarantees of origin have no monetary value, but can be transferred electronically (a) from one producer to another producer; (b) from a producer to a supplier of electricity; or (c) from a supplier holding guarantees of origin to another supplier.

Although the legislation provides that the transfer of guarantees of origin takes place separately or together with the physical transfer of electricity, in practice there are a number of difficulties related to the fact that the regulatory authority considers only a transfer of guarantees of origin together with the physical delivery of electricity would ensure traceability of the source of electricity and avoid double counting of the energy from renewable sources. The guarantees of origin are considered used in the situation where an electricity supplier uses them, at the request of a final customer, to prove the correctness of the information contained in the label of the electricity supplied.

The legislation related to guarantees of origin is being amended and updated and a series of clarifications are expected regarding their transfer including to other states in the European Union.

Case Studies

DLA Piper is the first law firm in the world to enter into a corporate PPA as offtaker of green energy

In January 2022, DLA Piper concluded its own virtual corporate PPA with NextEnergy Group, relating to the energy generated by a new build solar farm in the UK. The project will generate 13 MW of additional renewable energy that will be supplied directly to the UK's national grid and thereby by the interconnected power network supplying DLA's 15 European and UK offices. The power generated by the solar farm will be at least equal to, but likely in excess of, the power used by these offices.

The process of procuring, negotiating and finalising DLA Piper's own corporate PPA has bolstered and added a new perspective to the existing expertise of our corporate PPA team as to the entire process needed in order to sign such a contract.

Ecolab Inc.'s PPA in Finland

Ecolab Inc. has signed a 10 years corporate power purchase agreement (PPA) with renewable energy investment and asset management firm Low Carbon. The PPA relates to the energy generated by the Mörknässkogens wind farm in Finland, which, once constructed, is expected to generate 100 GWh of renewable energy annually, displacing more than 20,000 tones of CO2 emissions a year. This is the equivalent of bringing new renewable power onto the grid in a volume equal to the power consummated by all Ecolab's European sites.

The entry into this PPA builds on the investment in new renewable energy already made by Ecolab in North America, where it entered into a PPA in 2018, in respect of a renewable project with sufficient generating capacity to bring new renewable power onto the grid equal to the power consummated by its entire Borth American operations.

As legal adviser, DLA Piper's team worked with the client to ensure a risk profile consistent with their existing PPA in North America, whilst ensuring that the positions taken were adapted to reflect the European market where necessary.

Paula Corban
Partner
DLA Piper

The law firm's entry into a PPA is a major milestone in DLA Piper's journey to decarbonise and supports its commitment to halve the green gas emissions in absolute terms by 2030. As part of DLA's science-based targets, this covers reductions across the firm's entire value chain, including indirect greenhouse gas emissions from the supply chain against a 2019/2020 baseline.

Giacomo Billi
Founder and
Managing Director
Alive Capital

We're seeing a growing interest among large energy consumers in Romania for long-term green energy procurement contracts (Corporate PPAs). This reflects the global trend in adopting renewable energy and sustainability in the energy sector.

Alive Capital manages over

13%

of the total E-RES producers in Romania and

24%

of the PV capacities in Romania.

At this moment, in Romania, more than 50% of the electricity volumes are traded on a single market, namely on the Day-Ahead Market (DAM) managed by OPCOM. What are your expectations for the next years? How do you see the diversification of trading instruments?

Given the possible repeal of the legislation and regulations regarding the price capping and energy super levy, it is expected that liquidity in the energy markets will increase and new energy exchanges to develop in Romania in the coming years. This diversification of trading instruments could bring significant benefits for the power market.

Through the introduction of new power exchanges and other trading instruments such as futures, options and long-term contracts (PPAs), the efficiency and transparency of trading can be improved, the risks associated with price fluctuations can be reduced and a more attractive environment for investments in the renewable energy sector can be created.

The diversification of trading instruments can also contribute to the development and consolidation of the electricity market in Romania, offering more options for producers, consumers and suppliers. This could lead to a greater competition and thus to more competitive prices, as well as stimulating the development and implementation of innovative renewable energy solutions.

In conclusion, in the absence of price capping and the super levy, an increase in liquidity on energy markets and diversification of trading instruments in Romania is expected in the next years. These developments can bring significant benefits to the energy sector, promoting the development of renewable energy and creating a more competitive and innovative environment.

How mature is the local market for the diversification of electricity trading instruments?

The electricity market in Romania has gone through a significant development process in recent years, but the level of maturity in terms of diversification of trading instruments may vary depending on the delivery term.

Here is a general assessment of market maturity in this regard:

Day-Ahead Market (DAM): managed by OPCOM, is the most commonly used electricity trading platform in Romania. This ensures short-term trading of electricity. In this regard, the DAM market can be considered mature and functional.

Centralized Market for Electricity Bilateral Contracts (PCCB): The Centralized Market for Electricity Bilateral Contracts allows medium to long-term (usually monthly, quarterly or yearly) trading and is in a stagnant phase, lack of liquidity due to the new regulations.

Long-term contracts (PPAs): Regarding long-term contracts for the purchase of green energy (PPAs), this market is still in an early stage in Romania. Although there is interest from large energy consumers and investors in renewable energy, the number of PPAs concluded is still limited. In this sense, it can be considered that the PPAs market still has a low level of maturity in Romania.

In other countries, there is an increase of large energy consumers who are interested in long-term green energy (PPAs). Do you see interest in this direction also in Romania?

Yes, we're seeing in Romania a growing interest from large energy consumers for long-term green energy contracts (PPAs). This reflects the global trend in adopting renewable energy and sustainability in the energy sector.

There are several reasons that support this interest in the direction of PPAs in Romania:

Reduction of greenhouse gas emissions: large energy consumers in Romania, including industrial companies, are more and more interested in reducing the impact on the environment and aligning with sustainability objectives. Purchasing green energy through PPAs allows them to reduce their greenhouse gas emissions and meet their environmental commitments.

Price stability and risk management: PPAs can provide long-term energy cost stability, allowing consumers to hedge against energy price volatility and better plan their budgets. PPAs can also help manage risks associated with price fluctuations of the fossil fuel.

However, it is important to note that the development of the PPA market in Romania is at an early stage. There are certain obstacles and challenges, such as lack of predictability for prices, regulations and infrastructure that can influence the rate and expansion of PPAs in the country. However, the increased interest in this direction indicates there is potential for the development and growth of the PPA market in Romania in the near future.

What are the obstacles currently encountered in concluding these long-term electricity sales contracts?

In Romania, there are several obstacles encountered in concluding long-term energy contracts (PPAs). These include:

Energy regulations and policy: The legislative and regulatory environment can have a significant impact on the development and implementation of PPAs. Sometimes existing regulations can be complex and a greater clarity and stability may be needed to increase investors confidence. There is also a need for alignment with long-term energy and sustainability policies to facilitate the development of the PPA market.

Infrastructure and connectivity: The availability and quality of electricity grid infrastructure can be a challenge in concluding PPAs. Sometimes, further development and upgrading of the energy transmission network is required to allow new projects to be connected to the grid.

Financial risks and credit assessment: Concluding a PPA may involve an assessment of the financial risk and solvency of the parties involved. Investors, suppliers and consumers may be reluctant

to commit to long-term contracts due to the unpredictability of the energy price, respectively large price fluctuations, financial uncertainties and credit rating.

Contract negotiation and complexity: Entering into a PPA can involve complex negotiations between green energy producers, suppliers and large consumers. Such contracts must address issues related to prices, quantities, duration, delivery and other commercial terms. This may require specialized legal and technical expertise.

Do you currently have such contracts in preparation? At what stage are they and when do you see them materializing?

Yes, we currently have such long-term contracts (PPAs) in preparation. They are in the negotiation stage, and the term of concretization depends on the agreements that will be reached between the parties. We work closely with all parties involved to reach a beneficial and fair settlement. Although I cannot provide an exact date for the completion of negotiations and the conclusion of these contracts, we are confident that we will complete them in the near future after reaching an agreement satisfactory to both parties.

Romania, at legislative level, recognized and accepted the conclusion of PPA contracts, by introducing them in the Electricity Law nr. 123/2012, but it has yet to create a framework through which these contracts can be concluded without too high risks for one of the parties. I hope that we will have soon liquid markets for electricity trading, for financial contracts, for guarantees of origin, for hedging contracts, in order to have flexibility and liquidity.

6 The prosumer
Legislation and practical guidance

Prosumer connection

The good news is that the number of prosumers is growing in Romania. Grid-related procedures have also been considerably simplified, and they now benefit from special rules on connecting power generation capacities to electricity grids. The question is how do we integrate them into the energy market and at what cost? The biggest challenges remaining are the investments in grids in order to maintain voltage quality and in energy storage solutions.

Simplifying prosumer connection procedures

The regulations applicable to prosumers have witnessed important developments in recent years, effectively leading to the simplification of connection procedures and widening the range of facilities they can benefit from. These measures, together with clearer and more extensive public communication, both from the authorities and from private operators, led to a "boom" in this sector, in parallel with the second wave of development of large-scale renewable power plants.

The procedures for connecting prosumers to the grid are now substantially simplified, as they have benefitted since March 2022 from special derogatory rules from the general regime regarding the connection of energy capacities to electrical grids (Order No. 19/2022 for the approval of the Procedure regarding connection to electrical grids of public interest in the case of the places of consumption and production belonging to the prosumers), to the extent that the total installed capacity does not exceed 400 kW per place of consumption.

On the other hand, in the case of an existing consumption location to which an E-RES production facility is connected, the procedure is even simpler, with the prosumer having to send to the distribution operator, after the completion of the works for installing the production capacities, a notification accompanied by relevant documentation.

The future prosumer goes through the following stages for the situation of a new place of consumption and production

1 Submission of the connection request to the distribution operator and the related documentation to obtain the technical connection approval

2 Establishing the connection solution to the electrical network and issuing the ATR

the connection solution is established through solution sheet, and the ATR is sent to the prosumer within a maximum of 15 working days from the date of submission of the connection request and the complete documentation

3 Conclusion of the connection agreement

the operator communicates the signed draft of the connection agreement to the prosumer, within 3 working days of the prosumer's request in this regard, after the issuance of the ATR

4 Performing the connection works to the electrical grid and putting the connection installation into operation

at this stage, in parallel with the connection installation works, the works related to the installation of the prosumer's production capacities will also be performed

5 Energizing the utilization installation for the trial period

the trial period is a maximum of 5 working days from the commissioning date of the connection installation

6 Issuing the connection certificate

the distribution operator issues and communicates the connection certificate to the prosumer, ascertaining the capacity as prosumer, within a maximum of 3 working days from the date of submission of the commissioning reception minutes

7 Final powering of the utilization installation

within a maximum of 2 working days from the date of issuance of the connection certificate

After this moment, only the last three stages described previously need to be followed, starting with energizing the utilization installation for the trial period, provided that the connection of the electricity production capacity does not determine an increase in capacity compared to the approved capacity of the respective consumption place (as stated in the relevant connection certificate).

To the extent that it is necessary to increase the approved capacity mentioned in the connection certificate of the respective place of consumption, the prosumer will submit the connection request as a result of the modification of certain technical elements exceeding the previously approved capacity, before the construction of the production facility, following the previously described procedure for connecting a new consumption and production site (starting with the stage of establishing the connection solution).

Sale of electricity surplus by prosumers

Prosumers owning production facilities with an installed capacity (Pi) of no more than 400 kW per point of consumption can sell excess electricity (the amount injected into the grid when the production of its installationsexceeds the actual consumption of the prosumer) directly to their electricity supplier.

