

ECRB 2024 REPORT

Update on the Developments of Regulatory Framework on Renewables and Flexibility in the Energy Community Contracting Parties

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1. INTRODUCTION

1.1 About the Energy Community and the Energy Community Regulatory Board

The Energy Community[1] is an international organization established in 2006 with the aim to bring together the European Union and its neighbours to create an integrated pan-European energy market. The key objective of the Energy Community is to extend the EU internal energy market rules and principles to countries in South East Europe, the Black Sea region and beyond, based on a legally binding frame. Currently, the Energy Community has nine Contracting Parties: Albania, Bosnia and Herzegovina, Georgia, Kosovo*[2], Moldova, Montenegro, North Macedonia, Serbia and Ukraine, while Armenia, Turkey and Norway are Observer Countries.[3]

As a body of the Energy Community, the Energy Community Regulatory Board (ECRB) operates based on Article 58 of the *Treaty establishing the Energy Community*. The ECRB advises the Energy Community Ministerial Council and Permanent High Level Group on details of statutory, technical and regulatory rules and should make recommendations in the case of cross-border disputes between regulators. ECRB is the independent regional voice of energy regulators in the Energy Community. ECRB's mission builds on three pillars: providing coordinated regulatory positions to energy policy debates, harmonising regulatory rules across borders and sharing regulatory knowledge and experience.

With transposition of gas and electricity network codes, the package "Clean Energy for all Europeans" and the Electricity Integration Package[4] in the Energy Community legal framework, ECRB gained a number of new competences. This enhances its tools to foster integration of Contracting Parties' energy markets in the internal EU electricity and natural gas markets, in line with the objectives of the Treaty.

This report was prepared by the ECRB Electricity Working Group with active participation and inputs from all Energy Community Regulatory Authorities. ECRB acknowledges the leadership of Mr. Igor Malidzan (REGAGEN) in preparing this deliverable.

[1] https://www.energy-community.org/

[2] Throughout this document the symbol * refers to the following statement: This designation is without prejudice to positions on status, and is in line with UNSCR 1244 and the ICJ Advisory Opinion on the Kosovo* declaration of independence.

[3] https://www.energy-community.org/aboutus/whoweare.html

[4] https://www.energy-community.org/enc-lex/law/acquis/EIP.html

1.2 Scope of the report and Methodology

This report provides a comprehensive overview of the status and development of renewable energy sources (RES) and flexibility mechanisms across the Energy Community Contracting Parties (CPs). It aims to assess the progress made in aligning national energy frameworks with EU directives and market principles, with a particular focus on the integration of RES into competitive electricity markets.

The scope of the report includes:

- RES Generation Capacity and Electricity Production: Analysis of installed RES capacities and actual electricity generation from renewable sources in each Contracting Party, highlighting growth trends and technology shares.
- Support Schemes for RES: Examination of national support mechanisms, including feed-in tariffs, feed-in premiums, and market-based instruments. Special attention is given to the transition toward competitive allocation of support through auctions.
- Self-Consumption Models: Review of legal and regulatory frameworks enabling self-consumption of renewable electricity, including net metering, net billing, and prosumer incentives.
- Auctions for Support Rights: Assessment of auction-based schemes for awarding support rights, primarily based on feed-in-premium models, and their role in enhancing cost-effectiveness and transparency.
- Balancing Responsibility of RES Producers: Evaluation of balancing obligations imposed on privileged RES producers, including the shift toward full or partial balancing responsibility in line with EU market rules.
- Role of Energy Regulators: Analysis of the institutional role of national regulatory authorities in designing, monitoring, and enforcing RES support schemes and broader market integration policies.
- Guarantees of Origin (GOs): Overview of national GO registries and their connection to the Energy Community's regional GO platform, including the role of production device registers in ensuring traceability and transparency.
- Flexibility Tools and Market Integration: Identification of flexibility instruments—such as demand response, storage, and grid services—implemented to support RES integration and enhance system resilience.

By covering these dimensions, the report aims to inform policymakers, regulators, and market participants about the current landscape, challenges, and opportunities for accelerating renewable energy deployment and flexibility in the Energy Community region.

Data and analysis contained in the present report are based on survey which provided information and data by the regulatory authorities in CP's and Observers. For this purpose, a questionnaire was prepared and distributed to the regulatory authorities in Albania, Armenia, Bosnia and Herzegovina, Georgia, Kosovo*, Moldova, Montenegro, North Macedonia, Serbia and Ukraine.

2 COMPARATIVE ANALYSIS

2.1 Overview of generation technologies

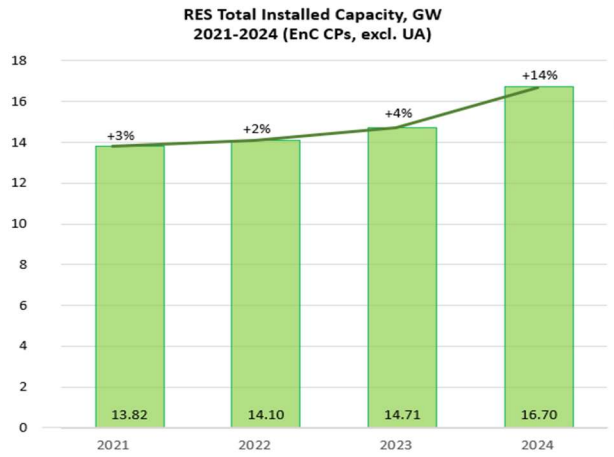


Figure 1

Renewable energy installed capacity in Energy Community Contracting Parties ("EnC CPs") (excluding Ukraine) grew from 13.82 GW in 2021 to 16.70 GW in 2024, representing 21% cumulative 2021-2024 growth. The acceleration is particularly notable in 2024 with a 14% increase—the highest annual growth rate in the period — suggesting strengthening momentum in renewable deployment across the region as regulatory frameworks gradually mature and investment increases.

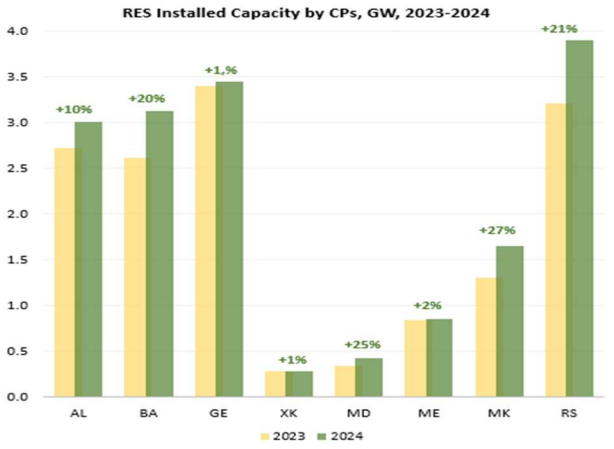


Figure 2

RES capacity growth between 2023 and 2024 varies significantly across EnC CPs. North Macedonia led in growth rate at 27%, followed by Moldova (25%) and Serbia (21%), while Serbia maintains the highest absolute capacity at 3.9 GW among EnC CPs without Ukraine. At the lower end, Kosovo* (1%), Georgia (1%), and Montenegro (2%) showed minimal increases. It is important to note that in Montenegro and Georgia total energy mix is dominated by RES technologies. Albania, with energy mix fully based on RES technologies, demonstrated additional 10% increase in RES installed capacity in 2024 vs 2023.

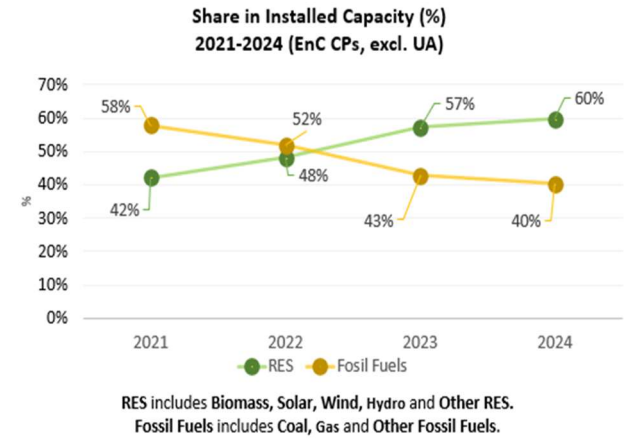
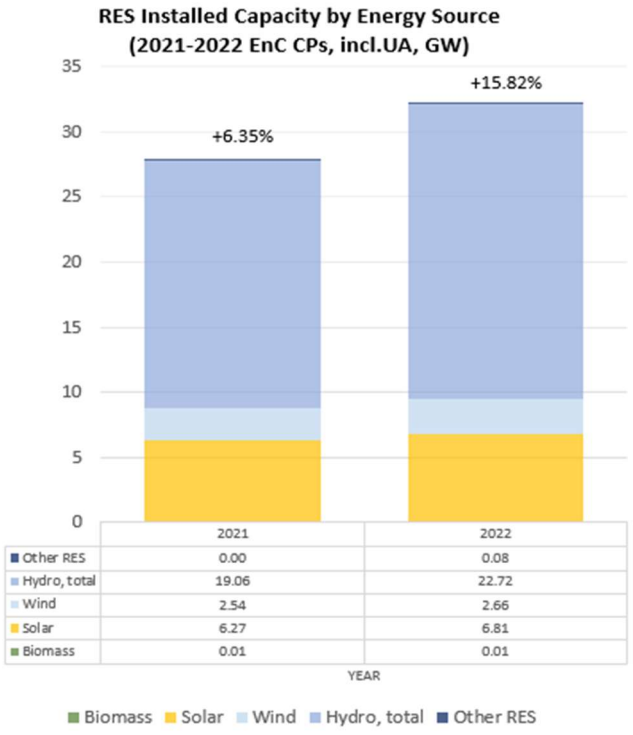
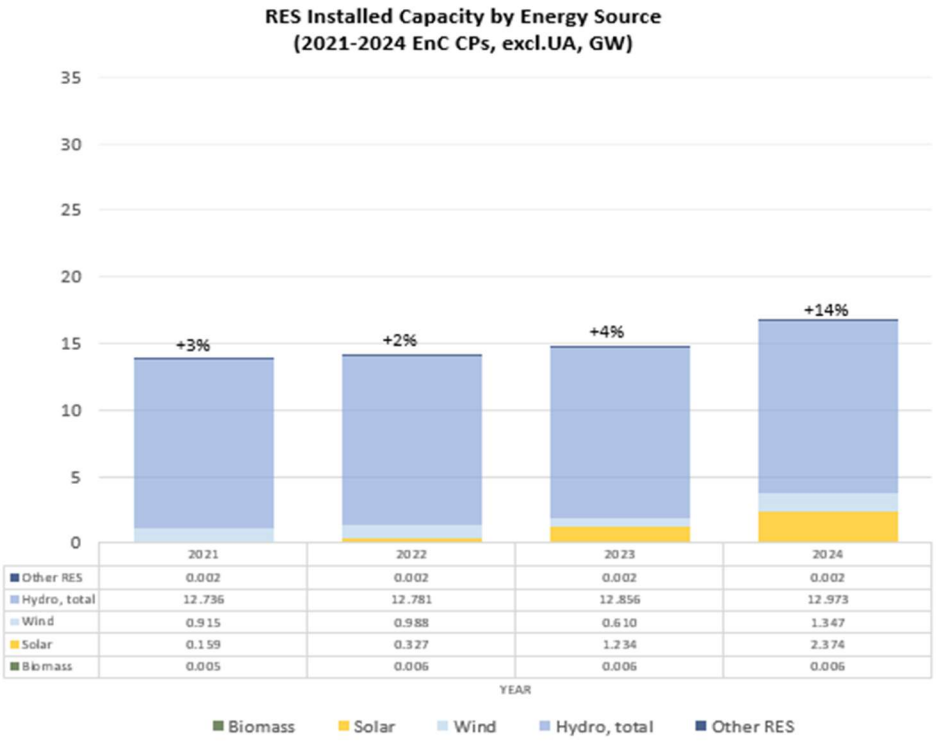


Figure 3

For EnC CPs (excluding Ukraine), RES share in total installed capacity surpassed fossil fuels for the first time in 2023. By 2024, RES maintains leadership at 60% with fossil fuels at 40%. This represents a dramatic shift from 2021, when fossil fuels dominated at almost 60% versus RES at 42%, demonstrating accelerating decarbonization progress across the EnC CPs (without Ukraine). In 2022, for EnC CPs with Ukraine, RES and fossil installed capacity were almost at par at cca 40%, 17% was represented by low carbon (nuclear) technology in Ukraine.

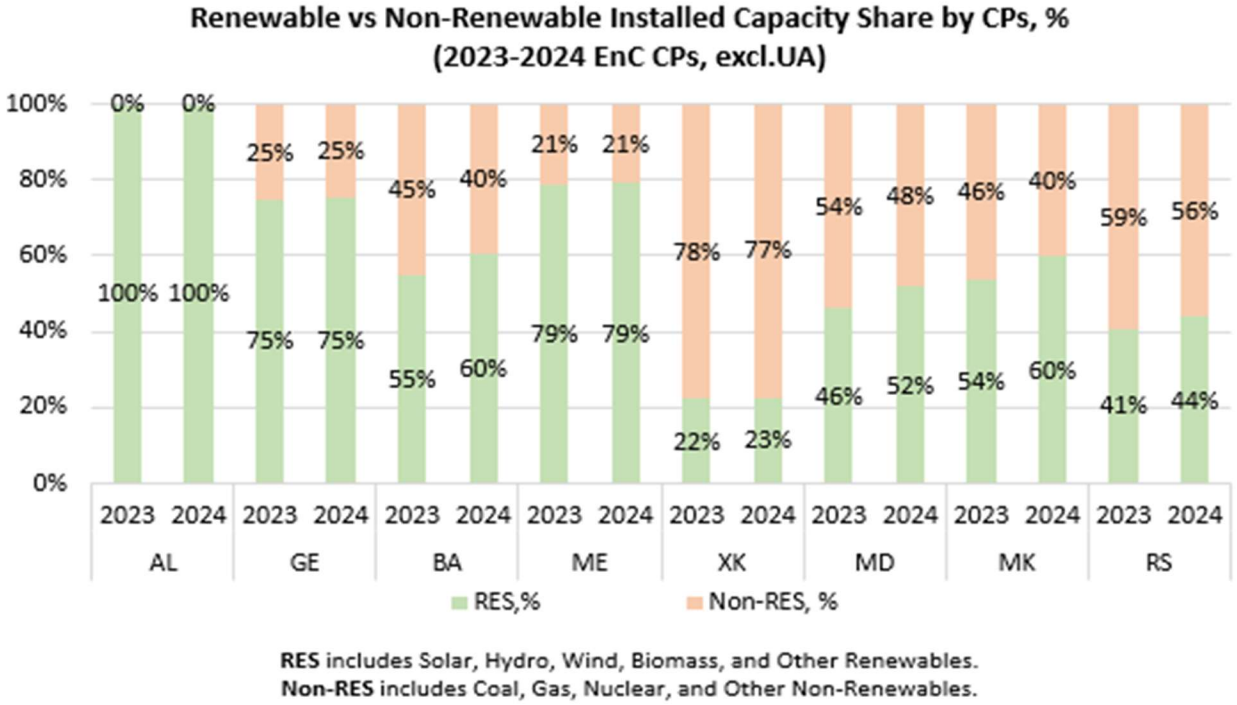
Figures 4 & 5


RES Installed Capacity by Energy Source
(2021-2022 EnC CPs, incl.UA, GW)
35
30
25
20
15
10
5
0
+6.35%
+15.82%
2021
2022
Other RES 0.00 0.08
Hydro, total 19.06 22.72
Wind 2.54 2.66
Solar 6.27 6.81
Biomass 0.01 0.01
YEAR
Biomass Solar Wind Hydro, total Other RES


RES Installed Capacity by Energy Source
(2021-2024 EnC CPs, excl.UA, GW)
35
30
25
20
15
10
5
0
+3%
+2%
+4%
+14%
2021 2022 2023 2024
Other RES 0.002 0.002 0.002 0.002
Hydro, total 12.736 12.781 12.856 12.973
Wind 0.915 0.988 0.610 1.347
Solar 0.159 0.327 1.234 2.374
Biomass 0.005 0.006 0.006 0.006
YEAR
Biomass Solar Wind Hydro, total Other RES

RES capacity in EnC CPs including Ukraine grew from 28 GW to 32.3 GW between 2021 and 2022—a 15.82% increase. 2022 represents the last year Ukraine published comprehensive energy statistics before Martial Law[5] restrictions on data publication. For 2021-2024 in EnC CPs (excluding Ukraine) hydropower continues to remain the dominant RES source. In 2024 vs 2023 in the Energy Community (excluding Ukraine), solar demonstrated the strongest expansion, increasing from 1.2 GW to 2.4 GW. Wind capacity more than doubled from 0.6 GW to 1.34 GW. This diversification beyond traditional hydropower reflects advancing renewable deployment and strengthening policy frameworks across the region.