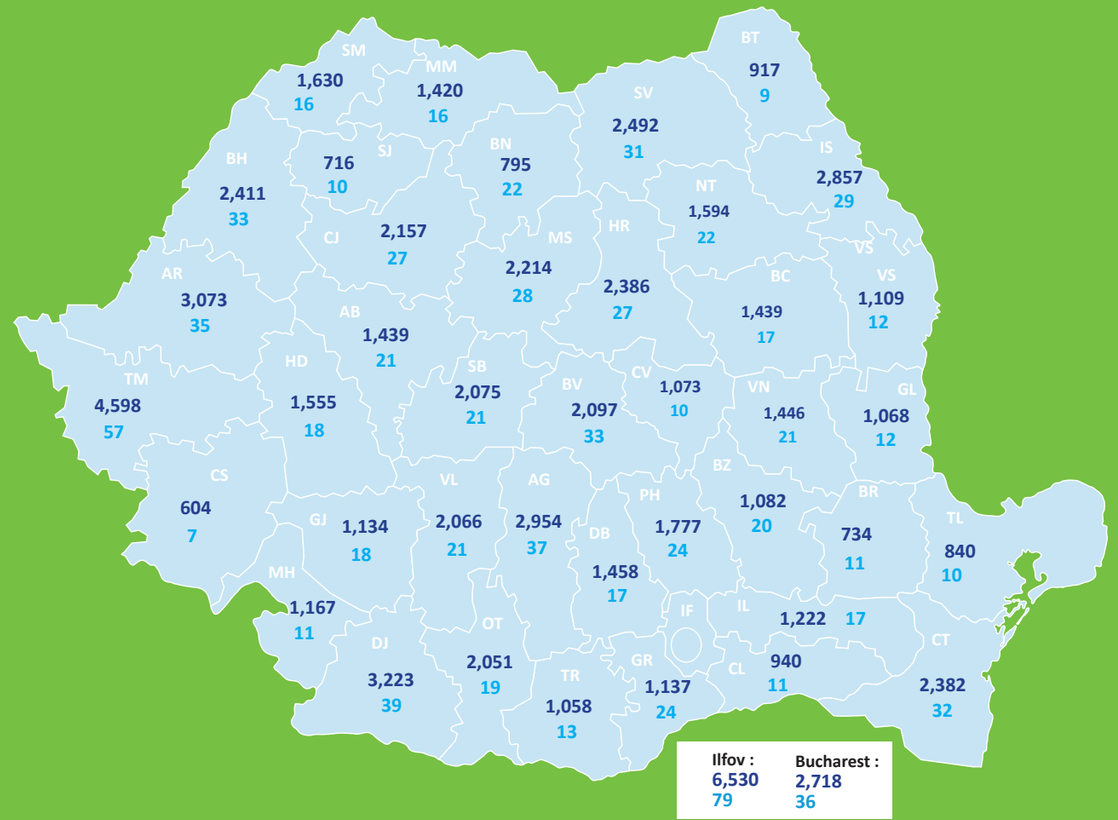
The regulation establishing the method of operation for this mechanism is ANRE Order no. 15/2022 for the approval of the Methodology for establishing the rules for the sale of electricity produced in power plants from renewable sources with an installed capacity of no more than 400 kW per place of consumption belonging to prosumers (Order 15/2022), which establishes two alternative scenarios of settlement between the supplier and the prosumer.

Alternative scenarios of settlement

1. Through financial settlement, for prosumers with 200 kW > Pi <= 400 kW per place of consumption	• The supplier has the obligation to purchase the electricity produced in the prosumer's facilities and delivered to the electricity grid, at a price equal to the weighted average price recorded on the Day-Ahead Market for the month in which the respective electricity was produced and delivered, based on a contract concluded with the prosumer according to the model from Annex 1 to Order 15/2022; • Between the amounts owed by the supplier to the prosumer for the energy delivered by the latter into the grid, and the amounts owed by the prosumer to the supplier under the electricity supply contract, a financial settlement shall operate, according to the applicable tax regulations (by offsetting the amounts under invoices issued by the prosumer with those under invoices issued by supplier).
2. Through quantitative settlement, for prosumers with Pi <= 200 kW per place of consumption	• Within this mechanism, the supplier purchases the electricity produced in the prosumer's facilities and delivered to the electricity grid, at a price equal to the price of active power from the supply contract concluded with the prosumer (excluding grid tariffs, excise duty, the value of green certificates and other regulated costs), based on a contract concluded with the prosumer according to the model in Annex 2 to Order 15/2022; • The invoices related to the sums owed to the prosumer according to the above will also be issued by the supplier, and the sums related to them will be offset with the sums owed by the prosumer to the supplier based on the invoices issued according to the supply contract; • If the amount of electricity delivered by the prosumer into the grid is greater than the electricity consumed from the grid, during the billing period, the difference is carried forward by the supplier for the following billing periods (this can be used to offset the consumed amounts from subsequent billing periods, over a 24-month interval).

Map of prosumers and of installed power capacities in Romania

The Romanian Energy Regulatory Authority monitoring report on prosumers shows a total installed capacity of 973 MW across the country, **until the end of June 2023**.



Total number of prosumers at the end of June

77,638

Installed electrical power [MW]

973

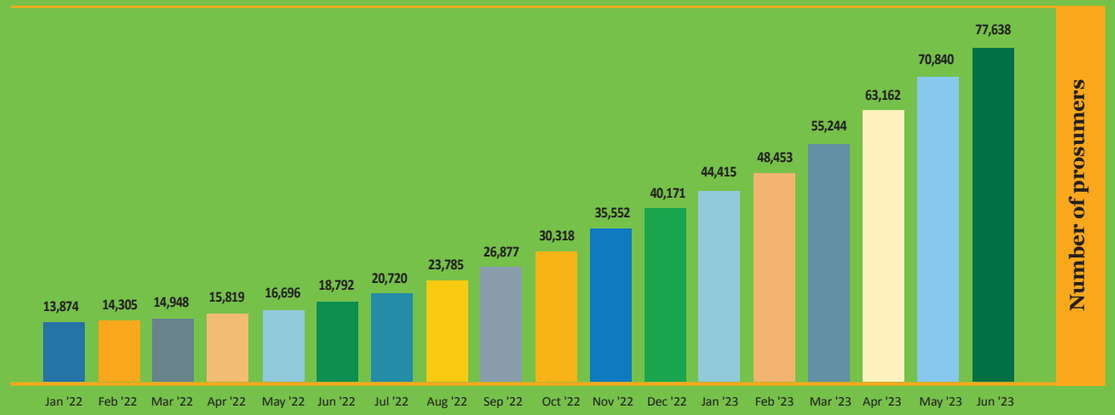
The number of prosumers

Installed electrical power [MW]

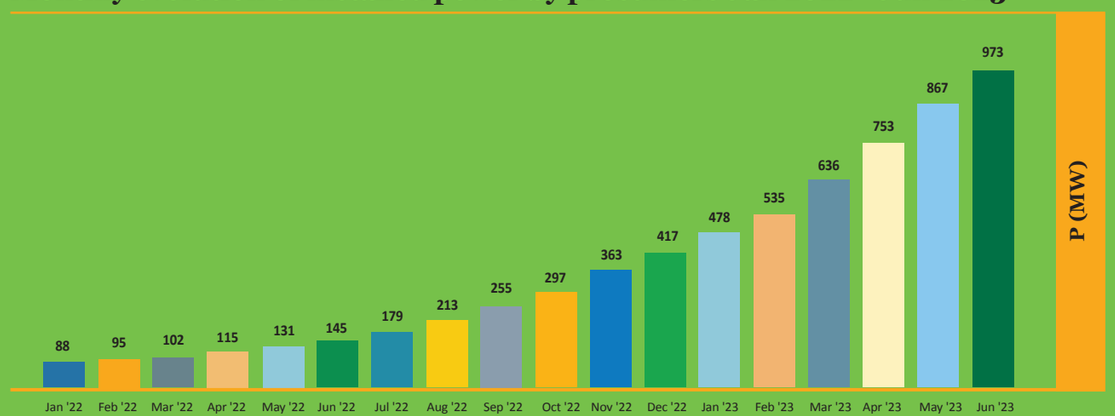
Number of prosumers and related installed power capacity per distribution system operators, as of 30.06.2023

Energy distribution operator	Total number of prosumers	Installed Power [kW]
Delgaz Grid	10,400	121,097
Distribuție Energie Oltenia	13,652	157,166
E - Distribuție Muntenia SA	10,385	139,143
E - Distribuție Banat	9,830	117,360
E - Distribuție Dobrogea	5,384	69,588
OMV Petrom	15	480
DEER Muntenia Nord	7,559	104,763
DEER Transilvania Nord SA	9,129	123,614
DEER Transilvania Sud	11,284	140,029
Total	**77,638**	**973,240**

Monthly evolution of the number of prosumers Jan 2022 - Jun 2023



Monthly evolution of installed power by prosumers Jan 2022 - Jun 2023



Source: ANRE

Nicolas Richard
CEO
ENGIE Romania

"We are happy to support Saint-Gobain's decarbonization needs and thank them for their trust in implementing this key project. Decentralized energy generation solutions are increasingly becoming a necessity for businesses aiming at remaining competitive by reducing energy cost while liming CO2 emissions.

Installed capacity
8.6 MWp

The park includes
15,760
Photovoltaic pannels modules

80 **inverters and strings**

ENGIE

Case study

ENGIE Romania is building the largest on-site photovoltaic park in the country

Installed on an area of 14 hectares, the bifacial photovoltaic panel system is intended for the generation of renewable energy exclusively for the industrial site, ensuring an important part of the electricity needs of the Saint-Gobain glass factory in Calarasi.

With an installed capacity of 8.6 MWp, the park consists of 15,760 photovoltaic panel modules, 80 inverters and strings, and a metal tracker structure to support the panels and the inverters. The annual green energy production is estimated at over 14,000 MWh, avoiding the emission of 2,400 tonnes of CO2 per year, the equivalent of about 9 million kilometres traveled by an average traditional car or the charging of over 265 million smartphone devices[1].

Saint-Gobain joins a portfolio of 30 business customers for whom ENGIE Romania has installed photovoltaic systems, in addition to over 800 household consumers. The company currently has a total installed capacity of about 120 MWp from renewable sources in operation and aims to reach 1,000 MW by 2030.

Leader in energy solutions with low CO2 emissions, ENGIE acts to accelerate the transition to an economy with a neutral impact on the environment. The company provides customers with customized green energy solutions, aiming to eliminate the equivalent of 45Mt CO2 each year and achieve carbon neutrality by 2045.

[1]Source: https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator#results

The number of prosumers is growing rapidly at EU level

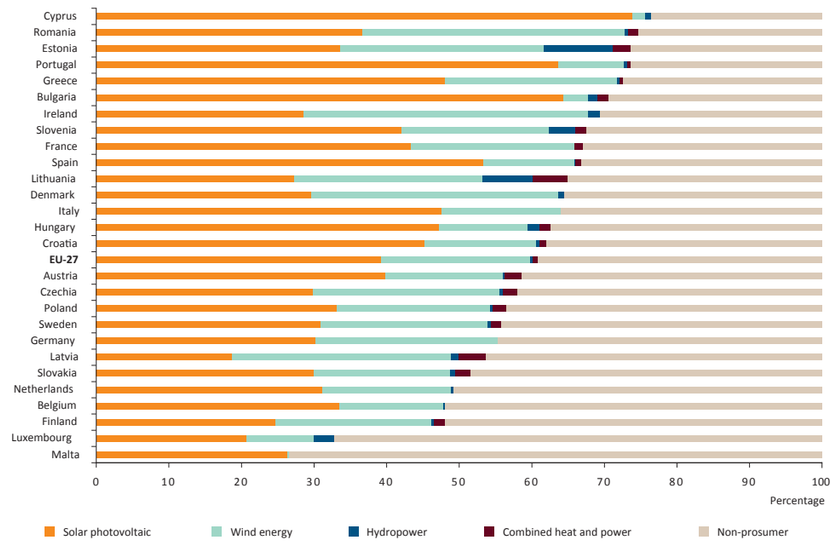
The EU solar energy strategy puts forward a target of over 320 GW of newly installed solar photovoltaic capacity by 2025, over twice today's level, and almost 600 GW by 2030.

To achieve that, the Strategy presents three concrete initiatives, including a European Solar Rooftop Initiative anchored around a legally binding EU solar rooftop obligation to ensure accelerated installation of solar panels on buildings. This kind of initiative can encourage citizens and companies to engage in the energy transition, either as individual prosumers or via energy communities to self-produce, consume and sell or share renewable energy.

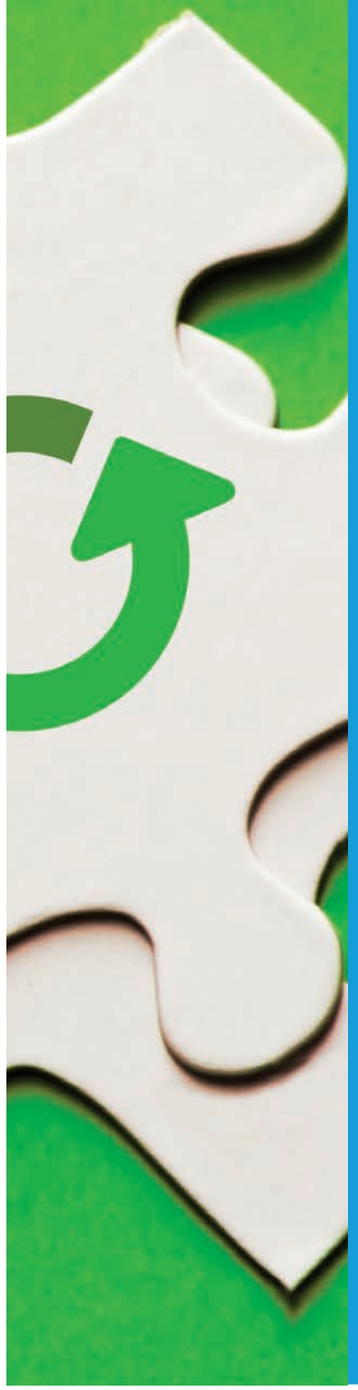
We see today that more and more corporates and households want to become managers of their own energy sources, either by acting individually or collectively. According to the Italian National Agency for New Technologies, Energy and Sustainable Economic Development (ENEA), by 2050 there will be more than 250 million prosumers in the European Union, and they will be producing energy with small domestic systems or in energy communities.

Figure below shows the technical potential for electricity production by prosumers compared with the total electricity demand for all EU Member States, as calculated in CE Delft (2021).

Technical potential electricity production by prosumers in 2050, relative to the total electricity demand in the EU



Sursa: EEA Report, ***Energy prosumers in Europe***



Alexandru Buzatu
Managing Director
Solar Distributed
Generation Europe

In a context of unstable and rising energy prices, we provide our B2B customers with decarbonized energy at competitive prices, offering long-term visibility and stability on energy cost, and technical support throughout the duration of the PPA.

TotalEnergies in Romania

Having started in Romania in 1998 with its lubricant activity first, TotalEnergies is present on the Romanian market through 4 companies - Hutchinson, TotalEnergies Marketing, AS24 Romania and TotalEnergies Global Services Bucharest – and it's located between Bucharest and the surroundings of Brasov, with over 1400 active employees.

On track to be one of the world's top 5 electricity producers from renewable sources by 2030

Net Zero by 2050. This is the goal we want to reach, together with society. As part of this ambition, TotalEnergies is building a portfolio of activities in electricity and renewables, having gathered extensive experience in developing large industrial projects, including renewable energies, conventional energies, transmission networks, as well as projects related to energy storage and hydrogen production. By doing that, energy becomes ever more affordable, cleaner, more reliable, and accessible to as many people as possible.

Self-consumption - Solar Distributed Generation

Romania is part of TotalEnergies plans for Solar Distributed Generation thanks to the long-term partnerships established with the local industrial customers and international key accounts present in the country. The development and the implementation will be done by a local team, who will benefit from the support of other existing subsidiaries in the country. Early 2023 the Company signed its first PPA contracts in Romania for a total capacity of about 38MW and has another 10 projects in different phases of development and PPA negotiation. The first project is expected to be implemented in 2024.

Globally, with the signature of 1 GW of green Power Purchase Agreements (PPAs) for self-consumption on the sites of its B2B customers in 2023, TotalEnergies reached a significant milestone. The deployment of this capacity to over 500 industrial and commercial sites will be completed by the end of 2023. These solar solutions enable companies to benefit from significant savings on their bills, while greatly reducing their carbon footprint. TotalEnergies sells to its B2B customers clean energy produced directly on their sites through long-term PPAs. To this end, the company develops, finances, builds, and operates solar plants installed on rooftops, parking plots, or vacant industrial land.

Photovoltaic projects to implement in Romania

TotalEnergies acquired five photovoltaic projects in the North-West part of Romania, with a total capacity of more than 200 MW.

The solar farms will help securing the supply of local renewable electricity to meet the country's needs and will enable TotalEnergies to provide its B2B customers with locally produced green electricity through power purchase agreements (PPA) from 2025.

Moreover, to preserve the agricultural vocation of the sites, the company will set up agri-pasture on the 200 hectares of land where the farms are located, to develop sheep farming in the North-West part of Romania.

The development of these projects allows us to deploy the Company's expertise in solar power generation and strengthens our presence in Eastern Europe with the acquisition of a portfolio of solar projects in Poland with a total capacity of 200 MW. We are proud to become a partner of choice to support Romania in diversifying and decarbonizing its energy mix from renewable energy

Catalin Iordache
Renewable Explorer Manager Romania

About TotalEnergies

TotalEnergies is a global multi-energy company that produces and markets energy: oil and biofuels, natural gas and green gases, renewables, and electricity.

Our more than 100,000 employees are committed to energy that is ever more affordable, cleaner, more reliable, and accessible to as many people as possible. Active in more than 130 countries, TotalEnergies puts sustainable development in all its dimensions at the heart of its projects and operations to contribute to the well-being of people.

TotalEnergies and renewables electricity

As part of its ambition to get to net zero by 2050, TotalEnergies is building a portfolio of activities in electricity and renewables. By the first half of 2023, TotalEnergies' gross renewable electricity generation installed capacity was 18 GW. TotalEnergies will continue to expand this business to reach 35 GW of gross production capacity from renewable sources and storage by 2025, and then 100 GW by 2030 with the objective of being among the world's top 5 producers of electricity from wind and solar energy.

TotalEnergies has experience in developing and operating large industrial offshore energy projects and is definitely a reliable partner for the development of such offshore wind projects. In order to start offshore wind developments in the Black Sea, Romania, the first step will be to define specific targets in terms of GW but also to choose favorable areas that could be used for the development of OFW without conflicting with present or future activities in the Black Sea.

Second, a well-developed, simple, transparent regulatory and legislative framework is mandatory and should be accompanied by a clear definition of the revenue scheme to be put in place for developers. Increase of the grid capacity with clear grid development roadmap from TSO in order for developers to get a guaranteed grid connection is also mandatory among the criteria that would enhance the Romanian offshore wind potential.

Dr Gabriela Dan Unterseh
Offshore Wind Business Developer – New Markets

Offshore Wind – a key factor in reaching the decarbonization targets

TotalEnergies is developing off-shore wind projects with a total capacity of more than 14 GW, the majority of which are bottom-fixed foundations. These projects are in the **United Kingdom** (Seagreen project, Outer Dowsing, Erebus, Valorous and West of Orkney), **South Korea** (Bada project), **Taiwan** (Yunlin and Formosa 3 projects), **France** (Eolmed project) and the **United States** (New York Bight project, North Carolina project) and more recently 2 projects in **Germany** (North Sea N12-1 and Baltic Sea O2-2).

Case Study

Seagreen Project

Seagreen Wind Energy is a joint venture between TotalEnergies (51%) and SSE Renewables (49%).

Seagreen Offshore Wind Farm, is under construction around 27km from the coast of Angus in the North Sea. The 1,075MW wind farm will feature 114 Vestas turbines and 1 offshore substation. The deepest foundation in the world has been installed across the Seagreen OFW at a depth of 58.6 metres in April 2023 and represented sizable challenges in fabrication, transportation and installation and requiring rigorous engineering and project management. The suction bucket foundation technology on jackets was implemented for this specific site to overcome the difficult and variable soil conditions, whilst gaining faster installation speed and avoidance of pile driving noise. This technology was a key contributor to the cost reduction on Seagreen.

First power was achieved in August 2022 and the offshore wind farm expected to enter commercial operation later this year. The wind farm will provide enough green energy to power more than 1.6 million homes, equivalent to two-thirds of all Scottish homes and will displace over 2 million tonnes of carbon dioxide from electricity generated by fossil fuels every year.

7 Technologies of the future & workforce

Technologies of the future

Let's embark on an exercise to rewind time to 2013, when the Romanian energy sector was at the forefront of a fresh era in green energy transition, meticulously scrutinizing four pivotal trends in power generation: wind, photovoltaic, geothermal, and biomass. Fast forward a decade to 2023, and we find ourselves amidst an unstoppable energy transition, witnessing the thriving emergence of a robust cleantech industry. Discussions are now taking place around the offshore wind technologies, Power-to-X, green hydrogen, storage systems, carbon capture solutions, N-type photovoltaic panels, Carport structures or auto tracking systems. Clearly, international and national developments over the past two years have highlighted the central role of clean technologies as key factors for increasing energy security, independence and resilience of energy systems. The encouraging news is that the portfolio of projects to produce these technologies is growing. Nevertheless, in the short term, there exist substantial operational challenges that must be overcome to seamlessly integrate renewable energy into national energy systems.

The Decade of Clean Technology

The global energy sector is prone to experience profound changes that are set to transform it in the coming decades to one increasingly dominated by renewables and clean energy technologies, experts say in the 2023 edition of "Energy Technology Perspectives". The analysis shows that there is a **global market opportunity for key mass-manufactured clean energy technologies worth around USD 650 billion a year by 2030** (more than three times today's level) if countries worldwide fully implement their announced energy and climate pledges. Clean energy manufacturing jobs would more than double from 6 million today to nearly 14 million by 2030, and a rapid industrial and employment growth as transitions progress, the IEA report shows.

However, concerns remain about a lack of equipment manufacturing capacities, including in Europe. It is also the trigger for new ambitions regarding local technology production: Europe wants to increase renewable energy systems and its capacity to produce technology locally.