Figure 6

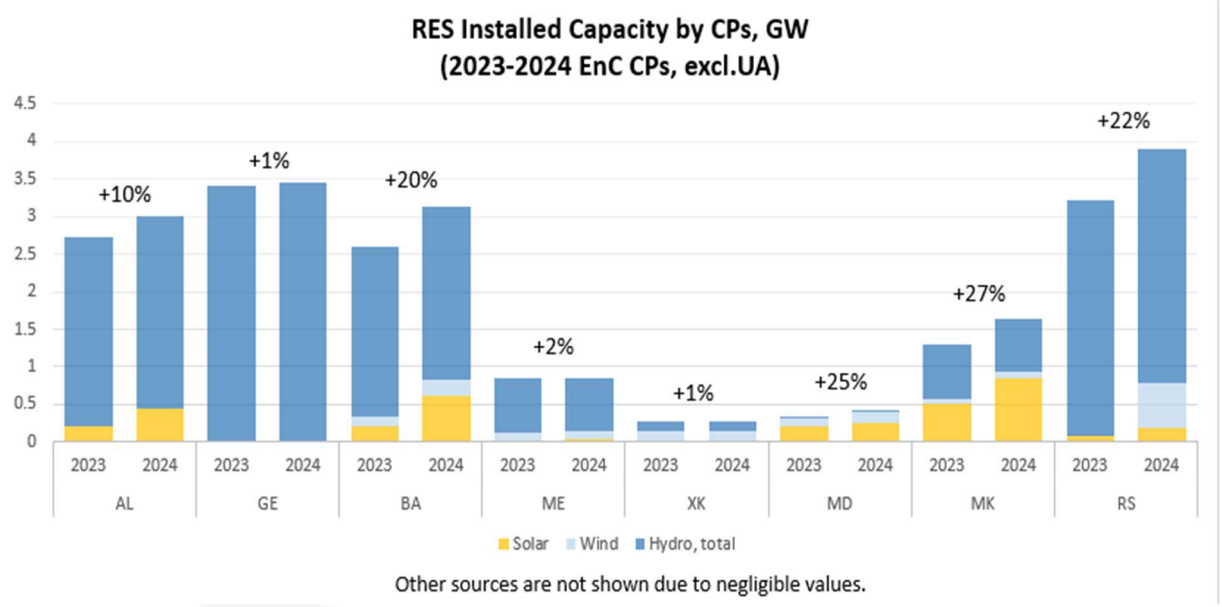


RES includes Solar, Hydro, Wind, Biomass, and Other Renewables.
Non-RES includes Coal, Gas, Nuclear, and Other Non-Renewables.

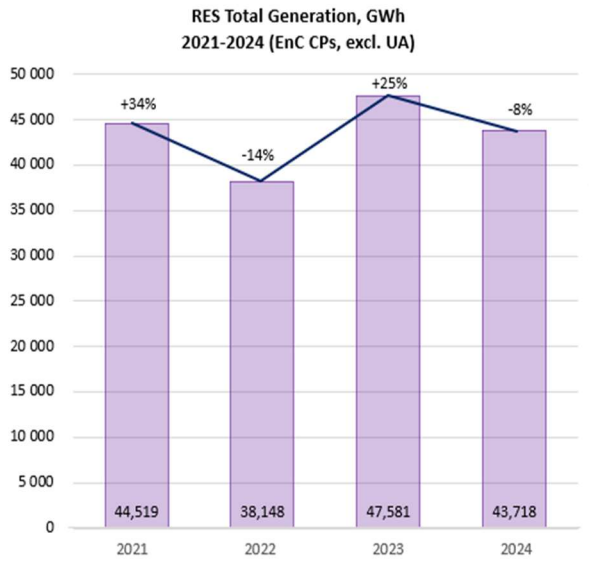
Between 2023 and 2024, the share of renewables in total installed capacity increased most in North Macedonia by 6%, Moldova by 6%, Bosnia and Herzegovina by 5%, and Serbia by 3%. Other Contracting Parties, including Albania, Georgia, Montenegro saw no significant year-on-year change, reflecting their already high renewable shares. In Kosovo* limited new RES capacity additions.

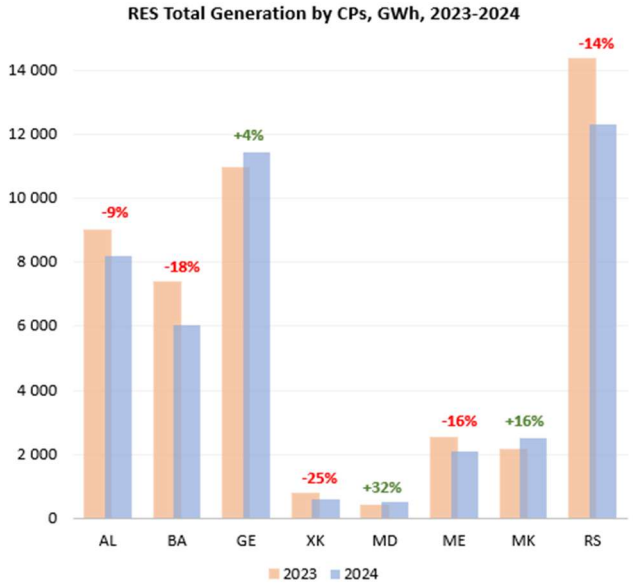
[5] Link to relevant UA Martila Law legislaiton

Figure 7



Figures 8 & 9

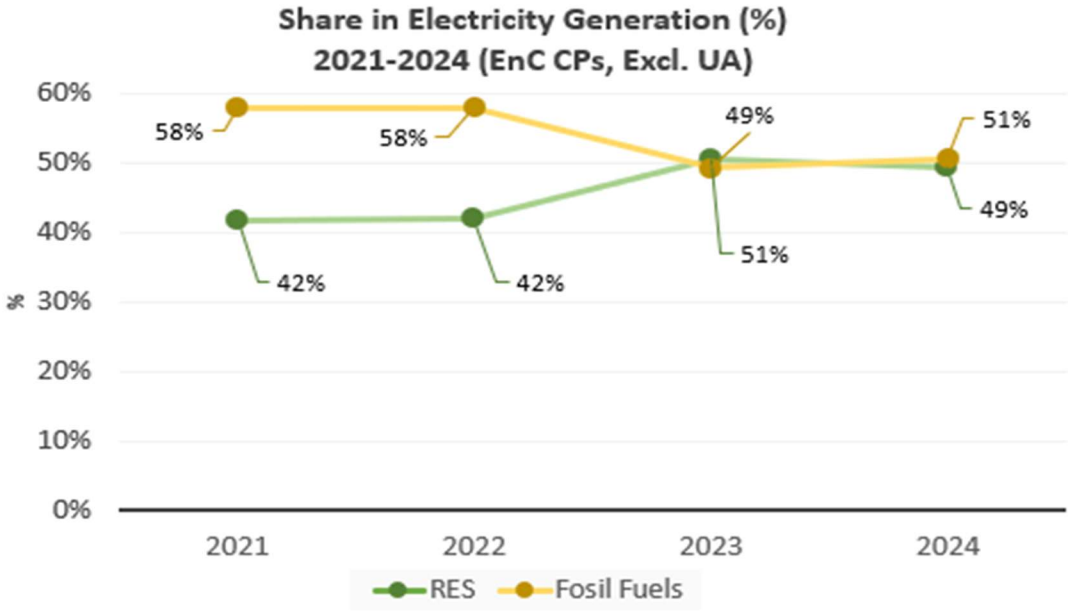




In 2024, total RES generation across the Energy Community Contracting Parties (excluding Ukraine) fell by 8% compared to 2023, reaching 43.7 TWh. This decline came after a strong rebound in 2023 (+25%). 2024 decline was mainly driven by weaker hydropower output due to less favorable weather and water conditions, despite continued growth in RES installed capacities in CPs (without Ukraine). At the country level, only a few Contracting Parties increased RES generation — Moldova (+32%), North Macedonia (+16%), and Georgia (+4%) — supported by expanding solar and wind capacity. In contrast, the majority of countries where hydro has the highest share among RES sources saw declines: Bosnia and Herzegovina (-18%), Montenegro (-16%), Serbia (-14%), and Albania (-9%),

primarily reflecting reduced hydrological inflows. Kosovo* showed the largest YoY decrease of -25%. Overall, 2024 marked a year of lower renewable generation but continued structural progress toward diversification beyond hydropower.

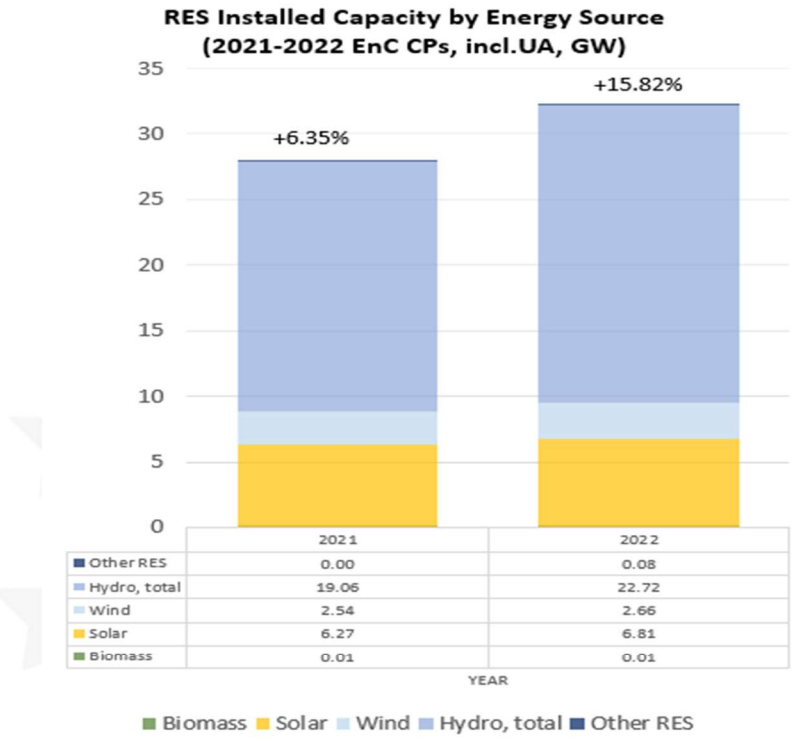
Figure 10

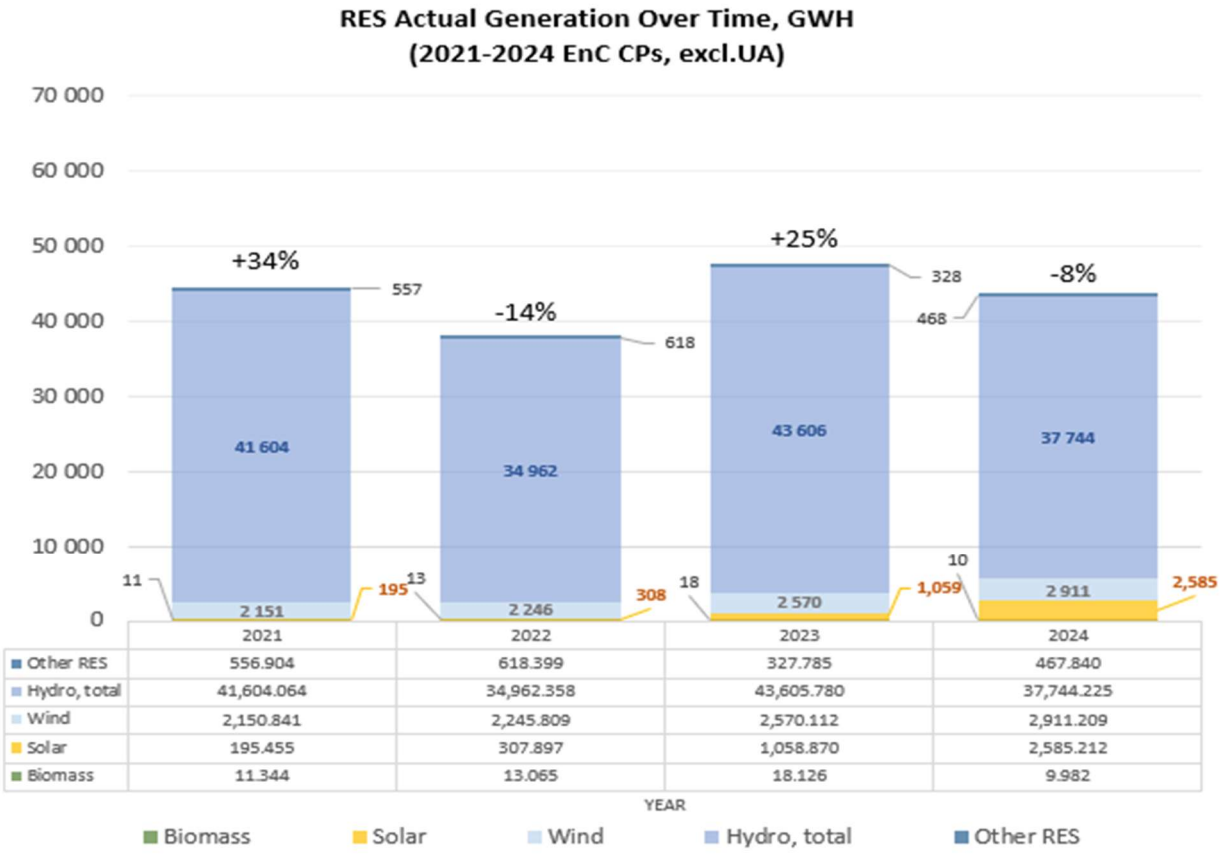


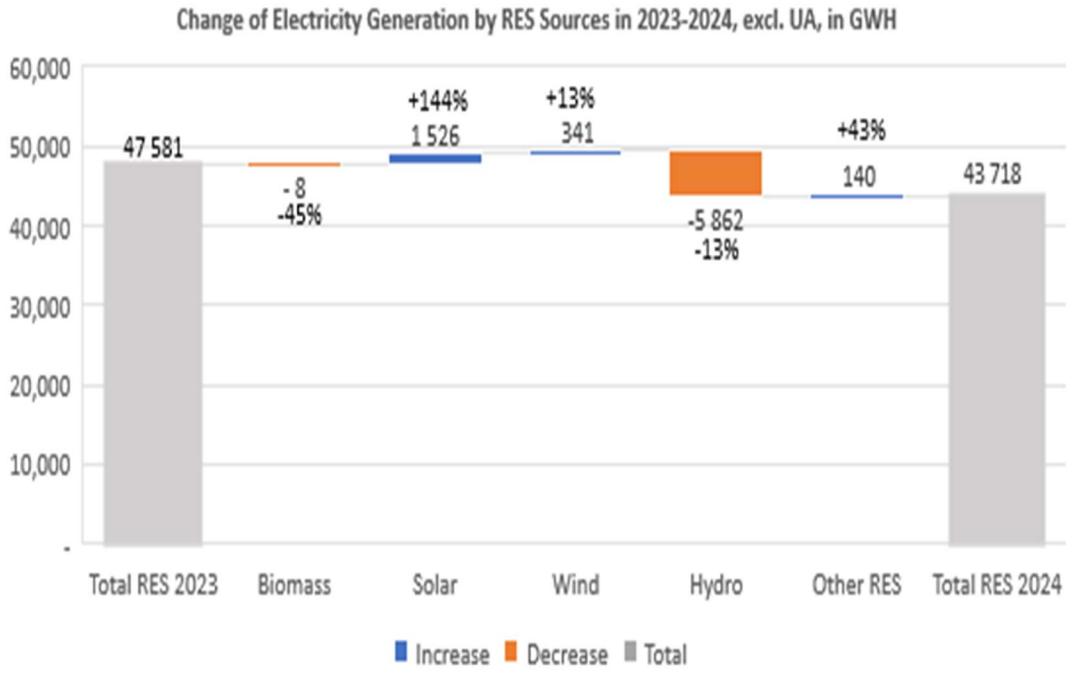
RES includes **Biomass, Solar, Wind, Hydro** and **Other RES**.
Fossil Fuels includes **Coal, Gas** and **Other Fossil Fuels**.