Through the ***Net-Zero Industry Plan Act***, the European Union aims to attract investments to develop key technologies that contribute to decarbonization and, implicitly, to increased security of supply. Such clean technologies are also expected to benefit from support in Romania, by means of a favorable legislative and regulatory framework. The authorities have already put for public debate the National Hydrogen Strategy and the draft law on the necessary measures for the exploitation of offshore wind energy, with the clear objective of installing wind power plants with a power generation capacity of 3 GW by 2035. Romania's offshore wind energy potential, as assessed by World Bank experts, in theory has a capacity of 76 GW: 22 GW in the form of fixed turbines and 54 GW in the form of floating turbines. It is expected that, in the coming years, 22,000 jobs will be created, and investors will be attracted in the production of components for wind turbines, as well as in the construction, installation and, respectively, maintenance of offshore wind farm infrastructure.

In parallel, the first energy storage facilities in commercial operation are announced and the hybridization trend in the power generation process is accentuated. Developers of green energy projects have already switched to projects combining wind, photovoltaic and storage batteries, some of them also considering integrating hydrogen into projects.

Amidst this evolving context, an increasingly prevalent question emerges: What will become of all the equipment once it reaches the end of its lifecycle? The recycling of green technology at European level is becoming essential, especially because important raw materials can be recovered in manufacturing processes. For example, 90% of a photovoltaic panel can be recycled, the raw material can be used to develop local technology production. In fact, Romania is taking the first steps towards developing a PVs recycling system, by announcing a facility construction plan through PNRR funds. So, ambitions in developing clean technologies and not only are based on substantial funds advanced, but we will see at the end of this decade how many of these opportunities will really turn into investments. We detail each of them in the articles below.

Q2 2023: a strong quarter for EU cleantech investment

€2.8 billion
Invested in EU Cleantech in Q2 2023

Deal volume decreased slightly, while amounts invested increased substantially in defiance of expectations.

Source: cleantechforeurope.com

Analysis

Hydrogen and energy storage

Alexandru-Valeriu Binig
Energy specialist

The latest developments in the energy technology sector

The *Net-Zero Industry Plan Act* proposed in February 2023 is an initiative derived from the Green Deal aimed at attracting investment and creating better development conditions for technologies that will make a significant contribution to decarbonisation. Such key technologies for the energy transition boost the EU's industrial competitiveness and at the same time contribute to increased security of supply.

The *Net-Zero Industry Plan Act* also supports other technologies such as sustainable alternative fuels, advanced technologies to generate energy from nuclear processes with minimal waste from the fuel cycle, small modular reactors and fuels from the most advanced class.

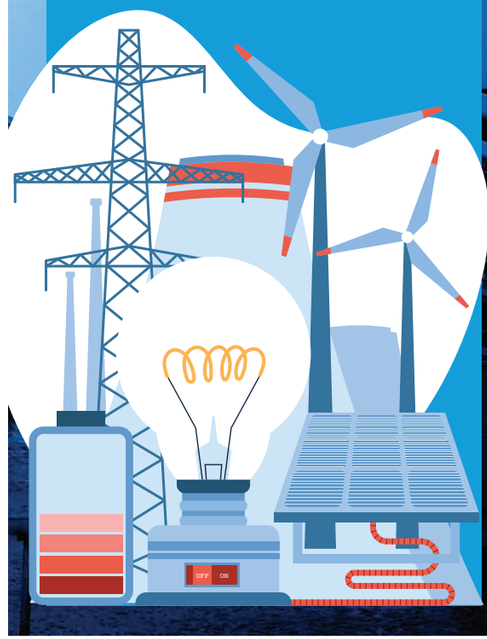
Such technologies are expected to benefit from state aid and other forms of support in Romania, including a favourable legislative and regulatory framework. The aim is to to attract the interest of investors to bring these technologies into sustainable businesses.

Energy storage

The Energy Storage Study - *Contribution to the Security of Electricity Supply in Europe* - ISBN 978-92-76-03377-6 – prepared for the European Commission in 2020, includes some important **recommendations**, valid for specific Romanian conditions:

Key technologies for the energy transition

- Photovoltaic and solar thermal systems
- Electrolysers and fuel cells
- Onshore and offshore renewable energy
- Sustainable gas/ biomethane
- Batteries and storage
- Carbon capture and storage
- Heat pumps and geothermal energy
- Grid technologies



1 "Energy storage requires a clear strategy that addresses system flexibility and stability needs, as well as political barriers, accompanied by support tailored to different technological maturities"

2 "Member States should address authorization barriers, while additional measures at EU level are warranted for standardization, such as EV safety and interoperability"

3 "Member States should prioritize the full implementation of the new electricity market organization and address remaining obstacles, in particular regarding appropriate price signals and access to auxiliary services markets"

4 "Double pricing in terms of grid tariffs and net metering (partially addressed by the new organization of the electricity market) as well as grid codes (to a lesser extent) is still a major barrier to storage"

5 "Revision of taxation, mainly through the Energy Taxation Directive (ETD), is essential to remove unjustified burdens on stored energy, such as double taxation, and to reduce cross-energy vector distortions

6 "Competitive flexible resources should be considered on an equal footing with grid investments, for all energy vectors"

Regarding the ***Stage of Applicable Technologies***, the study concludes:

> "The main "reservoir" of energy storage in the EU is, by far, pumped hydro storage. As their prices drop, new battery projects are on the rise."

> "Lithium-ion batteries represent the majority of electrochemical storage projects. Recycling these systems should be strongly taken into account as well as their actual lifetime: such theoretical specifications given to grids may be relatively optimistic compared to their use at nominal conditions."

> "Behind-the-meter storage is on the rise. It is quite heterogeneous depending on local markets and countries: being a new market it is still driven by political issues and/or subsidies. The overall availability of data is relatively poor."

Considering the large specific investments, the volume or authorizations required, the development time, the insufficiency of suitable locations, etc., it is expected that in Romania the pumped storage hydropower plants will not contribute to the flexibility and adaptability of the National Energy System in the next 10 years. Therefore, the focus should be on batteries, where Lithium-Ion technology appears to be certain, and commercially usable/deployable.

Since Romania, given the EU's Fit for 55 and RePower commitments, is expected to have around 17,000 MW installed in wind and solar power generation capacity by 2030, one could easily calculate a need of over 4,000 MW installed in electricity storage capacities by 2030, mainly in Li-Ion batteries. Such capabilities could be deployed in three configurations, giving rise to three business categories and regulatory regimes:

> Hybridization of existing SRE electricity genration capacities – adding batteries to existing parks;

> Independent storage operators (directly connected to the grid and providing auxiliary system services and balancing energy – in the future decentralized flexibility services);

> Behind-the-meter – in spaces belonging to end users, to optimize the consumption profile and reduce energy bills.

The Romanian authorities have made and will make available state aid from various sources (PNRR, Modernization Fund, etc.) as investment aid for new storage capacities.

Hydrogen

Energy Policy Group developed in 2022 a study entitled "Clean hydrogen in Romania - Elements of a strategy"[1], which provides, among others: "Two modelling scenarios analysed in the report based on the proposals from the Fit for 55 package on the use of clean hydrogen in industry and transport show that, **by 2030, an electrolysis capacity between 1,470 MW and 2,350 MW will have to be installed in Romania, which represents 3.7% and 6% respectively of the electrolysis capacity in the EU until 2030** established in the Hydrogen Strategy of the European Commission.

If the additionality principle is taken into account, the installation of 3 – 4,5 GW of new RES will be necessary, besides the capacities foreseen by the present The Integrated National Energy and Climate Change Plan.

Based on an electricity price of 50 EUR/MWh, a reasonable, even conservative assumption for Romania in 2030, considering the RES potential and expected cost reductions, the resulting updated cost of hydrogen (LCOH) for alkaline electrolysis is between 2.21 EUR/kgH 2 and 2.3 EUR/kgH 2, while for PEM electrolysis it varies between 2.34 EUR/kgH 2 and 2.73 EUR/kgH 2, depending on the capacity factor."

The Romanian authorities have simultaneously worked on the National Hydrogen Strategy, the Hydrogen Law, and the Hydrogen Code (a set of principles that should govern the sub-sector, mainly in terms of grid operation). The Hydrogen Strategy brings more information regarding its residential use in Romania, in addition to the established destinations declared at EU level, such as "hard-to-abate" industrial sectors and transport. Such an approach will have an essential impact on decisions regarding the development of natural gas distribution grids and the allocation of state aid for such purposes.

The new PNIESC/PNUCP is expected to include the general framework for the use of primary energy in Romania at the level of 2030 and the Strategy for Hydrogen will be derived from such general conclusions and sectoral objectives. The Romanian authorities have already made available PNRR funds for hydrogen generation capacities, and the first financing contracts are in the signing phase.

The new project of the Hydrogen Strategy proposes the installation of 7,970 MW in electricity generation capacities from renewable sources dedicated only to powering the electrolysers (with a total capacity of 3,985 MW in 2030) that will generate hydrogen according to the needs identified in the same strategy. These capacities would be additional to those required to be installed to cover the electricity consumption of the Romanian economy and population in accordance with the Fit for 55 and RePower EU objectives.

[1] https://www.enpg.ro/clean-hydrogen-in-romania-elements-of-a-strategy/

Liviu Gavrilă
Vice-president
RWEA

Opinion

Offshore Wind Energy, challenges and opportunities

Over the past few years, the subject of offshore wind farms, initially a timid presence, has gained increasing prominence in energy sector discussions. Recently, it has been formally recognized as a viable local generation option in the perspective of public authorities, reflected in strategies and action plans concerning the generation mix.

Nevertheless, it remains a stark reality that, regrettably, apart from one or two small-scale testing turbines, the Black Sea still lacks deployed wind turbines, making it one of the few seas without such installations. Why is this the case? While there are various explanations, the primary reasons are our ample onshore options and the recent shift where offshore costs have finally become genuinely competitive and comparable to onshore economics. Additionally, technology has become widely accessible.

So, finally, things are expected now to evolve into facts mainly due to:

- Increased share of offshore WFs across European area is triggering lower technology costs and higher efficiency;
- Each year more and more diversified technical solutions appear and mitigate most of the site conditions risks (ex. floating vs fixed technology, maintenance in logistics);
- Experience in onshore and human resources capable to handle also offshore;
- Plus, the most important, authorities made a first decision step by publishing the draft law for offshore wind power (an act that establishes the general framework necessary for the implementation of offshore wind power projects and providing Installed capacity eligible for support under the Contracts for Difference support scheme until 2035 and sets competent authorities responsible for facilitating and coordinating the implementation process of offshore wind power projects, including rules and conditions for the establishment and concessioning of areas where exploration and production of offshore wind power potential can be carried out).

There are still challenges. Timeline (based on other countries similar experience and process set by the proposed legal framework) is pointing towards several years after 2030 to have first turbines in place. Will technology and the rest of the expected evolution influence this? Most probably. Geopolitical developments as well.

But we should entrust market players to address all these challenges through a transparent and competitive environment. There are several international players, with significant previous experience and financial capability, interested in transforming the future projects into reality.

So, even if wind resources might be lower than other seas, even if there won't be too many locations suitable (conditioned by maritime spatial and plots allocation to follow the specific study to be carried out by Ministry of Energy) even if grid challenges will persist for longer than expected, and other challenges, there are still many arguments for offshore in Black Sea and many believing in it. We all maybe should consider believing in it!

Key recommendation:

Authorities to take into consideration proposals coming from the private sector regarding regulations for permitting and construction;

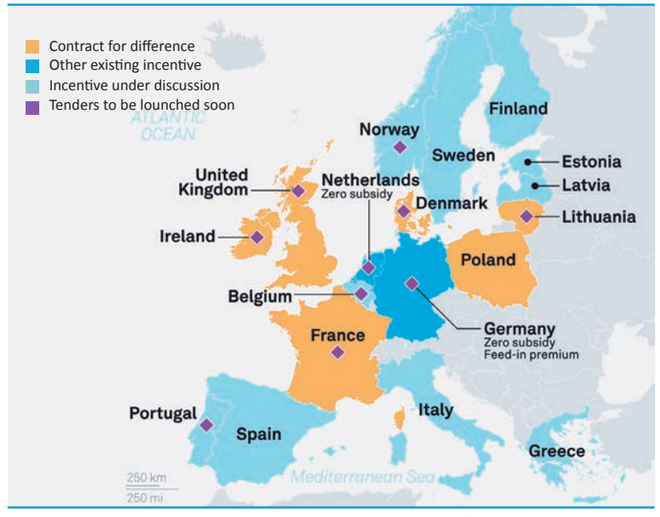
A secure investment environment is needed so all parts need to cooperate and be part of rules set-up (military, environment, oil & gas, maritime, historical and all rest of stakeholders must cooperate and transparently set rules);

Side capabilities (logistic, training centers, equipment and spare parts manufacturing etc) must be also taken into consideration;

Grid infrastructure being capable for such technology;

Enough qualified human resources to cover the needs.

European offshore wind policy scheme overview



Sourse: spglobal.com

Note: In June 2023, RWEA joined Black Sea Renewable Energy Coalition (launched by EPG- in partnership with the Center for the Study of Democracy from Bulgaria, the Turkish Offshore Wind Energy Association, and the Ukrainian Wind Energy Association, replicating the Offshore Coalition for Energy and Nature (OCEaN) model in the Black Sea region aiming effective co-operation format from an early stage to prevent potential conflicts related to environmental co-existence, transmission grid development, and the design of regulatory frameworks, as well as develop a common understanding of possible solutions for unlocking the potential of the Black Sea region for renewable energy)

"We should entrust market players to address all these challenges through a transparent and competitive environment. There are several international players, with significant previous experience and financial capability, interested in transforming the future projects into reality.

In June 2023, RWEA joined
Black Sea Renewable Energy Coalition

Circular Wind turbines and photovoltaic panels: from waste to value

Georgiana-Liliana Toma
Head of Regulatory Working Group
RWEA&RPIA

Renewable industry technology (wind turbines and photovoltaic panels) has evolved rapidly over time while the related industry has not kept pace. In a parallel manner to the current challenges faced in the production chain of wind turbines and photovoltaic panels, similar challenges emerge on the recycling front, stemming from degradation or eventual end-of-life scenarios. Europe must proactively cultivate an industry dedicated to recycling.

For electricity generated from renewable sources like wind and solar to genuinely earn the 'green' label, it's crucial to focus not only on their operational phase but also on their end-of-life considerations and beyond. A circular economy will be powered by more and more renewable energy, creating a sustainable economic model. But to achieve this, actions must be taken to close the loop of product life cycles through improvements in design, innovative materials, re-use and ultimately recycling.

In Europe, recycling is still at the research and innovation stage. Major universities, research centres and other industries have joined the renewable energy industry to work together to research and implement sustainable recycling solutions for wind turbines and photovoltaic panels and also to propose sustainable recycling policies, also from financial perspective. Many recycling companies are expanding their research and are innovating operational technologies for recycling solar panels, which is expected to boost market demand in the coming period.

The European Commission's legislative proposal entitled *Critical Raw Materials*, which is under debate today, aims to tackle the problem of supplying Europe with sustainable raw materials and in addition to boosting mining and energy production, the processing, bridging the gap – between raw material needs and resources in the EU – requires improving the recovery process of metals from current renewable recycling technology. Such progress require government investments in infrastructure, framework design including mandates through public policy, research and innovation in recycling technologies. The biggest problem hindering recycling today on a large scale is the cost.

Wind turbines

At the end of their normal lifespan (20-25 years) wind turbines can be upgraded with new components (life extension), can be replaced by newer models (repowering) or the wind farm will be decommissioned completely. In last two cases the turbine components are dismantled and have to be disposed of. Approximately 85% to 90% of the dismantled components are recyclable. Most components - the foundation, tower and nacelle components – have already established recycling practices.

Instead, the blades of wind turbines reach, at end of life, usually in pits landfills. Experts in the field say economic and environmental policy will play a key role in changing this behaviour. Landfilling is an unattractive option in Europe because of high disposal costs and limited storage space.

Example of Good Practice

Germany, Netherlands, Austria and Finland have already banned the landfilling wind turbine blades and more European countries are expected to introduce bans by 2025.

Wind turbines are the symbol of sustainability and green energy because they generate electricity without emissions and greenhouse gases. The disposal of wind turbine blades is an unsustainable way of decommissioning them and is also in contradiction with the objectives of wind energy. As a result, over the past few years, energy companies have been looking for ways to avoid burying these blades. Several wind turbine blade manufacturers, along with recycling companies and construction materials manufacturers, have put together their efforts in order to transform the blades of wind turbines into other products. In some cases, the blades are shredded and used to produce cement. Other strategies involve the separation of glass fibre of the blade and the polymer resin to make reinforced industrial products. In parallel, some companies and academic researchers are developing new materials for blades to simplify recycling. For now, however, the wind industry is growing rapidly, as is the number of blades being nearing retirement.

According to WindEurope statistics[1] it is expected that approximately 25,000 tonnes of blades per year to reach end-of-life by 2025. Germany and Spain will have the largest number of blades being taken out of service, followed by Denmark. Towards the end of the decade, Italy, France and Portugal will also start to significantly decommissioning and the annual volume decommissioned could double to 52,000 tonnes/year.

Example of Good Practice

On the RWEA's agenda recycling topic has an important place. In the medium-long-term activity plan of the association there is a task for applying for European funding programmes for research and innovation in the field of extending the lifespan of reliability and recyclability, sustainability, operability and maintenance of wind turbines and their foundations/substructures.

[1]https://windeurope.org/newsroom/press-releases/wind-industry-calls-for-europe-wide-ban-on-landfilling-turbine-blades/

PV panels

Solar energy is one of the energy sources increasingly being explored, from the domestic level, up to the level of wind farms of over 2 GW installed. Photovoltaic panels, which have a lifetime of 25-30 years, have great potential of PV waste in the coming years due to increasing demand and their production.

On a large scale, solar panels are still being ground up in a shredder and end up as filler material in construction and road building. In the EU, this is the fate of around 4,000 tonnes of solar panels every year.

In anticipation of the large volume of PV modules and to maintain the photovoltaic position as clean energy technology, PV panels recycling has become a key topic and have been led and developed various discussions and activities by governments, organisations and large companies. Standards for PV panels recycling include environmental, health and safety requirements and are, also aimed at metal recovery in order to provide a reliable secondary supply of raw materials for the PV sector and other industries.

Example of Good Practice

RPIA applied at the end of the 2022 to a call for projects for research and innovation in the field of PV panels recycling funded by the Horizon Europe programme. The association won the project along with 16 other entities, such as panel manufacturers, corporations, associations, research institutes and universities. RPIA will identify sustainable recycling methods for photovoltaic panels and will promote them to manufacturers, users and recyclers, thus contributing to addressing one of key technology issues as well as developing new investment opportunities in the photovoltaic value chain in Europe.

Key messages :

Governments will play a decisive role in stimulating the circular economy targeting technology renewable industry. They should supplement funding in research and development for the commercialisation and expansion of different recycling technologies for the component of wind turbines and photovoltaic panels. EU should also provide, in addition to guidance, funding for research and innovation to stimulate the development and use of new materials for the renewable industry sector.

At the same time, **the right legislation**, issued by Member States, will help to support the creation of viable recycling value chains and stimulate a market for recycled materials.

Large-scale development of the recycling industry in the renewable sector will help Europe become the technological leader in the field, increase its competitiveness and achieve climate goals in the most sustainable way.

Roberto Murgioni
Head of Technical Service Europe
JinkoSolar

In 2023, we will definitely focus on further promoting the N-type TOPCon technology, but beyond that, JinkoSolar will make a serious effort to become a more important supplier of energy storage solutions.

Jinko Solar is a global leader in the solar industry, with a strong presence in Europe. We specialize in the design, manufacture, and sale of high-quality solar products, including PV modules and storage systems.

Case Study

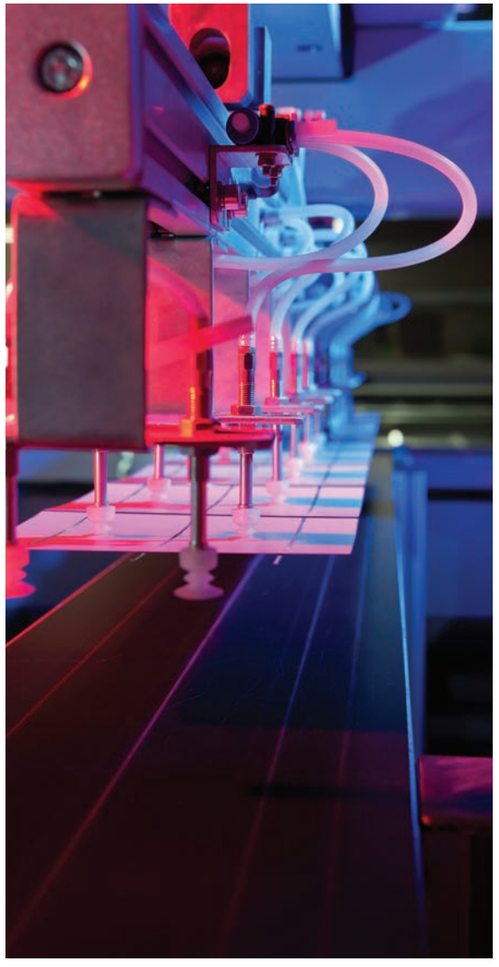
Jinko Solar's N-Type TOPCon Technology: Revolutionizing Solar Cell Efficiency and Reliability

The solar industry has made significant progress in technology, including improvements in the efficiency and durability of PV modules, the development of new materials and coating processes to enhance performance, and the integration of safe and highly efficient energy storage systems. Jinko Solar has been at the forefront of solar panel technology advancements, with the N-type TOPCon solar cell technology, which is known for its higher efficiency, lower degradation and better temperature coefficient compared to the standard P-type cells.

As more and more consumers and businesses look to adopt renewable energy solutions, there is a growing demand. This has led to a shift in the industry towards higher-quality and more reliable products, as well as the integration of energy storage systems to help customers achieve greater energy independence. Our N-type TOPCon technology represents a major breakthrough in solar cell design, as the technology uses advanced materials and an innovative cell structure to reduce energy losses and increase power output, making it an ideal solution for a wide range of applications.

N-type solar cells from Jinko perform better at higher temperatures than P-type solar cells, as the electrical properties of the materials used in N-type solar cells are less affected by temperature changes than those in P-type solar cells. In addition, the use of N-type technology can result in higher efficiencies and improved long-term stability compared to P-type technology. N-type solar cells are also less prone to degradation from light-induced effects such as light-induced degradation (LID), which can lead to a decrease in efficiency over time. We guarantee 0,29% power temp. coefficient. These benefits translate into significant cost savings and improved energy output for our customers.

As energy prices continue to rise and consumers become more aware of the environmental impact of traditional energy sources, an increased demand for renewable energy solutions is expected. This could lead to a shift in market conditions, with more investment and development in the solar and storage industry, as well as to higher government support for renewable energy initiatives. Jinko Solar Europe is well-positioned to take advantage of the growing demand for solar energy. We have a strong track record of developing high-quality solar products and solutions and a deep understanding of the European market. In 2022 we exceeded the target by shipping 44GW+. Tiger Neo has proven extremely popular with customers, particularly due to the power output. Jinko is constantly innovating and developing new technologies to improve the efficiency and reliability of its products, which will help the company remain competitive in a rapidly evolving industry.