Between 2021 and 2024, the EnC CPs (excluding Ukraine) saw a significant shift in their electricity generation mix. The share of renewable generation (RES) increased from 42% in 2021 to a peak of 51% in 2023, surpassing fossil fuels, which stood at 49% that year. In 2024, even though RES installed capacity grew, the share of renewables electricity generation slightly declined to 49%, still being almost at par with fossil fuels at 51%. This change in generation was mainly driven by lower hydropower output despite continued growth in renewable installed capacity in 2024 vs 2023 as seen in Figures 1 and 3. For 2020 for EnC CPs with Ukraine, fossil fuels technologies accounted for 39% of generation, RES for 28% and 31% was represented by low carbon (nuclear) technology in Ukraine.

Figures 11, 12, 13



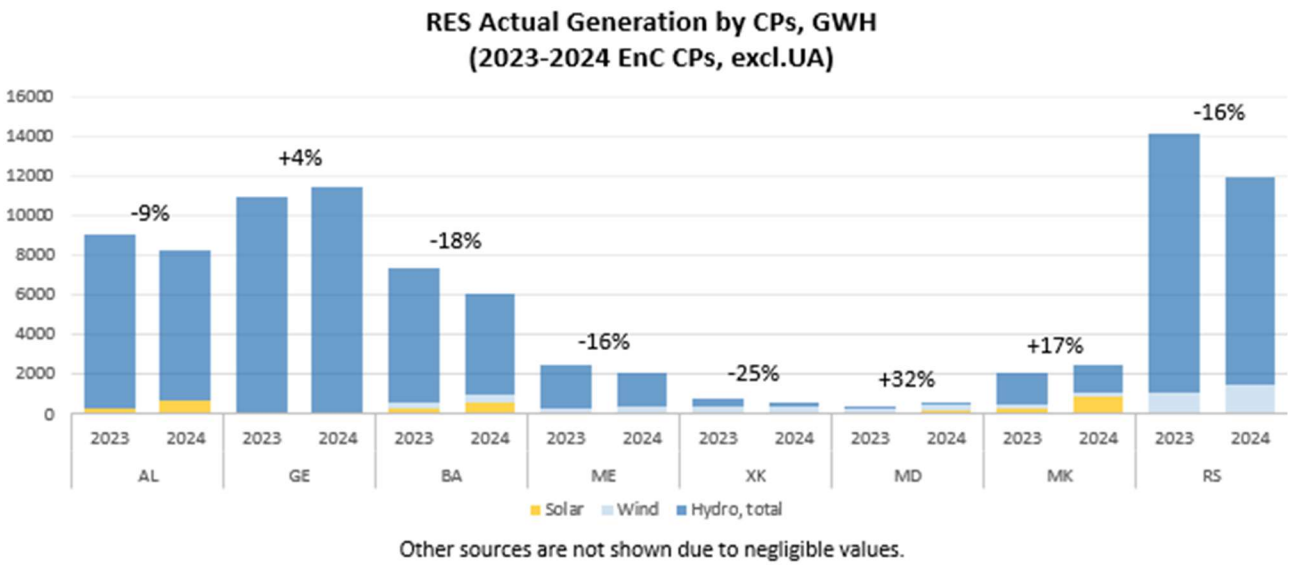




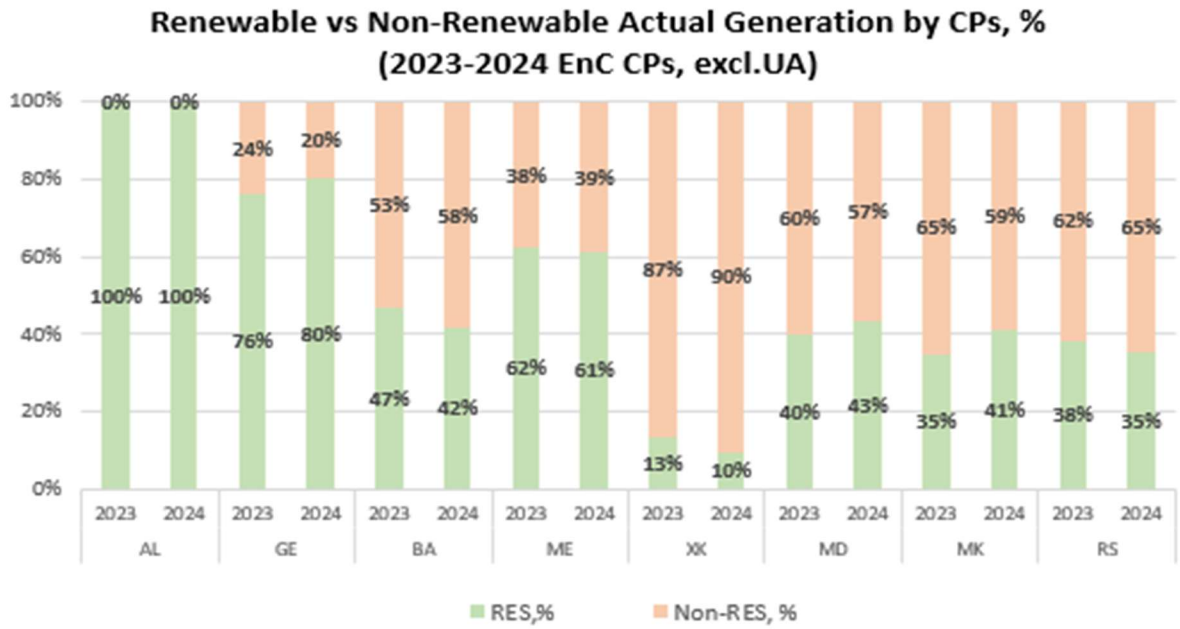
Between 2021 and 2024, RES generation across the EnC CPs showed strong but uneven growth, with significant differences when including or excluding Ukraine. When Ukraine is included, total RES generation reached about 66 TWh in 2021, marking a 33% increase over the previous year, before falling by 16% in 2022 to 55 TWh. This decline was mainly due to a drop in hydropower, loss of capacity in Ukraine due to war time autricities, which has a large impact on regional totals.

When Ukraine is excluded, total RES generation among the remaining CPs rose from around 43.2 TWh in 2021 to 43.7 TWh in 2024, showing strong year-to-year variability. RES generation increased by 34% in 2021, declined by 14% in 2022, rebounded by 25% in 2023, and slightly fell by 8% in 2024. Hydropower remained the dominant source, representing over 85% of total RES output, but its variability strongly influenced annual totals. Solar and wind generation showed continuous growth throughout the period—solar more than doubled between 2023 and 2024—helping to partially offset hydrological fluctuations. The overall reduction in generation was driven mainly by a 13% fall in hydropower output (−5.9 TWh), which outweighed increases in solar and wind generation. Solar showed the strongest growth, up by 144% (+1.5 TWh), while wind increased by 13% (+0.3 TWh). Biomass generation declined almost by half (−45%), and other renewables rose significantly (+43%), but their overall contribution remained quite minor.

Figures 14 & 15



Other sources are not shown due to negligible values.



RES includes Solar, Hydro, Wind, Biomass, and Other Renewables.
Non-RES includes Coal, Gas, Nuclear, and Other Non-Renewables.

In 2024 vs 2023, renewable electricity generation across the EnC CPs (excluding Ukraine) declined in most countries, reflecting weaker hydrological conditions despite ongoing growth in solar and wind. The steepest drops were recorded in Kosovo* (–25%), Bosnia and Herzegovina (–18%), Serbia (–16%), and Montenegro (–16%), while Albania saw a moderate decrease of 9%. In contrast, Moldova registered the highest increase in RES generation at +32%, followed by North Macedonia (+17%) and Georgia (+4%), supported by new solar and wind installations. Hydropower continued to dominate the renewable mix, but the contrasting national trends highlight growing diversification

— with non-hydro sources increasingly contributing to stability in countries where in solar and wind capacities are expanding.

2.2 Transposition of EU legislation related to renewable energy sources

Directive (EU) 2018/2001, commonly referred to as RED II, is a cornerstone of the EU's strategy to accelerate the transition to renewable energy. It sets a binding target for the EU to reach at least 42.5% renewable energy in its overall energy mix by 2030, with a voluntary top-up to 45%. The directive promotes renewable energy across electricity, heating and cooling, and transport sectors, while empowering consumers and communities to participate in the energy transition.

The Energy Community formally adopted RED II by the Decision (2021/14/MC-EnC) of the Ministerial Council of the Energy Community, to align its Contracting Parties with EU energy and climate goals. This adaptation ensures that Contracting Parties implement similar frameworks and targets, fostering regional cooperation and market integration.

Key elements of the Energy Community's version include:

- Transposition Requirements: Contracting parties must clearly indicate how national laws transpose each provision of RED II, ensuring full and precise implementation.
- Monitoring and Reporting: The Energy Community Secretariat oversees progress and compliance, helping countries meet their renewable energy obligations.
- Tailored Support: Recognizing different starting points and capacities, the adaptation allows for flexibility in implementation timelines and technical assistance.

By adopting RED II, the Energy Community strengthens its commitment to decarbonization, energy security, and regional integration. It also opens doors for investment in renewables and supports the development of sustainable energy systems across Southeast Europe.

Regarding the transposition, in the most of CP's RED II Directive has been partially or fully transposed. The transposition in primary legislation has dominantly been done through the adoption of Law on RES. In Albania, the Law on RES has been adopted in April 2023 which partially transposes RED II Directive. In Bosnia and Herzegovina's entity Republic of Srpska, the Law on RES has been adopted in February 2022. The Law on RES in Bosnia and Herzegovina's entity Federation of BIH has been adopted in November 2023 which brought many significant novelties in legal framework, such as:

- FIT and FIP incentive schemes are introduced. Auction processes for FIT (small plants and renewable energy communities) and FIP (large plants) are being introduced; and the procedure is carried out by the Operator for RES and CoGen, the concepts of energy credit, monetary credit, net metering and net billing, prosumer and community of renewable

energy sources were introduced, the jurisdiction of FERK and the distribution system operator to determine the status of a eligible producer
- The guarantee of the origin of electricity and the entire process of issuance, cancellation and transfer are defined;
- The term aggregator, active customer, EV charging point, energy storage and storage operator, prosumer (buyer/producer) is defined;
- The concept of renewable energy communities and citizens' energy communities (ZOE and GEZ) is defined;
- The calculation of the structure of residual electricity (residual mix – RM) is defined;
- Supply schemes are defined according to the net billing and net metering model;
- A direct link is introduced with the national integrated plan for energy and climate and the entity plans for energy and climate (NECP BIH and ECP FBIH);

In Georgia, the new RES Law, which will transpose the RED II, is in drafting phase. Kosovo* has transposed the Renewable Energy Directive 2018/2001, adopted by the Ministerial Council in 2021, into its national legislation.

The relevant law was adopted by the Assembly of the Republic of Kosovo* and entered into force on May 17th 2024.

The new RES Law aims to increase the use of energy from renewable sources and cogeneration in electricity, heating and cooling, and transport sectors and sets national targets for the share of renewable energy in gross final energy consumption through 2031.

Key Aspects / Changes Introduced by the New RES Law are:

- market-based support schemes (transition from fixed feed-in tariffs to competitive auctions and feed-in premiums, promoting cost-efficiency and prosumers and investors can now access market-reflective incentives),
- establishment of the Renewable Energy Support Fund (a new independent financial mechanism to manage support payments for RES producers which ensures transparency and separation from the state budget),
- legal basis for issuing and trading Guarantees of Origin in line with EU standards which increases traceability and promotes green electricity disclosure,
- clear framework for Prosumers by defining rights and responsibilities of self-consumers and energy communities, enabling net billing schemes and access to the energy market and simplified permitting and connection procedures for small-scale RES installations encouraging participation of households and small businesses.

In Moldova, Existing RES Law from 2016 was amended in 2023 with the aim of partially transposing RED II Directive (EU), in the version adapted and approved by Decision of the Ministerial Council of the Energy Community No. 2021/14/MC-EnC.

Important aspects/changes brought by the Law amendments were introducing net billing mechanism and renewable energy communities. In addition, ANRE has been appointed as issuing body for GOs.

In Montenegro, The Law on RES, which is in force from August 2024, transposed Energy Community adapted RED II Directive in primary legislation. The Law introduced market based support scheme based on auctions, except for the small producers with installed capacity less than 200kW, and market premium as an incentive price model. Feed-in tariff is still in use but for the new technology demonstration projects only. The deadline for adoption all bylaws arising from the RES Law was the end of August 2025.

Directive 2018/2001 adopted by Ministerial Council in 2021 is not transposed into the national legislation in North Macedonia. The first draft Law on RES was prepared by the Ministry of Energy, mining and mineral resources (Ministry) and there were expert discussions at the end of 2024 and beginning of 2025. Currently, Ministry is preparing final draft that is expected to be adopted in the first quarter of 2026. ERC (North Macedonian NRA) has had a possibility to comment the first draft which regulates main aspects of the RES Directive.

In Serbia, the Law on usage of RES adopted in 2021, has been amended in 2023 and 2024.

The most important amendments were related to following aspects:

- new rights and responsibilities were introduced to Guaranteed Supplier who became balancing responsible party for privileged RES producers using market premiums
- the right to priority access was limited to demonstration projects, generators with an installed capacity below 400 kW, and generators connecting to the system after 1 January 2026 with an installed capacity below 200 kW, irrespective of their participation in support schemes, except in cases where the power system is operating under emergency conditions.
- the market premium scheme is limited to facilities where at least 70% of the generator's installed capacity is made available.
- the Government has assumed responsibility for determining the maximum market premiums and maximum feed-in tariffs for RES, expressed per MWh, applicable to newly constructed and reconstructed generation facilities.
- new limits on installed capacity for prosumers have been introduced: up to 10.8 kW for households and up to 150 kW for other categories of prosumers. However, prosumers with higher installed capacities who were connected to the system prior to the entry into force of these amendments retain their previously granted prosumer status.
- the TSO and DSO are responsible for maintaining a public register of connected generators, as well as a list of all connection requests submitted to the TSO/DSO.

- the TSO and DSO are also responsible for system development planning, considering the results of system adequacy analyses. Based on these analyses, they may decide to postpone the resolution of connection requests for RES facilities.

The RED II Directive has been largely transposed into the national legislation of Ukraine through the adoption of the following regulatory legal acts:

• Law of Ukraine "On Alternative Energy Sources";

• Law of Ukraine "On the Electricity Market";

• Resolution of the NEURC No. 307 of 14.03.2018 "On the Approval of Market Rules";

• Resolution of the NEURC No. 641 of 26.04.2019 "On the Approval of Regulatory Legal Acts Governing the Activities of the Guaranteed Buyer and the Purchase of Electricity under the 'Green' Tariff, and the Procurement of Services under the Market Premium Mechanism."

The Verkhovna Rada of Ukraine adopted the Law of Ukraine of 30.06.2023 No. 3220-IX "On Amendments to Certain Laws of Ukraine Regarding the Restoration and 'Green' Transformation of Ukraine's Energy System."

The legislative changes introduced by this Law are aimed at implementing the provisions of EU legislation in the electricity sector, especially the Clean Energy Package.

The Law transposed several provisions of Directive (EU) 2019/944, introduced and improved a number of procedures and mechanisms related to RES, namely:

- the mechanism for issuing guarantees of origin for electricity produced from RES;
- incentives for electricity generation from RES under the market premium mechanism;
- incentives for electricity generation under the self-generation mechanism;
- the procedure for concluding and suspending electricity purchase and sale contracts under the "green" tariff;
- the procedure for concluding an agreement on participation in the balancing group of the Guaranteed Buyer;
- the procedure for concluding an agreement on the provision of services under the market premium mechanism;
- the procedure for purchase and sale of electricity by the Guaranteed Buyer from sellers under the "green" tariff, taking into account procurement specifics;
- the calculation of the cost and the procedure for payment for services to increase the share of electricity produced from renewable energy sources, provided by the Guaranteed Buyer and universal service suppliers;
- responsibility for electricity imbalances of sellers under the "green" tariff, as well as the payment of part of the cost of imbalance settlement by the Guaranteed Buyer;

- the possibility for consumers and distributed generation to participate in electricity trading and service provision in the electricity market through aggregators;
- extension of wind power plant construction deadlines under the "green" tariff for one year;
- partial changes to the auction mechanism for the construction of RES generation.

In Armenia, although under the Comprehensive and Enhanced Partnership Agreement (CEPA), signed between the EU and the Republic of Armenia and effective as of 1 March 2021, Armenia is required to gradually align its legislation with Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of renewable energy (within six years of CEPA's entry into force), the proposed new draft Law "On Renewable Energy and Energy Efficiency" already incorporates numerous provisions from the Renewable Energy Directive (EU) 2018/2001, Directive (EU) 2019/944, and Regulation (EU) 2019/943.

On May 14th 2025, the Law of the Republic of Armenia "On Amendments and Changes to the Law On Energy" has been adopted which:

a) Grants electricity producers from small hydro, solar, and wind power plants located on natural watercourses—who currently benefit from a statutory electricity purchase guarantee—the option to voluntarily renounce this guarantee and enter the competitive market within the next two years, with no possibility of reinstating the guarantee thereafter.
b) Establishes that certain consumers must independently participate in the electricity market as qualified consumers—without the option of choosing a retail supplier—if, during the previous calendar year:
c) their total electricity consumption exceeded 12 million kWh across all metering points with a voltage of 6 (10) kV or higher, and consumption at any individual point exceeded one million kWh. Consumers failing to obtain qualified consumer status will be subject to the highest applicable electricity tariff. The 12 million kWh threshold was determined based on an analysis of the potential additional costs and benefits of direct participation in the wholesale market.
d) Enhances wholesale market efficiency by granting qualified consumers the right to purchase and import electricity on behalf of other qualified consumers.
e) Ensures legal clarity by explicitly authorizing the Commission, through market rules, to define the requirements, conditions, and timelines for mandatory consumer access to the competitive segment of the retail or wholesale electricity market. The mentioned legal regulations aim to expand both the number of electricity sellers and the volume of electricity traded in the competitive market segment, thereby fostering the development of a liberalized electricity market.

The draft Law "On Amendments and Supplements to the Law on Energy", currently under development, envisage a gradual transition of autonomous energy producers to the net billing

system. Exceptions will apply only to the following categories of consumers, who will continue to operate under the net metering system:

- autonomous energy producers that are state or local self-government bodies;
- non-profit organizations established by the state or communities;
- state or community institutions;
- all other consumers connected to the electricity grid with a capacity of up to 15 kW (inclusive) who have obtained the status of autonomous energy producers.

As part of Armenia's strategic energy sector development programs, and in line with the implementation schedule approved by Government Decision, it is expected that in 2025 the Ministry of Territorial Development and Energy Infrastructures of the Republic of Armenia, in cooperation with the Public Services Regulatory Commission, will develop new Laws on Electricity and on Renewable Energy and Energy Efficiency. These laws are intended to address the challenges of the current electricity market model and trading mechanisms, while incorporating best international practices.

Key Reforms Proposed in the Draft Law "On Renewable Energy and Energy Efficiency":

- Introduction of auctions to ensure a transparent, non-discriminatory bidding process for determining financial support for renewable power plants and storage facilities.
- Promotion of renewable energy and energy efficiency in buildings and other structures.
- Broader application of renewable energy and energy efficiency measures in the heating, cooling, and transport sectors.
- Adoption of market-based support schemes for renewables, including premium tariffs and Guarantees of Origin for electricity.
- Introduction of Contracts for Difference.
- Establishment of energy efficiency obligation schemes and a framework for energy services provision.
- Promotion of energy audits.
- Creation of new opportunities for renewable self-consumers and renewable energy communities.
- Simplification of procedures for obtaining approvals, permits, and documentation related to renewable energy projects.
- Expected Outcomes of the Draft Law:
- Greater utilization of renewable energy and energy efficiency potential.
- Increased reliance on domestic energy resources.
- Expansion of market-based support schemes.
- Higher volumes of energy savings.
- Strengthened energy security.

- Reduced environmental impact.
- Introduction and deployment of modern technologies.

2.3 Support schemes applied in Contracting parties

As the global energy transition accelerates, the Energy Community CPs face a critical challenge: how to effectively stimulate the production of electricity from renewable energy sources (RES) while ensuring market integration, affordability, and sustainability. To meet national and regional climate targets, these countries have adopted a range of **support schemes** designed to incentivize investment in RES technologies such as wind, solar, biomass, and small hydropower.

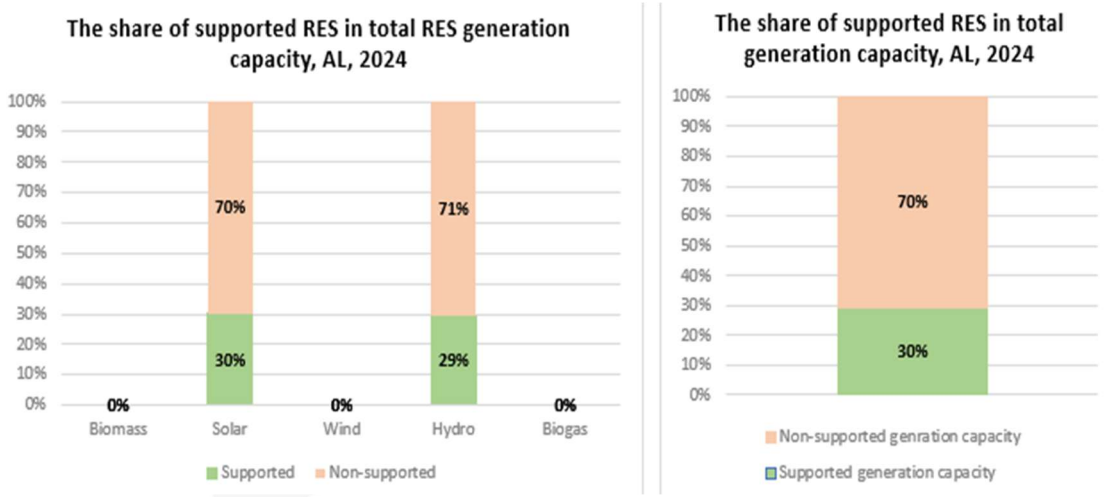
Support schemes—whether market-based or administratively determined—play a pivotal role in **bridging the gap between production costs and market prices**, thereby making RES projects financially viable. Common instruments include **feed-in tariffs (FiTs)**, **feed-in premiums (FiPs)**, **auctions**, and **contracts for difference (CfDs)**, each tailored to the maturity of the technology and the structure of the local energy market.

2.3.1 Generation support scheme

In the initial period, supporting schemes were dominantly based on Feed-in-tariffs model with guaranteed off-taking but, within the Energy Community framework, these schemes are now guided by principles of **transparency, cost-effectiveness, and competition**, in line with EU State aid rules and the Renewable Energy Directive. As Contracting Parties move toward more market-oriented mechanisms, the design and implementation of support schemes remain central to unlocking private investment, accelerating RES deployment, and achieving long-term decarbonization goals.

In **Albania**, feed-in-tariff for small PV and wind power plants is in place. For the latest RES projects, feed-in-premium with CfD is applied where the difference between the strike price and reference price is guaranteed from the off-taker. Feed-in premium for priority producers from hydro sources, where they benefit a bonus of 20% of the reference price (but they have a ceiling price of 10 ALL/kWh). These producers also have a minimal price guaranteed not less than the price set for the year 2016.

Figure 16



In Bosnia and Herzegovina entity FBIH, in accordance with the previously applicable Law on the use of renewable energy sources and efficient cogeneration, privileged producers had a guaranteed purchase at feed-in tariff during a period of 12 years, which purchase was carried out by the Operator for RES and CoGen. Eligible producers who did not have the status of a privileged producer or whose status had expired had the right to purchase the generated electricity at the reference price if its generation was included in the binding quotas in the Action Plan of the Federation of Bosnia and Herzegovina for the use of renewable energy sources.

Feed-in-tariffs were in use and are foreseen by the new law, however technological quotas have not been defined so far and auctions have not yet been announced in order to apply the system of feed-in-tariffs. Feed-in-premiums are defined by the new law, but quotas are also not defined, and no auctions have yet been announced in order to apply the system of feed-in-premiums. The procedure for adopting the rules on auctions by the Operator for RES and CoGen is ongoing. A RES producer can exercise the right to one of the following types of incentives for the generation of electricity from renewable sources:

- the right to an incentive based on the feed-in tariff for small plants that use the solar energy, wind energy, biomass or biogas energy, which is achieved by one or more of the most favorable bidders in the FIT auction procedure (auction for small plants)
- the right to an incentive based on the premium determined by the auction process for large plants, which is achieved by one or more of the most favorable bidders in the FIP auction process (auction for large plants)
- the right to an incentive for the generation of electricity from geothermal energy. A privileged producer is entitled to one of these types of incentives during a defined period of 12 years:
  - by an agreement on the purchase of electricity with the Operator for RES and Cogen at a feed-in tariff if it is a privileged producer from the FIT auction procedure, and after the

expiration of the contracted period, it loses the right to purchase electricity at a feed-in tariff.

– by a contract on premium with the Operator for RES and CoGen if it is a privileged producer from the FIP auction procedure, and after the expiration of the contracted period, it loses the right to a premium.

Regarding special measures to encourage the use of RES for heating and cooling, the Government of the Federation of Bosnia and Herzegovina, on the proposal of the Federal Ministry of Energy, Mining and Industry, may introduce the following additional incentive measures:

- incentives for domestic production and procurement of equipment used for heating and cooling using RES, such as solar collectors for preparing hot water, heat pumps for using aerothermal, geothermal and hydrothermal energy, etc.
- creation of a local market for thermal energy produced from RES by introducing a registry of the guarantee of the origin of thermal energy and by introducing an obligation for large consumers of thermal energy (industrial and city heating plants) that part of the thermal energy must be produced from RES and CoGen,
- incentive measures for the use of thermal energy from geothermal sources,
- other incentive measures in accordance with the planning document for energy and climate in the Federation.

Regarding special measures to encourage the use of RES in transport, the Government of the Federation of Bosnia and Herzegovina, on the proposal of the Federal Ministry of Energy, Mining and Industry, adopts the Regulation on the types, content and quality of biofuels in fuels for motor vehicles, which regulates the following:

- minimum participation of biofuels in the fuel mixture sold to end users,
- procedures by which fuel suppliers can prove the fulfilment of obligations prescribed by this regulation,
- punitive measures for suppliers who do not fulfil the obligations prescribed by this regulation.

In Bosnia and Herzegovina entity RS, in accordance with the previously applicable Law on the use of renewable energy sources and efficient cogeneration, privileged producers had a guaranteed purchase at feed-in tariff during a period of 15 years, which purchase was carried out by the Operator for RES.

Fee for RES is calculated to every final consumer in RS in amount defined by Regulator, and approved by government. That fee is used to finance incentives, among others, calculated as guaranteed price that producers had been contacted with the Operator for incentives system.

- The procedure for adopting the rules on auctions by the Operator for RES is finished.

A RES producer can exercise the right to one of the following types of incentives for the generation of electricity from renewable sources:

- the right to an incentive based on the feed-in tariff (guaranteed price) for small plants that use the solar energy, hydro, wind energy, biomass or biogas energy,
- the right to an incentive based on the premium for consumption for own needs or for the market (as the difference between guaranteed price and reference market prices)
- the right to an incentive determined by the auction process for large plants (auction for large plants)

Regarding special measures to encourage the use of RES for production and consumption, can be as net metering, net billing and standard scheme of supply.

In Bosnia and Herzegovina entity BD, the Law foresees the Rulebook on Incentives, which, among other things, will regulate the issues of the maximum participation of the District in the costs of construction, i.e. the acquisition of facilities for the production of energy from renewable sources by natural persons, the method of awarding incentives, the selection criteria and the procedure for selecting the beneficiaries of incentives. Producers of electricity from small plants have the right to compulsory purchase of the produced electricity in whole or in part at a guaranteed purchase price or the right to a premium for the produced electricity. The Government of BD BIH will decide on the implementation of the auction procedure for established technological quotas and determining the level of the market premium for encouraging the production of electricity from renewable sources for large plants.

Historically, Georgia applied the following support schemes: Premium tariff based on the resolution N403, Power Purchase Agreement based on the resolution N426 and command N40 of minister of energy and CfD mechanism and capacity auction based on the resolution N556.

Currently Georgia is applying two support schemes:

1) CfD Auction based on the Government Resolution №566

The support scheme (capacity auction) includes announcing an auction based on a specified capacity, where interested parties submit bids containing territory coordinates, capacity, operation details, expected investment, and requested tariff. During the auction process, a median tariff is determined, and if the company's requested tariff falls within the median tariff, the project is approved unconditionally.

2) Public Private Partnership based on the Government Resolution N426

According to this resolution, Power Purchase Agreement is concluded with investor.

All RES producers are equally responsible for their imbalance and no special treatment is given to the RES producers with respect of grid access or connection. According to the Law on

Promotion and Use of Energy from Renewable Sources, TSO shall give priority to the renewable sources when dispatching, as far as this action is not threatening the functioning of the electricity system, and if the transparent and nondiscriminatory requirements set by the NRA are met.

In Kosovo*, feed-in-tariff has been the only support scheme until 2020.

The Rule on support scheme for renewable energy sources generators also stipulates the maximum size of a single project (plant) eligible for the scheme as:

- 3 MW for PV,
- 14 MW for biomass,
- 35 MW for wind and
- 10 MW for hydro power.

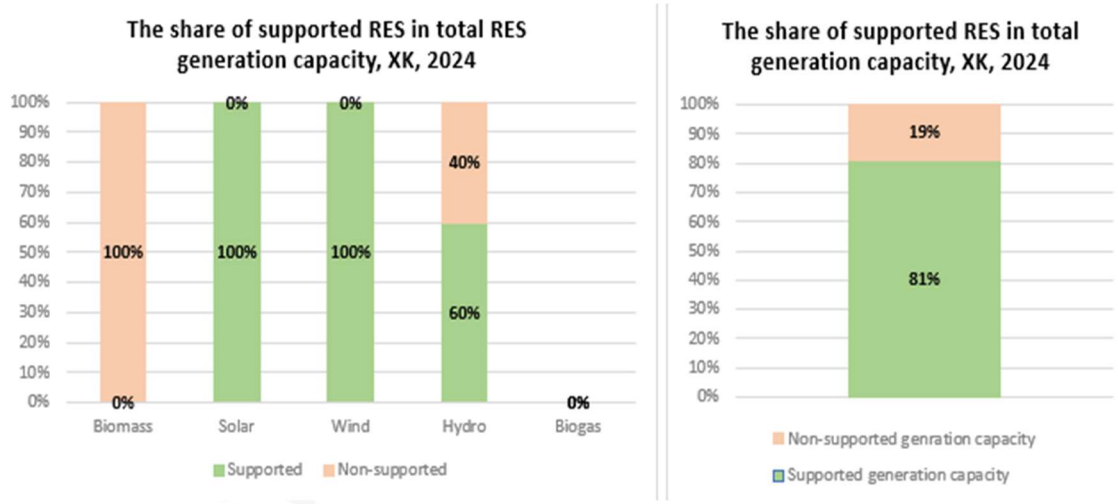
Key facts characterizing the RES Support Scheme:

- RES Generating Facilities sign Power Purchase Agreements valid for 10-12 years depending on technology
- Feed-in Tariff Support is provided through a credible and stress-tested regulatory framework to support the additional cost of producing RES
- RES generators are entitled to priority dispatching for all electricity production throughout the validity of the PPA and compensated for electricity curtailed for security reason

Kosovo* currently applies a competitive bidding (auction-based) support scheme for RES, starting with solar PV and with a plan to be extended to wind projects. The most important details about RES auctions and support schemes:

- Long-term agreements: Auction winners receive a 15-year power purchase agreement (PPA)
- Land rights: For state-owned land, a 30-year lease contract secures the project location; private land ownership is also allowed.
- Transparency: The auction process is fully electronic (e-auction) with multiple bidding rounds to ensure competitive pricing and transparency.
- Eligibility: Bidders must meet strict technical, financial, and professional criteria to ensure quality and reliability of projects.
- Balancing responsibility: RES producers are fully responsible for their production forecasts and imbalances, incentivizing accurate forecasting.
- Grid connection: Connection offers follow transparent, non-discriminatory rules prioritizing system reliability, but no special grid priority for RES.