Case Study

Innovations in wind farms

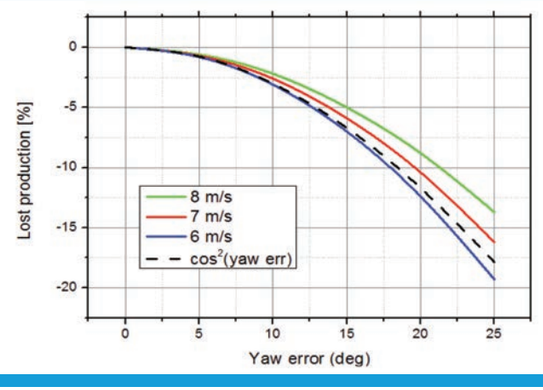
Laurențiu Dragoș Sopoglu
Engineering Department Manager
CEZ Group

One of the most famous wind parks in Romania is located in Dobrogea, at Fântânele - Cogealac, 17 km from Black Sea coast and has a total capacity of 600 MW. We are talking about CEZ Wind farm, which has in its component 240 turbines, GE 2.5 XL model, with a nacelle height of 100 meters and with a rotor diameter of 100 meters. Starting up with the year 2021, the company started numerous projects of improvement and optimization of turbine production, with a major impact in electricity generation.

Development and obtaining of the patent for the yaw error optimization method

The approach is unique in the onshore wind industry because offers a patented solution for onshore wind turbines with horizontal axis, for measuring the yaw error. The measurement is made with complex equipment such as LIDAR and automatic telemetry equipment for a precise measurement of the deviation at the level of the rotor positioning, relative to the wind direction. Concept proven in one of the largest onshore wind farms from Europe, Fântânele-Cogealac, where from 2021 untill present,yaw error determination measurements have been performed for all turbines. The campaign led to an adjustment and a yaw error improvement for over half of the wind turbines from the CEZ Wind Farm at Fântânele-Cogealac-Grădina. Teoretical measured annual losses of the yaw error, are presented in the figure below

Teoretical measured annual losses of the yaw error

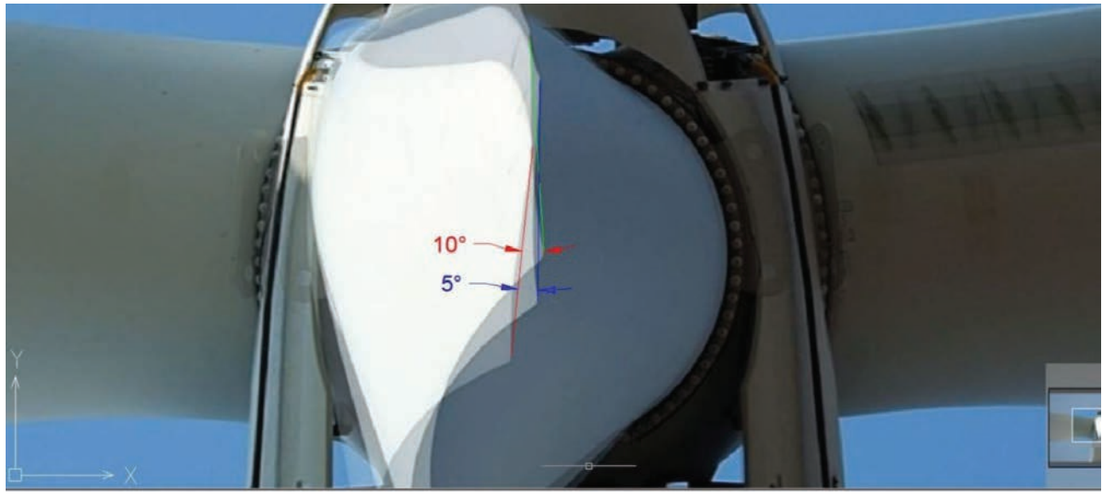


Production optimization project by adjusting the blade angle asymmetry of wind turbines.

The angles of the three blades are very important in the optimal operation of the turbine. A slight angle difference, in one or more blades, result in a lower power curve, a higher stress on the kinematic chain of the turbine, noise and acts as an imbalance in the rotor assembly.

A balanced rotor results in a higher performance, higher availability and increased lifetime for the main components.

280 measurements were made in the wind farm (240 normal measurements and 40 after the exchange of main components). From the 240 turbines, 53 were found with asymmetry problems, representing 22% of the wind farm's turbines. In the figure below it is presented an example of a blade angle asymmetry of a wind turbine from CEZ Wind Farm.

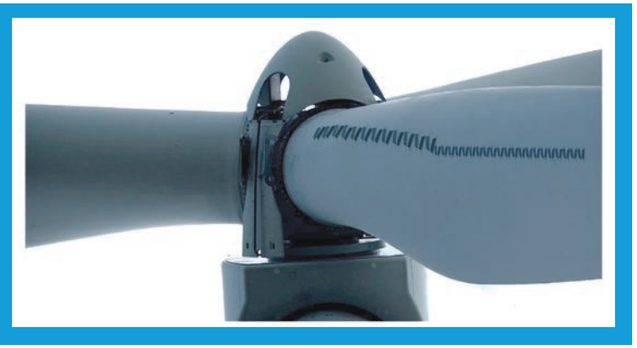


Production optimization project by installing vortex generators

At the end of 2022, the company completed the installation of vortex generators on all turbine blades from CEZ Wind Farm, for production optimization. A vortex generator (VG) is an aerodynamic device, composed of aerodinamic foils attached to the low pressure part of the wind turbine blades.

When the blade is moving relative to the air, the vortex generators create a vortex that ,by removing part of the boundary layer which moves slowly in contact with the surface of the aerodynamic profile , it delays local flow separation and aerodynamic stall, thus improving the effectiveness of the blade.

VG installation on a turbine blade in the CEZ Wind Farm



Trends in the wind industry from Romania for the next years

Innovation and new technologies represent a normality and a necessity in the wind industry. The trends of automation and digitization have become a continuously developing trend in any industry, these being also used in Romania.

AI – Machine Learning

This is an online AI diagnosis and visualization platform for the increase and improvement of energy production of the wind farms. The technology used in CEZ Wind Farm combines the sets of historical operational data provided with powerful AI technology and technical expertise to increase annual production and for minimizing the operational costs.

Services provided by AI platforms – Machine Learning:

- The service provides monthly reports and analysis;
- Detailed graphic reports using KPI from energy industry;
- 24/7 access to reporting and analysis tools online;
- Ability to report assets in the application;
- Dedicated engineer for custom reports;
- Actions issued based on specific findings after personalized analysis;
- Project validation (such as VG, yaw errors, etc.);
- MTTF – Mean Time To Failures;
- MTTR – Mean Time To Repair.

Diagnosis of blade defects using acoustic emissions

Early detection of damages allows prompt repair of the blade when the damage is small and cheap to repair. Acoustic technology used in the CEZ Wind Farm detects defects by monitoring sound changes generated on the surface of the blades in operation, sounds are evaluated for clues of damage or degradation and transmit the data to a cloud.

This method is based on acoustic emissions and on Machine Learning technologies for continuous diagnostics and detection. The system used for detection is mounted on the towers of the wind turbines and it is self-powered by a built-in photovoltaic pannel. The data is transmitted via GSM technologies to a cloud.

The technology compares the sound that is detected from the blades with the known acoustic signatures and with those of damaged blades, to identify the likely extent and type of defect. The project pilot in the CEZ Wind Farm focused on evolution blade erosion and lightning strikes.

Analyzed defect types:

Peak defect

Advanced erosion

Lightening strike

Split tip

Based on this evolution, we can estimate the blade degradation impact on production and schedule preventive and corrective maintenance periods for the affected blades. Future trends of this technology consist in its combination with sensors mounted directly on the blades of wind turbines, which will be able to monitor: blade angles, blade defecte, rotor speed, wind disturbances, blade twisting and aerodynamic behavior, ice detection and after ice start-up, temperature, acceleration, pressure and wake effect.

Storage of electrical energy in batteries – Storage of 1% reserve from CEZ Wind Farm

CEZ Wind Farm (600MW) which generates annually around 1,250 GWh is operated by three companies: Tomis Team, Ovidiu Development, MW Team Invest. The park must maintain a reserve of 1% of the electricity supplied to the network as support for frequency stability in the national transport network. The project aimed the installation of a 6MW/6MWh BESS for keeping the 1% reserve and increasing annual production by 12,000 MWh, through the release of the 1% reserve from the limitation of wind turbines. The location of the system was in the proximity of the owned 33/110kV transformer stations, connected to the internal network.

Battery storage trends will be an extremely important help in mitigation of intermittent pattern by storing the excess of energy when renewable sources produce more than necessary and releasing it then when demand exceeds generation. This thing allows a more stable and reliable electrical energy supply, reducing dependence on reserve energy based on fossil fuels.

The CEZ Wind Farm (600MW) generates annually

1.250 GWh

The storage capacities were 3 X 1C-rate Li-ion NMC batteries installed in:

Tomis Team:
2.62MW/ 2.62MWh

Ovidiu Development:
2.52MW/2.52MWh

MW Team Invest:
0.85MW/0.85MWh

Andrada Moldovan
CEO
Parapet

Due to hybridization, the installed capacity leads to less variations in the power generation process, to a better use of transmission and distribution systems and, implicitly, to maintaining the stability of the grid.

Installed photovoltaic capacity inside the Beştepe wind farm:

1,1 MWp

Total installed capacity of the mixed plant:

7,25 MWp

Involved the installement of:

2,652

photovoltaic panels

PARAPET.RO

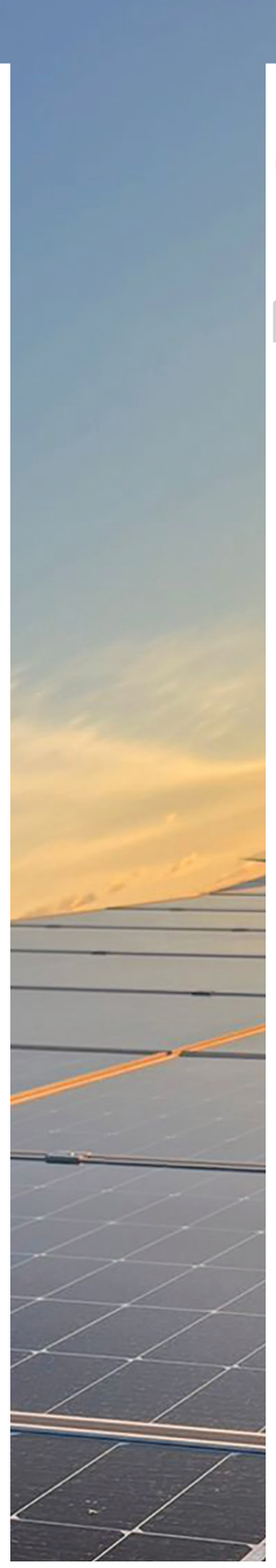
Case Studies

New trends in power generation: hybrid power plants with storage built by Parapet in Tulcea and Cluj counties

The two pioneering projects – the hybrid solar and wind farm in **Beştepe**, Tulcea County, and the hybrid power plant with storage installed in **Cluj-Napoca** – meet Romania's ambitious targets for decarbonization and innovation in the renewable sector.