Figure 17



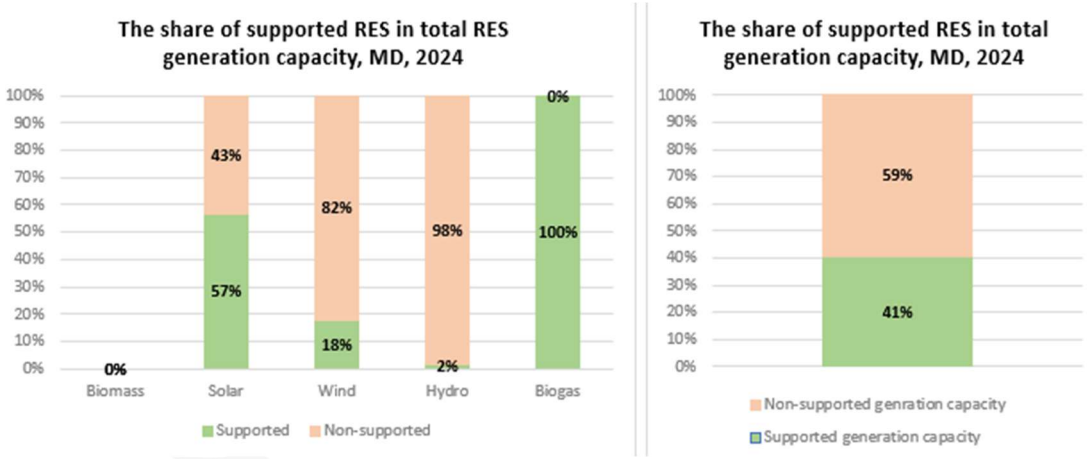
Previously, by the provisions of the Law no. 160/2007, in Moldova has been applied a feed in tariff for 15 years period. When calculating the tariff was used a case-by-case approach for each support scheme beneficiary. The electricity was bought by the central supplier and sold to active suppliers in the market.

In order to promote the production and use of electricity from renewable sources, in accordance with the Law on the promotion of the use of energy from renewable sources no. 10/2016, the following support schemes shall apply:

- "fixed price", established within the auction, in accordance with art. 35, for the eligible large producer that is to own a power plant/power plants with an installed/cumulative electrical power greater than the capacity limit established in accordance with art. 10 paragraph (1), letter e). (1 MW for PV and 4 MW for wind);
- "fixed tariff", approved according to art. 14 letter b1) for the eligible small producer who owns or will own a power plant/power plants with an installed/cumulative electrical power that does not exceed the capacity limit established according to art. 10 paragraph (1), letter e), but which is not less than 10 kW.

Both support schemes are applied for 15 years from the date of commissioning and in order to benefit from "fixed prices" or "fixed tariffs", eligible producers sign regulated contracts with the central electricity supplier for the purchase of electricity from renewable sources.

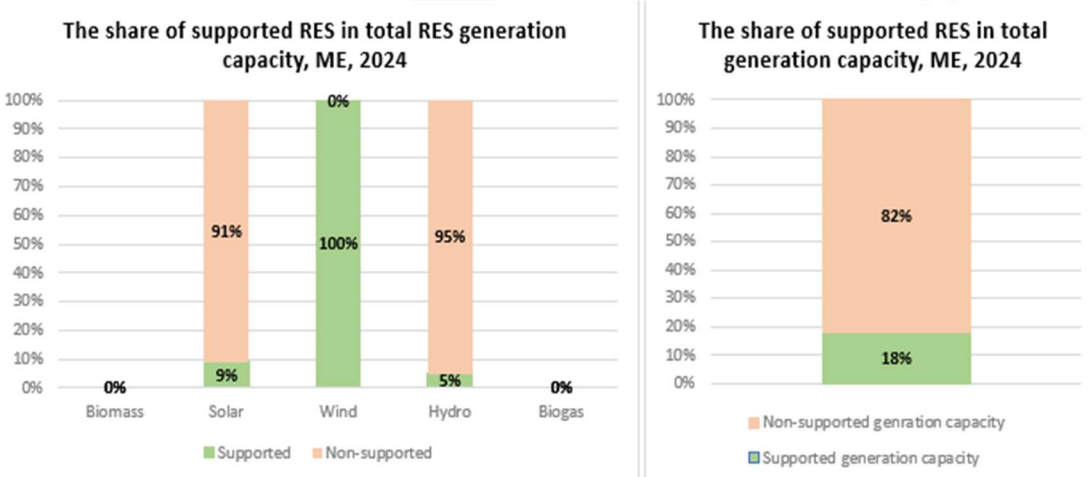
Figure 18



In Montenegro, feed-in tariff scheme was prescribed by the Energy Law in 2010 and has been used since 2013 when the first producer was granted status of privileged producer.

Producers which still have privileged producers status based on previous support scheme, are still incentivized with feed-in tariff and are not balancing responsible until exceeding guaranteed 12 year period. From 2024 with the new Law on RES in force, different support scheme is in place which is based on auctions, market premium prices and full balancing responsibility of producers after exceeding of transitional period. The new Law on RES introduces the auctions as a competitive tool for winning the support rights. The Ministry of Energy is responsible for organizing auctions for support rights.

Figure 19



In previous period and currently, two support schemes for RES generation are in usage in North Macedonia and that is feed-in tariffs (applicable from 2007) and feed-in premiums (applicable from 2018). Since 2018 for PVs feed-in premiums for PVs are used only and not feed-in tariffs. Feed-in tariffs are used for other technologies except PVs. CfD is not yet implemented and

applied. Feed in premium tariff is the premium that it is received in the competitive procedure and it is granted to the preferential producer as addition to every MWh produced.

The ERC (NRA) grants the preferential status to the preferential producer that uses feed-in tariffs upon individual request in accordance with the Rulebook for preferential producers that use feed-in tariffs. When issuing the preferential producer status, ERC checks if the producer meets the conditions and terms of the Decree on the measures supporting the electricity generation from renewable energy sources and the Decision on the total installed capacity of preferential electricity producers, both adopted by the Government of the Republic of North Macedonia. The Government sets the guaranteed purchase price of electricity produced by the preferential producers that use feed-in tarffs that applies in a period of 15 to 20 years, depending on the type of power plant. The Electricity Market Operator is obliged to purchase the electricity generated by preferential producers at the guaranteed price, based on the Power Purchase Agreement. The Electricity Market Operator sells electricity to every supplier/trader who supplies the end consumers.

In 2018, market premiums were introduced for PV solar power plants only (it is expected that soon market premiums will start to apply to wind power plants too). The preferential producers entitled to market premium have to sell electricity on the wholesale market. However, if they cannot sell the electricity on the wholesale electricity market, there is an off-taker that guarantees the purchase of the produced electricity, in case of which they conclude a power purchase agreement for one year. The preferential producer eligible for a premium tariff is chosen via tender procedure with the auction, carried out by the Ministry of Economy and since 2024 the inistry for Energy. The premium is granted to a preferential producer as an additional fixed amount to the price realized by the sale of each kWh produced on the wholesale electricity market over a period of fifteen years. The tender procedure for awarding premiums is conducted as an open procedure with an auction in accordance with the provisions of the Decree on the measures to support electricity generation from renewable energy sources and the Law on Public Procurement. The criterion for selecting the most favorable bid is the lowest offered fixed premium. The auction, conducted as a repetitive electronic process after the initial full evaluation of the bids, shall take place if it has been determined that there are at least two acceptable bids, whereas the ranking of bids is done by using automatic evaluation methods. The lowest of all eligible bids is set as the initial amount of the fixed premium at the auction. For a successfully conducted auction, it is necessary to have at least one gradual reversed bidding below the initial amount.

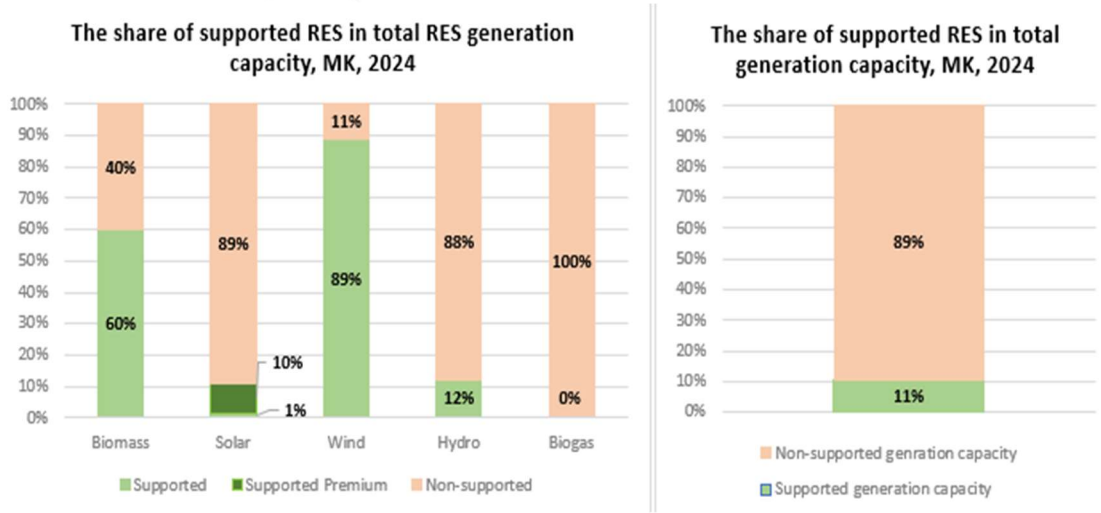
The subject of the tender is divided into lots depending on power plants installed capacity.

Upon conducting the e-auction the commission determines the awarded capacities depending on the lowest premium offered for the requested capacity in the respective lot, in which case the bidder that has offered the lowest premium is entitled to the market premium. Then, the right to

use a premium is granted to the bidder that has offered the next lowest bid for the installed capacity of the power plant. This rule is repeated until the determined quota for the respective lot is fulfilled. After 3 years, contracts for using market premium shall be concluded between the Ministry of Economy and the investors, after which the Ministry pays the premium to the investors upon receiving an invoice on monthly basis, for a period of 15 years.

The Government of the Republic of North Macedonia adopted a Decision on the total installed capacity of the preferential electricity producers, according to which the total installed capacity of the photovoltaic power plants for which market premiums awarded is 200 MW. So far, the Ministry of energy has announced three public calls for awarding contracts for the right to use the market premium for electricity produced by photovoltaic power plants, one on state land and two on private land. The first two announcements were published in 2019 for a total installed capacity of 60 MW, and the third in 2021 for a total installed capacity of 80 MW. The total capacity of all three public calls was allocated (35 MW + 25 MW + 60 MW). There are still 60 MW for which the procedure for the right to award a premium might be conducted. In line with the Program for financial support to produce electricity from preferential producers using premium for 2021, the maximum reference amount of the fixed premium for the PV solar power plants was set to 15 EUR/MWh.

Figure 20



In previous period, in Serbia the support scheme was based on RES priority access to system, feed in tariffs and market premiums, simplified connection procedure for prosumers.

The current RES support schemes include:

- Market Premiums: Applied in accordance with this law and methodologies adopted by AERS (applicable from 2021 to 2023), as well as relevant Government acts (in force from 2023 onward).
- Feed-in Tariffs: Since 2023, feed-in tariffs are limited to demonstration projects, generators with an installed capacity below 400 kW, and generators connecting to the system after 1 January 2026 with an installed capacity below 200 kW.
- Priority Access: Granted to demonstration projects, generators with an installed capacity below 400 kW, and generators connecting to the system after 1 January 2026 with an installed capacity below 200 kW.
- Balancing Responsibility: providing balancing responsibility on behalf of the Guaranteed Supplier
- Simplified Connection Procedure: Applicable to generation facilities installed by prosumers.

In Ukraine, the following mechanisms exist to stimulate electricity generation from renewable energy sources:

- the establishment of a "green" tariff for electricity produced from renewable sources (applies to business entities, electricity consumers whose generating and energy cooperative units do not exceed 150 kW, and private households whose generating units do not exceed 30 kW);
- a surcharge to the "green" tariff for compliance with the level of use of Ukrainian-made equipment (applies to business entities);
- holding auctions for the allocation of support quotas;
- electricity sales under the self-generation mechanism (Net-Billing);
- the mechanism for issuing guarantees of origin for electricity produced from renewable sources;
- the market premium mechanism (Feed-in-Premium).

The "green" tariff is a special tariff under which electricity generated at power facilities is purchased, including commissioned construction stages of power plants (start-up complexes), from renewable energy sources (in the case of hydropower — only by micro-, mini-, and small hydropower plants).

According to Article 65 of the Law of Ukraine "On the Electricity Market" (hereinafter — the Law), the Guaranteed Buyer is obliged to purchase from business entities granted a "green" tariff all electricity released from power facilities included in the Guaranteed Buyer's balancing group, or their construction stages (start-up complexes), from renewable energy sources (in the case of

hydropower — only micro-, mini-, and small hydropower plants), including electricity released from energy storage installations within such facilities (if the stored and released electricity was produced from RES), at the established "green" tariff with the applicable surcharge throughout the validity of the "green" tariff, in an amount not exceeding the installed capacity of the respective generating equipment, as specified in the electricity generation license.

The purchase and sale of such electricity under the "green" tariff, including the surcharge, is carried out on the basis of a bilateral agreement between the producer or consumer granted a "green" tariff and the Guaranteed Buyer.

The electricity purchase agreement under the "green" tariff is concluded between the Guaranteed Buyer and producers or consumers generating electricity from renewable energy sources (excluding blast furnace and coke oven gases, and in the case of hydropower — only micro-, mini-, and small hydropower plants) for the entire validity of the "green" tariff.

According to Article 63 of the Law, the universal service supplier is obliged to purchase electricity generated by private household generating units, whose installed capacity does not exceed the level defined for the relevant categories under part 23 of Article 9-1 of the Law of Ukraine "On Alternative Energy Sources," at the "green" tariff in the amount exceeding the monthly consumption of such households, and to make priority payments for it.

Under the Law of Ukraine "On Alternative Energy Sources," the "green" tariff is valid until 01.01.2030.

The market premium mechanism is a system of incentives for electricity generation from RES, under which the Guaranteed Buyer pays business entities granted the "green" tariff, as well as entities that acquired support through auctions, the difference between the "green" tariff (or auction price) including the surcharge, and the settlement price determined under the Law of Ukraine "On the Electricity Market."

The Guaranteed Buyer is obliged to procure the market premium service from such entities throughout the validity of the "green" tariff or auction-based support, provided they conclude a service agreement with the Guaranteed Buyer.

The self-generation mechanism is a support scheme for active consumers, designed for own consumption of electricity, where settlements are made between the value of electricity released into the grid and the value of electricity taken from the grid, considering transmission and/or distribution costs.

According to Article 63 of the Law, the universal service supplier must purchase electricity produced from RES and released into the grid by private households (≤30 kW) and small non-household consumers (≤50 kW) under electricity purchase agreements based on the self-generation mechanism.

According to Article 58-1 of the Law, active consumers sell the released electricity under the self-generation mechanism to the universal service supplier or another electricity supplier.

To promote the use of renewable energy sources (RES), Armenia has historically applied feed-in tariffs.

From 2003 to 2005, the Commission set feed-in tariffs for individual types of renewable energy in U.S. dollar equivalents. In 2007, however, a unified methodology was introduced for all RES producers. Under this system, tariffs are reviewed annually and adjusted based on the Consumer Price Index (CPI) and the average monthly exchange rate of the Armenian dram against the U.S. dollar.

Specific terms may also be defined through state–private partnership agreements, under which the electricity purchase guarantee is implemented.

Tariffs are reviewed each year by June 1, based on adjustments to the Consumer Price Index (CPI) and the average monthly exchange rate of the Armenian dram against the U.S. dollar. The revised tariffs enter into force on July 1 of the same year and remain effective until July 1 of the following year.

From the date of the Commission's first resolution establishing the tariff for a power plant, all electricity produced under the plant's generation license is subject to guaranteed purchase for a period of 15 years in the case of small hydropower plants, and 20 years in the case of power plants using other renewable energy sources.

The electricity purchase guarantee applies to all electricity produced, except for self-consumption or when the licensed producer has expressly waived the guarantee. Once a producer opts for the statutory electricity purchase guarantee, it cannot be revoked at a later stage.

No information has been provided by Georgian NRA.

2.3.2 Auctions

In recent years, the European Union has shifted its renewable energy support mechanisms toward more competitive and market-oriented approaches. One of the most prominent tools in this transition is the use of *auctions* to allocate support under *feed-in-premium (FiP)* schemes. These auctions determine which renewable energy projects receive financial support and at what level, based on competitive bidding processes that aim to minimize costs and enhance efficiency.

This evolution is strongly influenced by the EU's *Renewable Energy Directive (EU) 2018/2001*, commonly known as *RED II*. RED II sets binding targets for renewable energy consumption and encourages Member States to adopt support schemes that are both market-compatible and aligned with EU state aid rules. In particular, Article 4 of RED II, promotes the use of *market-based*

instruments, such as auctions, to ensure that support for renewable energy is granted in a transparent, open, and non-discriminatory manner.

Under FiP schemes, producers sell electricity directly on the market and receive a premium on top of the market price, which is determined through these competitive auctions. This model incentivizes cost-efficiency and market integration of renewables, while also reducing the burden on public budgets. The European Commission's guidelines on state aid for environmental protection and energy further reinforce the use of auctions as the preferred method for allocating support.

As such, the interplay between FiP auctions and RED II reflects the EU's broader strategy to foster a sustainable, integrated, and competitive energy market—one that accelerates the transition to a low-carbon economy while ensuring fair access and optimal use of public resources.

Auctions have already been organized in many CP's. In Albania, the first auction has been organized in June 15th 2021 when Ministry of Infrastructure and Energy, in its capacity as the Contracting Authority, opened the Competitive Procedure for the selection of projects with the wind as a primary source that will benefit from support measures for the construction of plants from renewable sources of wind electricity, with a specified location from developers. Opening of Financial Bids and announcement of Selected Bidders and respective Selected Projects has been finalized on 25th of July 2023. Minimum prescribed participant's capacity offer was 10 MW and maximum 75 MW per project. Ceiling price has been set by the Ministry with the price of 75,64 €/MWh. Foreseen auctioned capacity has not been set and awarded capacity of three successful participants was 224,48 MW. Average price achieved at the auction was 64,5 €/MWh.

On 15th January 2024, the Ministry of Infrastructure and Energy, organized second Competitive Procedure for the selection of projects with the solar as a primary source that will benefit from support measures for the construction of plants from renewable sources of photovoltaic electricity, with an unspecified location. Bid Submission Deadline was in June 10th 2024, announcement of Qualified Bidders happened on June 30th 2024 and opening of Financial Bids and announcement of selected Bidders and respective Selected Projects happened in July 10th 2024. Minimum prescribed participant's capacity offer was 10 MW and maximum 100 MW per project. Ceiling price has been set by the Ministry with the price of 59,97 €/MWh. Foreseen auctioned capacity was 300 MW and awarded capacity of 10 successful participants was 224,48 MW. Average price achieved at the auction was 51,89 €/MWh.

According to the existing legal framework, an auction in Georgia can be anounced for the hydro, wind, solar and other renewable technologies (hybrid, biomass, biogas, hydrogen and geothermal). The first auction for the allocation of 300 MW of capacity was held in early 2023 (February-March). A total of 78 applications were submitted, representing 943 MW of installed capacity, out of which, 27 winning projects were selected, including:

- 15 hydropower plant development projects,
- 2 wind power plant projects, and
- 10 solar power plant construction projects.

The second auction for the allocation of 800 MW of capacity was held in 2024 (January-May). A total of 147 applications were submitted, representing 1,900 MW of installed capacity, out of which 63 projects were successful. The winning projects include:

- Run-of-river hydropower plants – 32 projects (183 MW);
- Regulating (1–4 hour) hydropower plants – 8 projects (53 MW);
- Regulating (4–8 hour) hydropower plants – 6 projects (130 MW);
- Wind power plants – 7 projects (204 MW);
- Solar power plants – 10 projects (239 MW)

The only selection criterion for the capacity auction was the median tariff. The median tariff is the middle tariff selected from a list of proposed tariffs arranged by their growth rate. If an even number of tariffs is proposed, the median is the arithmetic average of the two middle tariffs.

The principle of the median tariff is the distribution of capacity at the median tariff or at lower proposed tariffs. In the case of full allocation of capacity offered in the power auction, the distribution of capacity will be carried out at higher tariffs close to the median tariff, in order of precedence, but at the median price.

For the second auction, the following prices were achieved per KWh :

- Wind: - 6 usd cent
- Solar : - 5.6 usd cent
- Hydro: - 6.5 usd cent

The amount corresponding to the price difference for a mixed producer in the power auction will be paid by the JSC "Commercial Operator of the Electricity System" as an addition to the balancing electricity price, only if, during the relevant accounting period, the balancing electricity price is lower than the tariff proposed in the capacity auction. Payment of the amount corresponding to the price difference for the mixed producer to the LLC "Commercial Operator of the Electricity System" occurs only if, during the relevant accounting period, the balancing electricity price is higher than the tariff proposed in the power auction.

In Kosovo*, the Energy Regulatory Office (ERO) is the institution responsible for setting the auction price parameters with the key Points:

• The ceiling price is determined based on a Methodology approved by ERO, which considers market conditions, technology-specific costs and investment return expectations.

• The Ministry of Economy organizes the auction, but ERO sets the price-related regulatory framework.

• A maximum price (security cap) is used to prevent excessively high bids and ensure cost-efficiency and consumer protection.

Kosovo* successfully completed its first solar auction in March 2024, awarding a 100 MW solar PV project through an electronic auction led by the Ministry of Economy. The auction had four bidding sessions, with the winning Orllati Consortium offering a price of 48.88 €/MWh. In total, 5 companies and consortia participated, and the project includes a 15-year Power Purchase Agreement (PPA). The initial ceiling price was established at 75 €/MWh per Methodology approved by ERO. Five qualified bidders were authorized to participate in the electronic reverse auction. In a government procurement context (Auction) the buyer is a public institution (e.g., a ministry), and the qualified bidders are companies offering the service or product as follow:

• The reverse auction starts with an initial price (often from submitted proposals).

• Bidders then lower their prices during the auction to win the contract.

• The auction continues until no one is willing to bid a lower price.

• The lowest bidder typically wins, assuming all requirements are met.

Out of five bids received, the two lowest bids received at this stage were €71.99 per MWh and €70 per MWh. As the reverse auction progressed, the following prices were achieved:

- Company 1 €48.88 per MWh/Solar
- Company 2 €48.97 per MWh/Solar
- Company 3 €49.45 per MWh/Solar
- Company 4 €53.80 per MWh/Solar
- Company 5 €56.49 per MWh/Solar

Following this, Kosovo* launched its first wind energy auction in December 2024, targeting 150 MW, split in two rounds of 75 MW. The first round plans to allocate 50–100 MW, also offering a 15-year PPA and Contract for Difference (CfD). The maximum bidding price is set at 80,2 €/MWh, and the auction is expected to conclude by third quarterly 2025.

Prospective bidders had to meet eligibility and minimum qualification criteria, including technical, professional, economic, and financial capacity. The contract has been awarded to the responsive bidder offering the lowest guaranteed purchase price per MWh of delivered energy (€/MWh, VAT excluded). Bidders had to demonstrate experience in developing and operating renewable energy projects, as well as sufficient financial strength. The bid evaluation was based solely on price, ensuring transparency and competitiveness. Land access (public or private) and grid connection has also been a criteria.

In 2024, for the first time in the Republic of Moldova, the auction for the construction of onshore wind power plants with a total capacity of 105 MW and photovoltaic plants with a total capacity of 60 MW was launched.

Thus, until March 31, 2025, the submission and receipt of applications, technical and financial offers took place and in June 2025 the winners have been announced.

Auction realization, which represents ratio between the awarded capacity and auctioned capacity, was 100%. There were 8 offers related to wind power plants and 24 offers related to PV solar power plants. For the wind power plants auction, minimum capacity of 4 MW and maximum capacity of 105 MW were prescribed and for the solar power plants auction, minimum capacity of 1 MW and maximum capacity of 60 MW were prescribed. The lowest and the highest prices achieved in the auction for wind power plants were 60 €/MWh and 70 €/MWh respectively. The lowest and the highest prices achieved in the auction for solar power plants were 58 €/MWh and 60 €/MWh respectively.

Additionally, according to the Action Plan on the organization of tenders for granting the status of large eligible producer in the period 2025-2026 approved by Government Provision no. 64-d/2025, the next round of tenders is scheduled for October 2025 and concerns projects for the construction of wind power plants with an estimated total capacity of up to 173 MW and a minimum of 44 MWh (storage). For the first time, the tender will also include energy storage components, in order to increase the flexibility and reliability of the energy system. The estimated deadline for submitting bids is March 2026. The auction criteria were based on technology and price cap. The ceiling price used in auctions is set by NRA. The ceiling prices are calculated, in accordance with the methodology approved by the National Agency for Energy Regulation, for each type of technology for producing electricity from renewable sources and by capacity category, using data from international and local sources regarding the operating period of the plant, investment costs, costs related to the maintenance and operation of the plant, the rate of return on investments, determined based on the weighted average cost of capital method (WACC), and depending on the quantity of electricity expected to be produced.

On 11th of July 2025, for the first time in Montenegro, Ministry of Energy and Mining has organized auction for the allocation of market premium rights for unspecified locations for solar power plants with generation capacity of more than 400 kW. The deadline for submitting bids is 10th of November 2025. Auction has been organized for solar PV plants only and the auctioned capacity was 250 MW. Offered price was the only auction criteria. The minimum prescribed participant's capacity offer was 400 kW. The Ministry of Energy and Mining is responsible for setting the maximum bidding price which in this case is 65 €/MWh. The auction price model is pay-as-bid and realized price and will be subject of correction with the Eurozone inflation based on HICP index.

The last auction in North Macedonia has been conducted in 2022 for solar PV power plants with 200 MW requested capacity. The criteria for selection of the most favorable bid was the lowest fixed premium. The most favorable bidder shall be the economic operator that offers the lowest fixed premium during the electronic auction.

The bids were divided into four parts according to capacity:

- Part 1 (200–500 kW): Total auction capacity — 3,000 kW
- Part 2 (501–1,000 kW): Total capacity — 22,000 kW
- Part 3 (1,001–6,000 kW): Total capacity — 25,000 kW
- Part 4 (6,001–10,000 kW): Total capacity — 30,000 kW

Specifically, a maximum and minimum capacity range was prescribed for each part of the auction:

- Part 1 (200–500 kW)
  - Minimum offered power: 201.42 kW
  - Maximum offered power: 499.50 kW
- Part 2 (501–1,000 kW)
  - Minimum offered power: 501.40 kW
  - Maximum offered power: 999.90 kW
- Part 3 (1,001–6,000 kW)
  - Minimum offered power: 1,004.40 kW
  - Maximum offered power: 5,406.00 kW
- Part 4 (6,001–10,000 kW)
  - Minimum Offered Power: 6,050.00 kW
  - Maximum Offered Power: 10,000.00 kW

The subject of the electronic auction was the discount (rebate) expressed as a percentage, which represents the relationship between the price at which the buyer will ultimately purchase the electricity produced by PPP and the reference price, and is calculated according to the following formula:

〖EE〗_p [%]=(1-(〖EE〗_ппп [EUR/MWh])/(〖EE〗_реф [EUR/MWh]))*100[%]

Where:

EEp – discount (rebate)

EEреф – reference price

EEппп – price of electricity at which the offtaker buys it from preferential producers that premium tariff (PPP)

The contracting authority will use the most economically advantageous offer based on the price expressed as a percentage of the discount as a criterion for selecting the most favourable offer. The most favourable offer will be the one with the lowest offered discount expressed as a percentage that represents the ratio between the price at which the offtaker will buy the electricity produced by PPP and the reference price.

Offtaker pays the received electricity to the PPP at the hourly price published on the Hungarian Electricity Exchange (HUPX) for the hours during which the PPP delivered the electricity to him in the accounting period in which the electricity was taken, reduced by 9.55% discount.

For the feed in premium the maximum cap, set by the Ministry, was 15 €/MWh.

Average achieved premium was 3.9 Euro/MWh

In Serbia, auctions were organized in 2023 and 2025.

In 2023, auction was organized for wind power plants with overall auction capacity of 400 MW and for solar PV power plants with overall auction capacity of 50 MW. The auction realization percentage, which represents ratio between the awarded capacity and auctioned capacity, was 100% for wind power plants and 50,4% for solar power plants. Minimum capacity offer for wind power plants was 3 MW and minimum capacity offer for solar power plants was 0,5 MW. Price achieved were: lowest offered price 64.48 €/MWh for wind and lowest offered price 88.65 €/MWh for solar.

In 2025, auction was organized for wind power plants with overall auction capacity of 300 MW and for solar PV power plants with overall auction capacity of 124,8 MW. There were 4 auction participants, three participants for wind power plants and one for solar power plant. The auction realization percentage, which represents ratio between the awarded capacity and auctioned capacity, was 100% for wind power plants and 100% for solar power plants. Minimum capacity offer for wind power plants was 3 MW and minimum capacity offer for solar power plants was 0,5 MW. Price achieved were: lowest offered price 53.59 €/MWh for wind and lowest offered price 50.9 €/MWh for solar.

For the awarded price setting, the pay-as-bid model has been used.

In Ukraine, by Order of the Cabinet of Ministers of Ukraine dated November 29, 2024 No. 1195-r, a support quota for the 2025-2029 period has been envisaged. For 2025, a support quota of 330 MW for business entities generating electricity from renewable energy sources is envisaged. For the period 2026-2029, the indicative quotas are as follows:

- 2026 – 340 MW;
- 2027 – 350 MW;
- 2028 – 375 MW;

- 2029 – 400 MW.

In 2024 and 2025, seven auctions have been organized:

- 31.10.2024 with 11 MW of auctioned capacity for solar power plants with maximum bid price of 90 €/MWh but the auction was unsuccessful due to the absence of participants.
- 29.11.2024 with 88 MW of auctioned capacity for wind power plants with maximum bid price of 90 €/MWh but the auction was unsuccessful due to only one application being submitted.
- 14.11.2024 with 11 MW of auctioned capacity for power plants using biomass/biogas and small hydro power plants, with maximum bid price of 111 €/MWh. No data provided if the auction failed.
- 12.08.2025 for 33 MW of auctioned capacity for solar power plants with maximum bid price of 80 €/MWh but the auction was unsuccessful due to the absence of participants.
- 04.04.2025 for 100 MW of auctioned capacity for wind power plants with maximum bid price of 80 €/MWh but the auction was unsuccessful due to the absence of participants.
- 12.05.2025 for 47 MW of auctioned capacity for power plants using biomass/biogas and small hydro power plants, with maximum bid price of 120 €/MWh but the auction was unsuccessful due to the absence of participants.
- 31.07.2025 for 150 MW of auctioned capacity for solar power plants with maximum bid price of 80 €/MWh, too soon to have any data since the auction has not been finished yet.

The Cabinet of Ministers of Ukraine is responsible for setting the auction parameters based on the submission of the Ministry of Energy of Ukraine. The National Energy and Utilities Regulatory Commission of Ukraine (NEURC) provides the Ministry of Energy with proposals on the maximum auction price. There is no approved methodology for determining the maximum bid prices of auction participants established by the Regulator. Therefore, the Regulator recommends that the Ministry of Energy set the maximum bid prices at auctions either at the level of the current feed-in tariffs or based on the limits specified in Article 9-3 of the Law of Ukraine "On the Electricity Market":

"The bid price of an auction participant taking part in the allocation of support quotas for power plants or construction phases (start-up complexes) that generate electricity from wind energy and/or solar radiation shall not exceed 9 euro cents per kilowatt-hour for auctions held until December 31, 2024, and shall not exceed 8 euro cents per kilowatt-hour for auctions held from January 1, 2025."

Based on this, the Ministry of Energy made decision to set the maximum bid prices for 2024 and 2025 in line with the limits defined in Article 9-3 of the Law "On the Electricity Market" in order to facilitate investor participation.

Armenia did not organize any auction so far.

2.3.3 Self-consumption support scheme

The traditional electricity system—where power flows one way from centralized producers to passive consumers—is rapidly evolving. At the heart of this transformation is the emergence of self consumers (*prosumers)*: individuals, households, and businesses that both produce and consume electricity, often through rooftop solar panels or small-scale wind turbines. This shift toward *self-consumption* empowers energy users to generate their own clean power, reduce reliance on the grid, and actively participate in the energy market. As prosumer activity grows, regulatory frameworks, grid operations, and market structures must adapt to support decentralized generation, ensure fair compensation, and maintain system stability. Understanding the role of prosumers is key to unlocking a more resilient, democratic, and sustainable energy future.

In Albania, the scheme related to self-consumption has been introduced in legislation in Article 20 of the Law "On promotion of use of energy from renewable sources" where the renewable self-generators are defined.

At the end of August 2025, total self-consumers installed generating capacities was 263,7 MW. The only data available and provided by NRA related to electricity produced by self-consumers, refers to the amount of energy they inject into the distribution grid once they have covered their own consumption. Above mentioned electricity produced by self-consumers was 1,720 MWh in 2024.

In Bosnia and Herzegovina entity Federation BIH, there is no incentive in the sense of "feed-in" tariff or "feed-in" premium, however, an incentive is defined in the form of the Program on co-financing of prosumers from the category of households, which is adopted by the Operator for RES and CoGen with the consent of the FBIH Government ((Article 17. (Jurisdictions of the Operator for RES and CoGen) Law on the use of RES and CoGen).