Hybrid solar and wind farm in Beştepe, Tulcea County

In Tulcea County, Parapet built a photovoltaic plant with a total capacity of 1,1 MWp, installed inside the Beştepe wind farm. It is the first hybrid renewable power generation project in the country, according to Transelectrica data, and involved the installement of 2,652 photovoltaic panels close to the wind turbines functional since 2014. The total installed capacity of the mixed plant currently amounts to 7,25 MWp, the system ensuring a total annual production of 24 GWh and contributing to the reduction of CO_2 emissions by 20,400 tons/year.



Hybrid power plant with storage installed in Cluj-Napoca

In Cluj, Parapet has completed works on a new mixed wind-photovoltaic power plant with a total capacity of 1 MWp, the second of its kind installed by the company in Romania. The project is used for research and includes an energy storage system with a capacity of 110 kW. The hybrid park is, in fact, a research laboratory for testing in real conditions the energy efficiency produced by photovoltaic panels and modern wind installations.

In addition to the wind turbine and storage system (100 KWh lead-acid batteries and 10 KWH Li-Ion batteries), the hybrid park involved the installation of 1,730 photovoltaic, monofacial and bifacial panels, installed on three types of structures:

- Photovoltaic panels installed on fixed structure, **390 kW**
- Photovoltaic panels installed on Carport structure, **400 kW**
- Photovoltaic panels installed on self-tracking systems, **200 kW**

The energy produced will ensure the partial electricity consumption of Cluj Innovation Park, for non-commercial purposes, as well as the consumption of two charging stations of 60 and 150 kW, also used to supply electric buses used for public transport in the area. Thus, the project will contribute to the development of a smart microgrid for electricity distribution, generation, and storage.

PARAPET is a Romanian construction company in the renewable energy sector, with offices in Cluj-Napoca and Nuremberg.

With a **portfolio of over 150 photovoltaic projects** carried out in 15 countries in Europe, with a total installed capacity of over 750 MWp, the company offers solutions and services in the light EPC category.

Parapet owns one of the largest fleets of equipment in the country and the organizational structure includes internal departments dedicated to each stage of the construction of a photovoltaic park, including seismic evaluation of constructions.

Workforce

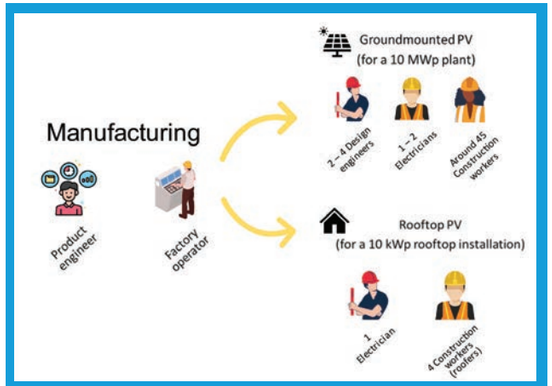
You get your energy from the future, not just your salary. Come and work with us in the renewable industry for a sustainable future." Sounds familiar? Amid the explosion of renewable projects, companies in the field are competing to attract workforce through extensive recruitment campaigns and increasingly attractive job offers. In the sector dedicated to installing photovoltaic panels on the roof, the lack of highly qualified electricians can delay the implementation of photovoltaic projects by up to one year. The lack of a curriculum dedicated to renewables in educational institutions and the recognition of a new professional layer puts even more pressure on the industry. Therefore, to achieve the "green" targets set by Romania, key actions are needed, including in the labor market, such as training programs, platforms for apprentices for future electricians and installers, recognition of new trades and facilitation of cross-border movement.

SolarPower Europe: 1 million jobs are needed in the European photovoltaic industry to reach REPowerEU target

The solar sector is about to create **a million job opportunities** before the end of the decade, according to SolarPower Europe Position Paper on the solar skills challenge. The paper shows that reaching the 2030 REPowerEU target for 750GWdc will require a total of 1.03 million direct and indirect jobs in solar PV. To understand the scale of the issue, at the end of 2021, 466,000 people were employed in the sector. The EU only has six and a half years to double it, SolarPower Europe's specialists write.

Out of the 466,000 current solar workers, 79% are associated with the **deployment** of solar PV. Although reshoring PV manufacturing will create extremely strategic jobs — although more maintenance, decommissioning and recycling will be necessary as the sector grows — deployment remains by far the most labour-intensive branch.

As part of deployment, the majority of jobs stem from the **rooftop PV segment**, providing 76% of EU solar jobs. Nonetheless, this number is dependent on national specificities, the SolarPower Europe Position paper shows. For example, Spain and France see an equal growth of jobs related to utility-scale and to rooftop PV. Contrastingly, countries like Poland and Italy have created around 90% rooftop-related jobs. You will see below a rough estimation of the personnel required for utility-scale vs rooftop PV installations.



Source: SolarPower Europe

Companies are already experiencing delays in installations because of the lack of workers. According to SolarPower Europe Position Paper, in the rooftop PV market, the lack of highly-skilled electricians can delay installation by up to a year. Overall, with the acceleration of PV deployment, in the context of REPowerEU, and the reindustrialisation targets of the Net-Zero Industry Act, the lack of a skilled workforce could the achievement of our renewables targets at risk.

Therefore, SolarPower Europe experts write that it is crucial to foster enabling conditions for the ramp up of the solar workforce through key-actions as the ones indicated below:

1. Launch **an EU communication campaign** on solar trainings and job opportunities. Governments should better communicate on green job and training opportunities.
2. **Support logistically and financially, companies that hire and train** young and transferring workers, including through the RRF.
3. Launch national platforms with **modular training courses** for workers to train and specialise in solar PV installation or retrain easily if coming from different fields.
4. **Recognise 'DC electrician' as a European profession** for all tasks related to the installation of solar PV, and other home renewable installations. Those workers would be responsible for placing modules and handling the wiring up to the inverter. They would have knowledge on roofing, while also mastering basic electrical and PV specific skills. Overall, they would be capable of carrying out the entire work. This would also increase the efficiency of solar installations, by limiting the work of certified electricians to the minimum: connecting systems to the grid.
5. Include DC electricians as part of the **Net-Zero Academies.**
6. Ensure the m**utual recognition of certifications** across the EU and work towards harmonisation.
7. Create enabling **national authorities tasked with the acceleration of border control** procedures for posting experts. Companies often launch projects outside the national borders of their host Member State. In such context, companies send workers abroad for a definite period – "posting" expert workers. However, companies go through long, sometimes impossible administrative procedures. To go through fiscal procedures, social insurance, and acquiring work permits, national governments must create an enabling authority.
8. Make solar PV a central part of **Talent Partnerships and the EU Talent Pool**.

Good Practice Exemples: 4 case studies presented by SolarPower Europe

#OHKW

A German independent platform gathering modular training opportunities, with the aim of training large numbers of solar and heat pump installers. The platform serves to attract large numbers of workers, provide fast and quality training, and recognises micro-credential for easy horizontal movement.

Learn more at: ohkw.de/en

Swissolar

The Swiss solar association launched an apprenticeship for solar installers. With the recognition of the government, and thanks to collaboration with the academic and corporate worlds, 15-year old students will be able, starting September 2023, to undergo three years of studies to become fully qualified solar installers.

Learn more at: Solar installateur: in EFZ (swissolar.ch)

Enpal

Through its academy and efficiency, this company managed to rapidly scale-up its number of solar installations. They are able to attract numerous new workers, train them in their academy and deploy them on rooftop installations in under a month. Their efficient use of electricians, strictly where their presence is required, addresses the core bottlenecks of solar installations.

Learn more at: enpal.de

Reskilling4employment

R4E identifies how best to address reskilling & upskilling needs in the European Union. The goal of this pan-European programme is to serve as a hub that stimulates partnerships that provide reskilling opportunities to unemployed and 'at-risk' workers, so they can find employment in new occupations that are in-demand.

Learn more at: reskilling4employment.eu/en/who-we-are/

Sebastian Enache
Head of M&A Monsson
and RenewAcad
Training Coordinator

I hope that by the end of the year we will introduce 20 new professions, that will actually represent the future of the renewable energy industry in Romania. It is very important to understand that more renewable energy integrated with batteries and hydrogen means less dependence on everything around us.

There are more than

6,500

people working in the renewable industry in the country

RENEWABLE ENERGY SCHOOL OF SKILLS

Romania needs 20,000 new jobs for the construction of wind and photovoltaic parks by 2030

The last 10 years have meant not only MW installed in renewables, but also new jobs in the wind and solar power generation and in maintenance works. Moreover, new professions have developed that, unfortunately, are not yet fully recognized. Labor regulations have not kept pace with the development of generation capacities from renewable sources, so at this moment there are only three new officially recognized professions out of the 20 that have appeared in energy.

And it's not just about recognizing new professions, it's also about schools and universities stalling. If for energy from nuclear, thermal, hydro sources there are clear specializations within educational institutions, for "green" sources the curriculum is not yet developed. This happens even though renewable energy is already a basic component in the country's total electricity production.

Moreover, Romania's RES targets for 2030 have increased to 36.3%, based on the National Long-Term Strategy, which means a significant increase in additional solar and wind energy capacity in 2030: approximately 5 GW of wind and 6.8 GW of solar energy. This also means new jobs in industry. According to Deloitte's analysis, additional investments in electricity generation, mainly based on renewable energy sources, lead to an increased potential for new jobs in the economy. On average, every €1 million invested generates 6.1 jobs. In order to meet this demand, it is necessary to attract and train the workforce, including by recognizing new professions.

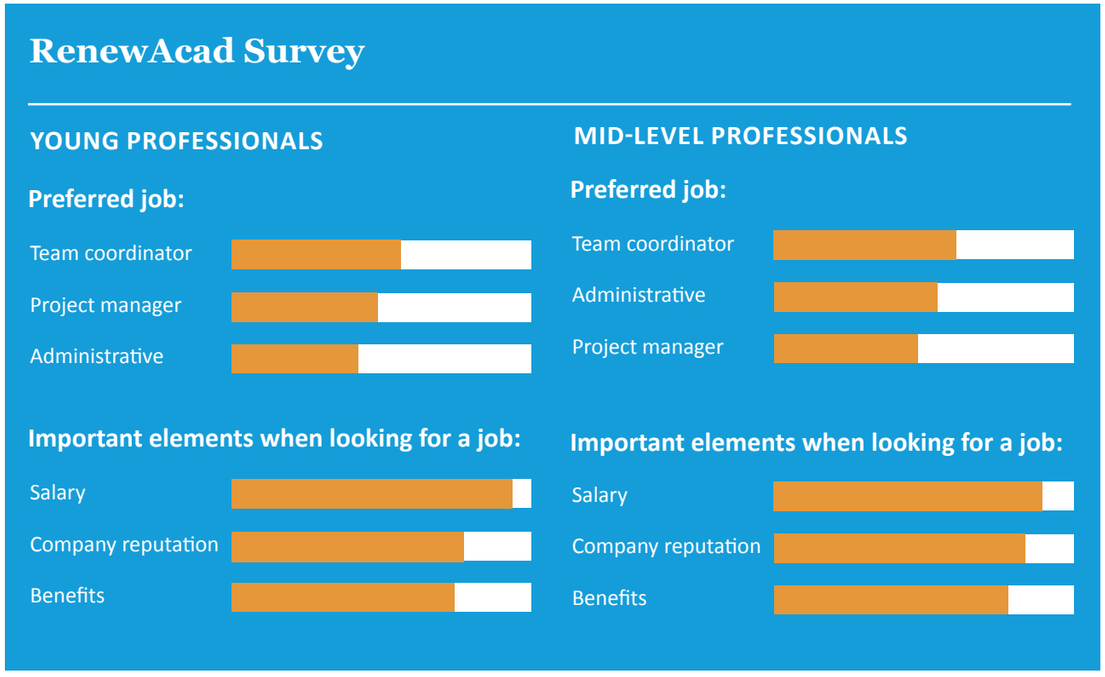
There are more than 6,500 people currently working in the renewable industry in the country. According to European