The very concept of self-consumption is defined in Article 46 of Law on the use of RES and CoGen:

(Prosumer supply schemes)

(1) The end customer has the right to connect a power plant that uses renewable energy sources to the internal electrical installations of its facility for its own consumption.
(2) The installed capacity of the power plant, in case of application of net metering or net billing supply schemes, cannot be greater than the approved connection capacity of the end customer's facility, and the maximum installed capacity per individual plant is limited to 150 kW.
(3) The end customer obtains the status of prosumer by connecting the power plant referred to in paragraph (1) of this Article to the internal electrical installations of its facility and by regulating contractual relations with the competent DSO and supplier,

and it has rights and obligations from this law and the law governing the field of electricity.

(4) Prosumers have the right to use the net billing supply scheme.

(5) Prosumers from the category of households with approved connection capacity up to 10.8 kW have the right to:

a. to choose a net metering supply scheme for a period of 10 years, after which they exercise the right to a net billing supply scheme, or

b. the right to use the net billing supply scheme.

(6) The owner of the power plant for the prosumer's own needs can also be a third party, with the signing of a special agreement with the end customer for whose needs the power plant is connected.

No data has been provided related to self-consumption scheme in entity Republic of Srpska.

In entity Brcko District, the scheme related to self-consumption has been introduced in legislation.

The calculation of more taken over and delivered electricity produced by the buyer - producer is done by applying:

- net metering schemes for plants with an installed power of up to and including 10.8 kW (including 10.8 kW);
- net billing schemes for plants with installed power in the range from 10.8 kW to 50 kW (including 50 kW);
- standard supply schemes for plants with an installed capacity of over 50 kW.

No actual data related to capacity and production in Bosnia and Herzegovina have been provided.

In Georgia, current incentive mechanism for self-consumers is the net metering scheme, which is available to end-consumers who own micro power plants. The installed capacity of such micro plants is limited to 500 kW; however, it should not exceed the grid connection capacity of the consumer. Under the net metering scheme, kilowatts fed into the grid and withdrawn are netted, and any surplus kilowatts are rolled over to the next consumption period as a credit.

In the net metering scheme, Georgia allows self-consumption not only at the consumer's connection point but also virtually within the same DSO grid. This means that a micro power plant and consumer can be located in a different cities. In addition, groups of consumers can also benefit from this scheme, with surplus electricity allocated to group members either proportionally or according to their requests. The net metering scheme will remain in place until January 2033 for those final consumers, who were connected to the grid before moving to the net billing shceme.

Starting from October 2025, a new self-consumption scheme—net billing—will be introduced. It will apply to all new micro power plant connections with an installed capacity of up to 100

kilowatts, and only in cases where the total installed capacity of micro power plants connected to a given distribution system operator (DSO) exceeds 20% of the peak load. Under this scheme, the price of electricity fed into the grid and withdrawn will be netted, and any positive balance will be rolled over to the following months to offset electricity consumption costs.

The National Regulatory Authority (NRA) also supports the development of micro power plants by introducing simplified and transparent grid connection rules in the Distribution Network Rules. These rules regulate the grid connection process, including timelines and fees, based on connection capacity. If the DSO fails to meet the required connection timeline, final consumers are compensated depending on the length of the delay.

Finally, consumers benefit from the one-stop-shop principle, which is facilitated through application forms approved by GNERC. This system allows applicants to submit all necessary information at once, eliminating the need for further direct contact with the DSO.

The full transition to the net billing system is planned to take place gradually, in accordance with amendments to the Law on Energy and Water Supply and the Electricity Retail Market Rules.

As of June 2025, the total installed capacity of micro power plants participating in the net metering scheme is 255.827 MW. In 2024, electricity produced by self-consumers estimated approximately 180 000 MWh. The total electricity consumption in Georgia was 15.21 TWh, so the share of the electricity produced by self-consumers in final electricity consumption was 1.18%.

Self-consumption scheme is introduced in Kosovo's* legislation, specifically in Article 30 of the RES Law and the recently approved Rule on Prosumers of Renewable Sources. The scheme allows Self-Consumers from Renewable Sources to use the electricity they produce for their own consumption and receive compensation for excess electricity injected into the grid.

Key details include:

- The Regulator defines net billing schemes, including applicable thresholds.
- Suppliers are obliged to sign supply contracts with self-consumers and must purchase all excess electricity produced.
- Excess electricity is compensated through a monetary credit in euros, calculated based on the net difference between electricity withdrawn and injected over the billing period.
- If the credit exceeds the cost of energy consumed during the billing period, the surplus credit is carried over to the next billing cycle.
- This scheme supports prosumers by ensuring financial compensation for surplus renewable energy they feed into the grid while promoting self-consumption.

Capacity of self-consumers (32,91 MW) represents approximately 2.66% of Kosovo*'s total installed generation capacity(1.239 MW). n 2024, Kosovo*'s self-consumers (prosumers) produced approximately 23.733,18 MWh of electricity. Given that the total electricity production

in Kosovo* for 2024 was around 6.059 MWh , prosumers contributed about 0.39% of the total electricity generated.

In Moldova, according to the Law no. 10/2016 on renewables, there are 2 self-consumption mechanisms, namely:

• "net metering" – not possible to apply any more for consumers (since the beginning of 2024), but still will be applied for those who benefit from it until December 2027.

• "net billing" – possible to apply at the moment. According to the legal provisions the total installed capacity of the prosumer's power plant(s) is equal to or less than the power contracted with its own electricity supplier for the respective place of consumption and falls within the individual capacity ceiling established by the Government, but does not exceed 200 kW. Thus, consumers can choose between an individual capacity ceiling that is less than or equal to 10 kW, or can be calculated using the maximum annual consumption registered in the last 3 years and the potential generation kWh/kW for different technologies (PV – 1200; Wind-1600; Biogas - 6100).

According to the National Center for Sustainable Energy as for October 2025 in Moldova the total installed capacity of described self-consumption mechanisms is :

- Net metering – 115,31 MW;
- Net billing –67,60 MW.

This represents around 19,6 % from the total installed RES capacities (932,81 MW).

The agency does not have information on the electricity produced by these installations, but it does have information on the electricity injected into the electricity grid.

In 2024 both net metering and net billing capacities injected into the grid 106.917 MWh, which represent approximately 2,6% from the overall final electricity consumption.

In Montenegro, Law on RES prescribes in details self-consumption scheme. Maximum installed capacity is limited by allowed self-consumer's connection capacity. Supplier is obliged to offtake all electricity produced by self-consumer which exceeds electricity consumed, at the price at which supplier supplies it.

Three groups of self-consumers, related to different sub-scheme, are prescribed depending on installed capacity. The first group are self-consumers with installed capacity less than 16 kW, where net-metering is applied. The second group of self-consumers have installed generation capacity between 16 kW and 50 kW, where net-billing is applied, and in the third group are self-consumers with installed capacity more than 50 kW. In the third group, commercial scheme is applied where calculation of electricity taken from the system and produced electricity delivered to the system is done independently. Self-consumers, whose installed generation capacity is

between 50 kW and 300 kW, sells electricity to his supplier at price which represents the price at which it is supplied, reduced by 5%. Self-consumers, whose installed generation capacity is more than 300 kW, sells electricity to his supplier at price which represents the price at which it is supplied.

At the end of 2024, self-consumers generation capacity was 24 MW which represents 2,2% of overall production capacity in Montenegro. For the same time frame, energy produced by self-consumers and delivered in the system was 31,8 GWh and represents the share of 1,1% in overall final electricity consumption.

The self-consumption scheme as a special scheme is not introduced in North Macedonia's national legislation. Instead, in the national legislation prosumers are defined as consumers that have installed RES generation capacity and can deliver electricity into the grid without license issued by ERC.

Suppliers are obliged to take excess of produced electricity.

Curently, the installed capacity for household is limited up to 10kW and for small consumers is 70kW. In 2024 the upper limit for household was 6kW and for small consumers 40kW.

The installed capacity of their generation at the end of 2024 was 25 MW and, with a total installed capacity in the country of 2.984 MW, represents the share of around 1%.

Electricity injected into the grid by prosumers in 2024 was 12.300 MWh and it represents 0,2% share in total electricity consumption.

The concept of prosumers (consumer-producers or self-consumption) is introduced in the RES law. Energy law defines the rights and obligations of prosumers.

In Serbia, the concept of prosumers (consumer-producers) is introduced in the RES law. Energy law defines the rights and obligations of prosumers.

Also, the following are also introduced:

- Net metering for households and small enterprises (small customers).
- Net billing for all other group of consumers.

In 2024, the capacity of prosumers connected to LV network was 49,2 MW and capacity of prosumers connected to MV network was 33,98 MW, which represent the share of 0,58% and 0,4% respectively. Related to electricity produced by self-consumers, production in 2024 was 32.100 MWh which represent 0,1% share in overall final electricity consumption.

In Ukraine, incentives for electricity generation from renewable energy sources under the "green" tariff and for electricity generation under the self-generation mechanism provide for the activity

of an active consumer who consumes self-produced electricity and sells the surplus to their supplier.

This is provided for by the Laws of Ukraine "On the Electricity Market" (Article 581) and "On Alternative Energy Sources" (Articles 91 and 96), as well as by the subordinate act of NEURC – the Rules of the Retail Electricity Market of March 14, 2018 No. 312.

An active consumer has the right to sell surplus electricity generated but not consumed for own needs under the self-generation mechanism in accordance with the Law of Ukraine "On the Electricity Market."

As of July 1, 2025, the total installed capacity of generating units of all active consumers is as follows:

- private households under the "green" tariff – 1,800.8 MW;
- private households with self-generation contracts – 3.6 MW;
- private households without grid feed-in – 7.4 MW;
- non-household consumers with self-generation contracts – 196.7 MW;
- non-household installations of 150 kW under the "green" tariff – 0.8 MW.

As of the end of 2024, private households concluded 64,854 contracts for the purchase and sale of electricity under the "green" tariff with a total installed capacity of 1,684.71 MW.

As of the end of May 2025, 651 contracts for the purchase and sale of electricity under the self-generation mechanism were concluded with active consumers, with an installed capacity of 142.387 kW.

The volume of electricity generated by private households under the "green" tariff in 2024 amounted to 1.621.647,74 MWh.

2.3.4 Balancing responsibility and connection/access

As electricity markets across the Energy Community Contracting Parties evolve toward greater liberalization and integration, the principle of balancing responsibility has become a cornerstone of efficient and secure system operation. Traditionally, privileged electricity producers—such as those benefiting from feed-in tariffs or priority dispatch—have been exempt from balancing obligations. However, this exemption is increasingly viewed as incompatible with competitive market principles and the need for system-wide accountability.

Balancing responsibility refers to the obligation of market participants to forecast their production or consumption accurately and to bear the costs of any deviations from scheduled volumes. Extending this responsibility to privileged producers ensures a level playing field, improves system reliability, and incentivizes better forecasting and operational discipline.

In line with EU legislation and the Energy Community acquis, Contracting Parties are gradually introducing reforms that require privileged RES producers to assume full or partial balancing responsibility. This shift supports the integration of renewables into the market, enhances cost-reflectiveness, and aligns national frameworks with the broader goals of decarbonization and market efficiency.

In Albania, after Electricity Balancing Market becoming operational, RES producers became balancing responsible parties. Only, Karavasta Solar as a winner of the first auction of the construction of a PV park under a CFD contract, has a price cap for the imbalances. If the market price of imbalances results higher than the price cap, the difference is covered by the off-taker. The RES producers out of the support scheme are fully balancing responsible. They can join the balancing group of the off-taker, or they can join another balancing group or also register by themselves as a BRP. Access and connection to the grid of RES producers are defined in Articles no. 17 and 18 of the law no 24/2023 "On promotion of use of energy from renewable sources". Also, ERE has transposed the network codes stemming from EU Directive, as adopted by the Energy Community PHLG as: Network Code on Demand Connection; Network Code on requirements for grid connection of high voltage direct current systems and direct current-connected power park modules and Network Code on Requirements for Grid Connection of Generators.

In Bosnia and Herzegovina entity FBIH, the Law on Electricity in Article 35 defines the rights and obligations of all generators, including RES producers, in terms of balancing, to assume balance responsibility or conclude a contract with the balance responsible party, and to bear the costs of the imbalance, unless otherwise defined by a special regulation,

The Law on the use of RES and Cogen defines the rights and obligations of RES producers who are incentivized and defines the balance group of RES. The above is defined, among other things, in Article 55 (Balancing) and Article 56 (Balancing Group of RES).

In entity RS, the Article 17 of the Law on Electricity in Srpska Republic defines the rights and obligations of all generators, including RES producers, in terms of balancing as obligations of the generator who produces in the incentive system and whose installed capacity is over 150 kW has the obligation to assume balance responsibility or conclude a contract with the balance responsible party and bear the costs of the imbalance. Operator for RES is responsible for balancing RES producers who formed balance group of RES

In entity BD, if the installed power of the plant exceeds 150 kW, the manufacturer is obliged to report the work schedule and bear the costs of the imbalance in case of responsibility for the imbalance.

Related to balancing responsibility of RES producers out of the support scheme, in entities FBIH and RS, RES producers are fully responsible while in entity BD, according to the Law on RES and

CoGen of the BD BIH, the adoption of the Instructions on the work of the balance group is foreseen where power plants with an installed capacity of more than 150 kW are the balance responsible party.

Regarding connection to the transmission network, in Bosnia and Herzegovina facilities that use renewable energy sources for electricity generation pay 50% of the fixed part of the connection fee. Facilities that use hydropower can use this privilege if their installed capacity does not exceed 10 MW.

In entity FBIH, the Law on the Use of RES and CoGen defines the rights of producers from RES to priority when resolving requests for connection. Electricity producers that use RES have an advantage in solving requests for connection to the electricity network, compared to plants that do not use RES, and in accordance with the current regulations and rules governing connection to the distribution network, and have the advantage of delivering electricity produced from RES and CoGen into the network, or priority in dispatching, in accordance with the applicable regulations and rules governing the operation of the power system of Bosnia and Herzegovina.

Distribution system operators prescribe simplified procedures for connecting a power plant that uses renewable energy sources to prosumer internal installations and acquiring prosumer status with the aim of simplifying the procedures.

In entity BD, based on the Regulations on the conditions for connecting power plants to the electricity distribution network, which was adopted by Power utility, RES producers have a special treatment related to connection.

In Kosovo*, all producers from renewable energy sources are responsible for balancing in accordance with the Law on Electricity, market rules and other procedures approved by the Regulator. Each balance responsible party shall be financially responsible for its imbalances.

In case the volume of the imbalance is higher than ten percent (10%) for the technology of wind and five percent (5%) for solar technology, the volume of the imbalance falling above this threshold is charged or equated with the Privileged Producer in accordance with the Market Rules and other procedures approved by the Regulator.

Balancing Responsibility under the Renewable Energy Sources Law is defined as follows:

1. Except for Privileged Producers selected under a Support Scheme pursuant to this Law, all Renewable Energy Producers bear full balancing responsibility in accordance with the Law on Electricity, market rules, and other procedures approved by the Regulator. Each balancing responsible party is financially liable for its own imbalances.

2. For Privileged Producers, based on the Regulator's assessment, the following forecast error margin shall apply for a period of up to twelve (12) months after the intraday organized market

in Kosovo* becomes functional and liquid, whereby partial exemption from the balancing responsibility and associated costs applies:

- If the imbalance volume during the final imbalance settlement period does not exceed ten percent (10%) for wind technology and five percent (5%) for solar technology of the scheduled volume for the imbalance settlement period, the imbalances shall not be charged to the Privileged Producer;
- If the imbalance volume exceeds ten percent (10%) for wind technology and five percent (5%) for solar technology, the imbalance volume above this threshold shall be charged to or settled with the Privileged Producer in accordance with the Market Rules and other procedures approved by the Regulator.

RES producers outside the support scheme are fully responsible for balancing. They are required to provide the TSO/DSO with all relevant measurement data necessary for calculating imbalance volumes and prices. These producers must cover imbalance costs monthly, in accordance with the Market Rules and the Methodology for Calculation of the Imbalance Price, as approved by the Regulator.

There is no special policy granting priority access or connection for RES producers. The connection process is conducted based on objective, transparent, and non-discriminatory criteria, in line with applicable grid codes and market rules. All applications are treated equally, ensuring system safety and reliability, without imposing additional administrative burdens on RES projects.

In Moldova, all RES under the support scheme are within the balancing group managed by the central energy supplier (S.A "Energocom"). According to the Law no. 107/2016 on electricity, all generators including RES are Balancing responsible parties (BRPs). Nonetheless, for RES under the support scheme the Law no. 10/2016 provides some tolerance thresholds. Thus art. 37 of the mentioned Law states that:

(7) In the event that the measured net position of the eligible producer within the balancing group of the central supplier is within the range of +/− 8%, in the case of wind power plants, or within the range of +/− 4%, in the case of photovoltaic power plants, from the contractual net position, the central electricity supplier shall not calculate the imbalance of the respective eligible producer.