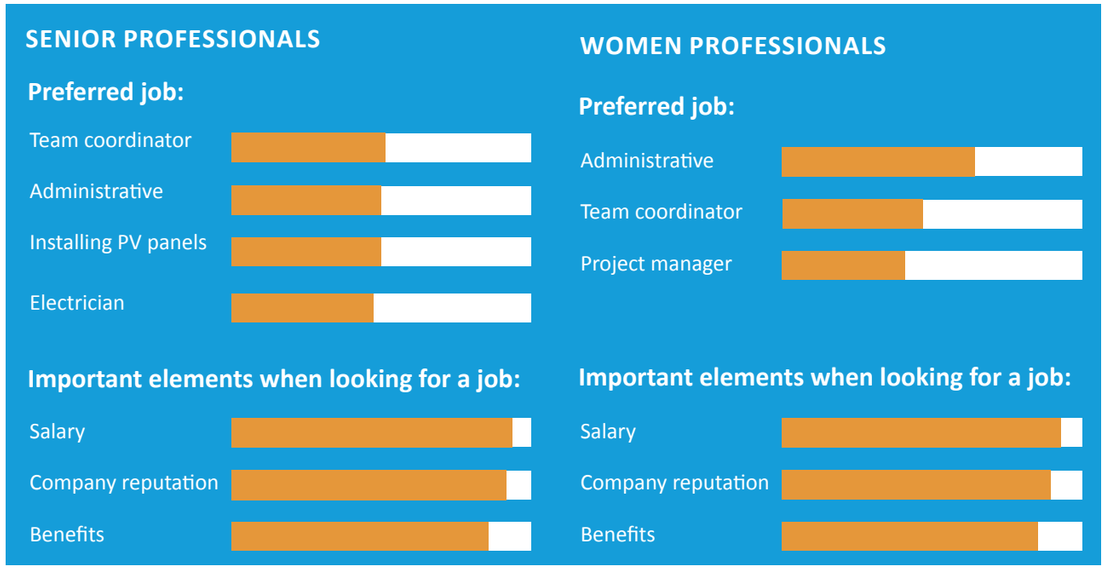
associations, the new targets for “net-zero” emissions require 20,000 jobs in the local renewable industry by 2030. For this, wind and photovoltaic project developers develop operational standards for introducing in the Romanian trade nomenclature professions that already exist. Recently, three new occupations have been introduced in the field of wind energy, namely wind turbine installation technician code 311313, wind turbine maintenance technician code 311311 and wind turbine blade inspection and repair technician code 311312. The associations activating in the renewable field hope to introduce new qualifications in the Classification of Occupations in Romania (COR) in the coming period, including in the photovoltaic sector. In parallel, companies are launching campaigns and test workers’ appetite for a job in the renewable industry.

According to a recent survey conducted by RenewAcad, young people aged 18-29 perceive jobs in the renewable sector as stable and they are most likely to perceive companies in the field as being reliable. However, they might have concerns regarding the general physical safety and risks at work. Generally, they are more likely to have attended renewable and/or electrician courses compared to other age segments.

People aged 30-39 believe that the renewable energy projects can have high potential in Romania and do not perceive an entry barrier due to required knowledge to work on projects. They perceive the environment as being safe but might not perceive the jobs as being stable. They also are the least likely to view companies in this area as being reliable. More likely to have attended electrician courses, without receiving a certification.

People aged 45-55 might be optimistic in regard to the future of renewables, but they are also the segment which might perceive the highest barriers to entry due to the required knowledge to work in this industry. They perceive the coal industry as having the highest risks and might perceive renewables as less risky by comparison. They perceive the jobs as being stable. They value the relationship with the team and with the direct supervisor and would appreciate a mentor during their first weeks in the new job.

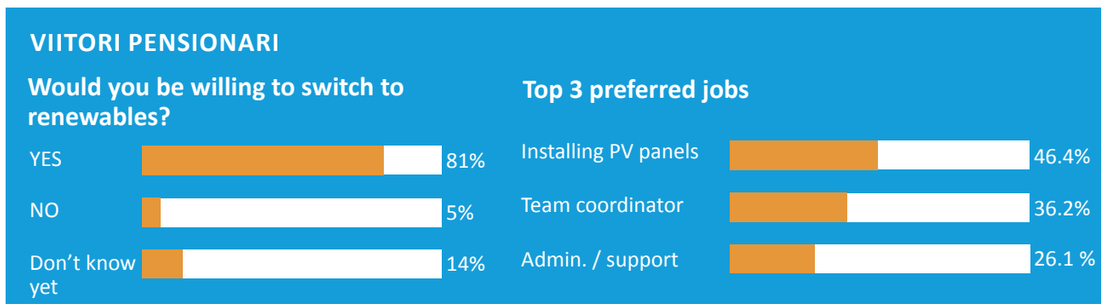




In terms of women’s willingness to work in this industry, the RenewAcad study shows that young professionals aged 18-29 are more likely to consider a job in renewables. They have limited knowledge in the energy sector and in renewables and are less likely to have attended electrician courses. They might have a more restrained view of the industry and might not perceive its potential in Romania, safety, and the job stability. The limited knowledge and interest in the industry are the main switching barriers and could be addressed through communication based on working in safety conditions and the presence of a mentor during the first weeks. An attractive salary and extra benefits can have an influence on the decision to switch to the industry.

The RenewAcad study also analyzes the desire to retrain those who work or have worked in the mining industry. Based on the responses received during the research study, the experts created the profiles below to exemplify most respondents, by each category.

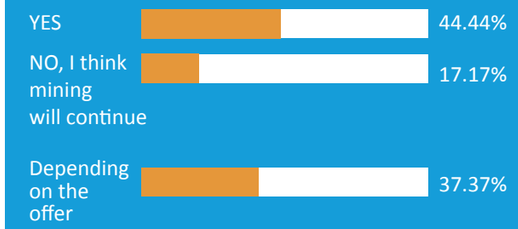
Miners 41-50 years old, with University degree and with 2-4 years until retirement, are well aware of the mining industry and its limitations and are considering alternatives for their future. They are keen on remaining active and will actively search for jobs, making them a top contender for companies working in renewables. Among all segments, future retirees are the most optimistic regarding the renewable energy sector and seem to have a high regard for it. They see green energy projects as having a high potential in Romania, perceive the companies as being serious and the jobs as being stable. At the same time, they might also perceive barriers to entry in this industry, as they think a broad set of knowledge is required to work for companies in this area.



Miners 31 – 40 years old, with high school degree or University Studies, seem more cautious regarding renewables - though they see impact the Just Transition will have on the mining activities, they seem uncertain about the transition to this field. Though they see the need to tap into a different industry, miners with less than 15 years might not fully grasp the new sector or understand its potential in Romania, or they might consider this area as requiring a larger skillset. They foresee the importance of getting trained in a different area for their professional development - either in renewables or in other industries. From this point of view, they are also the segment with the highest completion rate of classes in renewables. Of all segments, they care most about friend & family recommendations when looking for a new job.

MINERS WITH LESS THAN 15 YEARS IN INDUSTRY

Considering the low chances of retiring from mining, would you consider switching to PV?



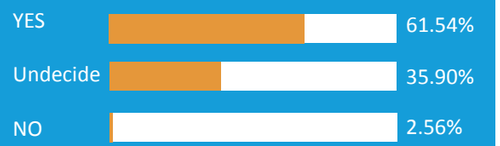
Given the current context in the mining industry, what is important for you?

Miners 41-50 years old affected by Ord. 69/2019 are the most aware about the changes in the mining industry as they have been directly impacted by the sector restructuring. Nonetheless, they also seem the least open to working in renewables. They prefer to look for jobs near their homes, regardless of the industry.

MINERS BETWEEN 41-50 YEARS OLD AFFECTED BY ORD. 69/2019

Given the similarities between mining and working on green energy projects, would you be willing to do the switch?

Are you willing to look for a job considering you've been or will be dismissed with a 2 year severance package?



Good Practice Examples in Romania

International School of Competences in Renewable Energy in Constanta, RESS

The Renewable Energy School of Skills (RESS) is the largest renewable training center in Southeastern Europe, with offices in Constanta and Petroșani. The training center is designed to train technicians working in the renewable energy industry, especially wind energy and photovoltaics. In its 14 years of activity, the school in Constanta has trained over 10,000 people, from Romania and other EU countries, by conducting qualification and retraining courses. The program hosts 16 modules dedicated to the wind and solar sectors.

In my opinion, such centers must be expanded, given that we want to have a significant development on renewables throughout Romania, both at industrial and individual levels. More and more Romanians will want to transform the way they generate or consume energy, there is a clear trend also supported by European funds to install, for example, photovoltaic panels on houses, on apartment buildings. We strongly encourage this trend. I congratulated those I met today in the center, it is a young and very energetic team, a very good example for other similar developments.

Klaus Iohannis, President of Romania, during his visit to the Constanta Training Center

Learn more at: gwo-training.eu

RenewAcad – Academy of Counseling and Professional Training for Renewable Energy Sources

The project carried out by Wind Power Energy together with the Romanian Association for Wind Energy (RWEA) and co-financed by the European Social Fund through the Human Capital Operational Program 2014-2020 aims to retrain employees in areas affected by the energy transition, miners, and personnel in the Romanian coal sector, to become specialists in renewable energy and electricity distribution. Until February 2023, 571 of the people who went through the programs provided received certifications in the field thanks to the support provided, 119 found a job and 576 employees benefited from support for participation in training/ validation of skills.

Learn more at: renewacad.eu

15 YEARS

OF MAKING BUSINESS BETTER

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inspiratia H1 2023

We are a global law firm with lawyers located in more than 40 countries throughout the Americas, Europe, the Middle East, Africa and Asia Pacific, positioning us to help clients with their legal needs around the world.

Our Romanian office sits at the forefront of the renewable energy industry market, providing strategic advice to companies and financiers across the renewable energy spectrum, including solar, wind, biomass or biofuels.

We have been working with world renowned companies on various matters connected with wind farm or solar plants development, financing or acquisitions, regulatory and licensing matters or energy contracting. Clients rely on our depth and breadth to provide market leading advice on the entire spectrum of legal issues which can arise on any energy project investment.

"Highly skilled professionals in all relevant areas of expertise, available, trustworthy."

"Extensive knowledge of area of expertise, pro-active attitude, diligence."

Client comment
– Legal 500 EMEA 2023

If you are considering a transaction or have any queries, please contact one of our partners listed below.

Marian Dinu
Country Managing Partner
+40 372 155 881
marian.dinu@dlapiper.com

Paula Corban-Pelin
Partner
+40 372 155 847
paula.corban@dlapiper.com

DLA PIPER

EDITORIAL TEAM

Andreea Gheorghe

Ana Aneculaesei

Mihaela Ciocoiu

Editorial Partners

DLA Piper

Paula Corban-Pelin
Tudor Nedelea
Florin Țineghe
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Ioana Anton
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Lidia Duțu-Cârstea

EPG

Radu Dudău
Alina Chiriță

Deloitte

Sorin Elisei
Livia Kicsi

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