In the event that the measured net position of the eligible producer within the balancing group of the central supplier exceeds the range of +/− 8%, in the case of wind power plants, or the range of +/− 4%, in the case of photovoltaic power plants, from the contractual net position, the central electricity supplier shall calculate the imbalance of the respective eligible producer only for the quantity of electricity that exceeds the established ranges.

(8) The price of positive imbalance for the quantity of electricity produced by the eligible producer in excess of the upper limit established in accordance with paragraph (7) is limited to less than 50% of the fixed tariff or fixed price, or, as the case may be, the strike price of the eligible producer.

(9) The price of negative imbalance for the quantity of electricity to be purchased by the eligible producer as a deficit in comparison with the lower limit established in accordance with paragraph (7) is limited to less than 200% of the fixed tariff or fixed price, or, as the case may be, the strike price of the eligible producer.

The RES producers out of the support scheme are treated in the same way as other market participants, being balancing responsible parties that should financially compensate the caused imbalances.

Related to the RES connection procedures, the Law no. 10/2016 on renewables states in art. 28 that producers of electricity from renewable sources, including prosumers of electricity from renewable sources, benefit from a simplified procedure for connecting small-capacity power plants to the grid, through a simplified notification, provided that the stability, reliability and safety of the electricity grid are maintained. The simplified notification procedure is described in the Regulation on connection to electricity networks and the provision of electricity transmission and distribution services, approved in accordance with Law no. 107/2016 on electricity. The „simplified notification procedure" will be reflected in the new Regulation on connection to electricity networks and the provision of electricity transmission and distribution services which is now being developed with the support of development partners.

In Montenegro, privileged producers that obtained status in line with previous Energy Law, are still incentivized with possibility to transfer balancing responsibility to market operator who finance all their imbalances. On the other hand, privileged producers who will obtain status in line with new Law on Renewables will be balancing responsible. In initial transitional period, imbalances will still be covered by market operator and privileged producers will have to pay fixed fee set by the Government but when transitional period expires, privileged producers will be fully balancing responsible. All other RES producers that are out of the support schemes, are fully responsible for their imbalances. RES producers out of the support scheme are fully balancing responsible party.

Related to connection and access to the grid, RES producers, except prosumers, don't have any special treatment in connecting their facilities but have the priority in access.

In North Macedonia, preferential producers that use feed-in tariffs are not balancing responsible parties and do not have financial obligations for their imbalances. Electricity market operator takes balancing responsibility for preferential producers.

Other RES producers, including preferential producers that use feed-in premiums, have balancing responsibility. They must take balancing responsibility and sign the agreement with TSO and after that register as electricity market participants. They can be balancing responsible party or transfer the responsibility to other balancing responsible party.

Related to RES generator grid connection, there are special provisions in the Methodology for setting the connection fee for connection to the distribution network. In this Methodology RES producers are not charged for creating technical conditions in the network for the purposes of connection.

RES producers in Serbia are balancing responsible party. RES producers that have obtained the status of privileged RES producer are entitled to select only one form of incentive for the same generation facility. There is no policy which gives a special treatment for a connection or access to grid for RES producers.

In Ukraine, according to the final and transitional provisions of the Law of Ukraine "On the Electricity Market," the share of reimbursement to the Guaranteed Buyer by business entities whose facilities or construction stages are included in the balancing group of the Guaranteed Buyer, and which sell electricity generated from RES at the "green" tariff, for the cost of imbalance settlement is gradually increasing by 10% annually from January 1st 2021 with 10% till January 1st 2029 when cost of imbalance settlement will reach 100%.:

For facilities exceeding 1 MW, 50% of imbalance cost has been charged from January 1st 2021 and fully after January 2022.

Until December 31, 2029, for wind power facilities in the balancing group, reimbursement is required if actual hourly output deviates from the schedule by more than 10%.

Until December 31, 2029, for solar power facilities in the balancing group, reimbursement is required if actual hourly output deviates from the schedule by more than 5%.

According to Article 71 of the Law, for deviations of actual hourly output (not related to transmission system operator commands), producers are required to reimburse part of the cost of imbalance settlement in accordance with the Law and the balancing group participation agreement.

RES producers without support operate in the balancing market on a general basis under the Market Rules.

Related to policy which gives a special treatment for a connection or access to grid for RES producers, Section IV of the Code, approved by NEURC Resolution No. 310 of 26.03.2018, regulates relations arising during the connection of newly built, reconstructed, or technically upgraded consumer electrical installations to the grid and when changing their technical

parameters. To obtain a connection service, the customer submits an application to the DSO, as per the form in Annex 3 of the Code. The application includes data and documents defined in the Code.

To strengthen resilience, flexibility, and decentralization of Ukraine's power system due to missile and drone attacks on generation facilities, NEURC, by Resolution No. 352 of 26.03.2022, approved the Procedure for temporary connection during martial law. Paragraph 7 provides for a simplified procedure for connecting generating units (until 01.10.2026), with the mandatory condition for RES (solar and wind) that the business entity installs energy storage with capacity equal to or exceeding the installed generating capacity and ensuring at least 4 hours of full-capacity output.

In Armenia, Universal (Guaranteed) supplier assumes responsibility for imbalances caused by market participants benefiting from an electricity purchase guarantee.

Small HPP`s (up to 30 MW installed capacity) and other electricity producers using renewable energy sources, which electricity purchase guaranty according to energy law has not expired, are involved in the balancing group created by Universal (Guaranteed) supplier and have a status of BRPP. BRPP status means that the wholesale electricity market (WEM) participant has joined to the other participant's balancing group by authorizing the latter to trade electricity in the WEM on behalf of itself, to undertake balancing responsibility and pay for services.

Small hydropower plants (installed capacity of up to 30 MW) and other renewable energy producers whose electricity purchase guarantee under the Energy Law has not expired are required to sign a Power Purchase Agreement (PPA) with the Universal (Guaranteed) Supplier.

The responsibility for balancing RES producers outside the support scheme will be regulated under the WEM rules on a common basis.

The WEM participant may trade in electrical energy (capacity) within the framework of the WEM rules and, accordingly, use the services provided in the WEM if has chosen the method of implementing balancing responsibility.

Small HPP`s (up to 30 MW installed capacity) and other electricity producers using renewable energy sources, which electricity purchase guaranty according to energy law has expired, may involved in the balancing group created by as BRPA or BRPP. The imbalance relationship between such producers and other market participants involved in balancing group, except cases of group created by Universal (Guaranteed) supplier, are not regulated. Small HPP`s (up to 30 MW installed capacity) and other electricity producers using renewable energy sources, which electricity purchase guaranty according to energy law has expired, may become an independent balance responsible party or assume the responsibility for imbalances of other WEM participant or has formed a balancing group with limitations prescribe by WEM Trading rules. According to Point

168 of WEM trading Participants with BRPI status and BRPG status shall sell electricity surplus and purchase electricity shortage that occur as a result of Imbalances from the Balancing Service Provider in cases and procedures defined by WEM trading rule.

Amendments to the transmission and distribution network codes, as well as to licensing rules, have been introduced to regulate the activities of RES producers (primarily solar power plants) constructed from July 1, 2024. A new category, "Restricted Producer," has been introduced and further clarified.

From March 1 to October 31, in cases where the reliability or safety of the power system is at risk—or threatened—the Electricity System Operator is authorized to issue an administrative order instructing a Restricted Producer to suspend or limit electricity delivery to the grid for up to 2,200 hours.

2.3.5 Dispatch and curtailment rules for RES generation and treatment of demonstration projects

As renewable energy sources (RES) become central to modern power systems, the rules governing their integration into the grid are evolving to balance technical feasibility with economic fairness. Two key mechanisms—dispatch and curtailment—play a pivotal role in this process. Dispatch refers to the prioritization of grid access for RES producers, ensuring that clean energy is utilized first whenever technically possible. Curtailment, on the other hand, acts as a financial safeguard for RES producers when grid constraints prevent full absorption of their available generation. Together, these rules shape how renewable electricity is managed, offering both operational clarity and investment security in an increasingly decentralized and variable energy landscape.

In Albania, according to the article 15 of the law no. 24/2023, has been defined that:

- Support for demonstration projects shall be granted through a Council of Ministers Decision which shall define the demonstration projects and their form of support.
- Demonstration projects of an installed capacity lower than 10.8 kW are subject to simplified grid connection procedures through the notification for grid connection directed to the Distribution System Operator.
- The connection to the grid through the notification for connection is enabled to demonstration projects with an installed capacity of up to 10.8 to 50 kW only for the cases when it is maintained the stability, reliability and safety of the distribution grid.

Related to dispatch or curtailment rules for renewable energy generation, there are no specific rules in place.

In Bosnia and Herzegovina the support scheme for demonstration projects for innovative technologies is not introduced in legislation and there are no separate dispatch or curtailment rules for RES connected on transmission network.

Related to support scheme for demonstration projects for innovative technologies, is not recognized in Georgia as EU regulation 2019/943 has not been transposed yet.

Regarding dispatch or curtailment rules for renewable energy generation, according to the Law on Promotion and Use of Energy from Renewable Sources, the Transmission System Operator (TSO) is required to give priority to renewable energy sources during dispatch, provided that such prioritization does not jeopardize the stability of the electricity system. This prioritization must also comply with the transparent and non-discriminatory conditions established by the regulator.

With regard to curtailment, the Electricity (Capacity) Market Rules—approved by the Ministry of Energy in 2006—define the priorities for electricity exports via new interconnections. Priority is first granted to RES that have a contractual agreement with the TSO, for the duration of that contract. After that, priority is given to RES without long-term contracts, but with a guaranteed priority period of 10 years.

In Kosovo*, currently there is no support scheme for innovative technologies introduced in the national legislation of Kosovo*.

Under the provisions of the Law on Renewable Energy Sources, RES producers are entitled to compensation for curtailed energy based on Compensation Methodology which is on process to developed to determine the volume of energy curtailed and the corresponding financial compensation.

In Montenegro, the new RES Law introduced support for demonstration projects for innovative technologies, as prescribed with EU Regulation 2019/943. Support is based on Feed-in tariff that are granted until the quotas, established by the government, are filled on a first-come, first-served principle. The Ministry prescribes the manner of conducting the feed-in tariff allocation procedure, instructions to bidders for submitting bids, deadlines, conditions for participation, qualification and selection in the feed-in tariff allocation procedure.

Related to dispatch or curtailment rules, priority dispatching for electricity produced from RES is prescribed in primary legislation and curtailment rules has been introduced by new Law on RES where privileged producers can exercise the right to compensation for energy that they could have produced and made available to the system operator, but were prevented from delivering that energy due to delivery restrictions by the competent system operator. More detailed conditions for exercising this right will be prescribed by the Ministry.

There is no support prescribed in national legislation in North Macedonia related to support scheme for demonstration projects for innovative technologies, in line with EU Regulation 2019/943.

RES generators have priority in dispatching during the duration of the license for performing energy activity under the manner and under the operational conditions in the network codes, rules that foresee the limitations arising from the capabilities of the electricity system and if such production facilities are with installed capacity up to 200 kW and demonstration projects approved by the Energy Regulatory Commission, with such priority being limited to the time and scope necessary to achieve the project objectives.

The Energy Regulatory Commission, upon request from the operator, may, for the generation facilities up to 200 kW, adopt a decision to reduce the threshold for installed capacity or not to apply priority dispatch, provided that:

- there is a functional intraday market and other wholesale markets as well as a balancing market accessible for all market participants,
- the rules for redispatching and congestion management are transparent and are for all market participants, or
- the national target for the share of energy from renewable sources in gross final energy consumption adopted in the relevant decision of the Ministerial Council of the Energy Community has been achieved or if electricity produced from renewable sources accounts for at least 50% of gross final electricity consumption.

The Energy Regulatory Commission, before adopting the decision, shall notify the Energy Community Secretariat of the intention to adopt the decision with an explanation of the fulfillment of the conditions and publish it on its website, taking into account the protection of commercially sensitive information.

The decision to discontinue the application of priority dispatch shall apply to generation plants that will start operating at least six months after its adoption. The decision to reduce the installed capacity threshold shall apply only to generation plants that will start operating at least six months after its adoption.

Producers who have priority in dispatching may waive that right at any time, upon a previously signed agreement with the transmission system operator.

The Government, after previously receiving an opinion from the Energy Regulatory Commission, may grant support measures to producers who have priority in dispatching, if the producers waive their right to priority in dispatching. Priority dispatching must not endanger the security of the electricity system and must not cause or be a justification for a direct reduction in the cross-border transmission capacity of an interconnection line with any neighboring bidding zone.

Operators may make a decision to refuse access only in the event that there is no necessary transmission or distribution capacity and when there is a shortage of electricity or gas capacity in the heat distribution system due to other supplies of waste heat, heat from renewable sources or heat produced by high-efficiency cogeneration or in the event that providing access to a specific user may jeopardize the security of energy supply in the Republic of North Macedonia.

The operator who refused access is obliged to deliver the decision on the refusal to the person who requested access in writing, and is obliged to state in the explanation of the decision the reasons for the refusal, which must be based on technically and economically justified criteria, determined in the network rules for transmission, i.e. distribution of the relevant system.

The person whose access to the system has been denied by the decision or who is dissatisfied with the conditions for access to the system may submit an objection to the Energy Regulatory Commission within 15 days of the delivery of the decision. The relevant operator is obliged, upon request of the person who has been denied access to the system, to provide him with the necessary information on the measures that need to be taken to improve the conditions in the system, which would enable access, and for providing the information, he may charge a fee in an amount previously approved by the Energy Regulatory Commission.

In Serbia, support scheme for demonstration projects for innovative technologies, in line with EU Regulation 2019/943, are introduced in national legislation. Support scheme for priority access to system as well as feed in tariffs are limited to demonstration project and generators with installed capacity less than 400 kW, and generators connecting to the system after 1. January 2026 with installed capacity less than 200 kW.

In relation to dispatching, in the connection process, the operational limitations may be issued in accordance to the Energy law.

There is no support scheme for demonstration projects with innovative technologies in Ukraine.

Regarding dispatch and curtailment, according to Article 68 of the Law, producers with installed capacity ≥1 MW, included in the Guaranteed Buyer's balancing group (except those exempts under market rules), must submit offers to the TSO for load reduction services, corresponding to their daily production schedules. The cost of the service equals the value of electricity not released under the "green" tariff due to TSO commands. These provisions have been implemented in the Market Rules approved by NEURC Resolution No. 307 of 14.03.2018.

No support scheme for demonstration projects for innovative technologies, in line with EU Regulation 2019/943, and dispatch and curtailment rules are introduced in national legislation in Armenia.

2.4 The role of Regulathory Authorities in support scheme

National regulatory authorities play a pivotal role in shaping the renewable energy landscape across the Energy Community Contracting Parties. As independent institutions overseeing electricity markets, their responsibilities range from tariff regulation and market monitoring to the design, implementation, and supervision of support schemes for renewable energy sources (RES).

In the context of RES development, regulators help ensure that support mechanisms—such as feed-in tariffs, feed-in premiums, and auctions—are implemented transparently, cost-effectively, and in line with national and regional energy objectives. They also contribute to setting rules for balancing responsibility, overseeing grid access for RES producers, and facilitating the integration of self-consumption models.

However, the scope and influence of regulatory agencies vary significantly across Contracting Parties. In some jurisdictions, regulators have extensive mandates, actively shaping RES policy and overseeing Guarantees of Origin (GO) systems. In others, their role is more limited, with responsibilities confined to technical oversight or tariff approval, while ministries or other institutions lead on policy and support scheme design.

As Contracting Parties move toward more market-based and competitive frameworks, the role of regulators becomes increasingly strategic—balancing investor confidence, consumer protection, and system reliability. This section of the report explores how national regulatory agencies are fulfilling these roles, the diversity in their mandates, and the challenges they face in supporting the energy transition.

Regarding the RES, based on NRA's response, regulators responsibility varies. In Georgia, regulator has no role in relation to RES support scheme, unless self-consumers. Similar situation is in Serbia where, following the 2023 Amendments to the Law on usage of RES, AERS no longer holds competencies related to the RES support scheme. Prior to these amendments, AERS was responsible for drafting methodologies for renewable energy sources and market premiums. Regulatory authority in Montenegro has minor responsibilities in RES support scheme mechanism. Almost all responsibilities are in the hand of Ministry of Energy, Government and Market operator. The most important regulator's responsibility is to adopt substitutional price in market premium mechanism when market price is negative and to investigate the impact of support scheme on market and tariffs. Related to self-consumer scheme, there is no role of regulator. In the previous period, regulator was responsible for determining status for privileged producers and for issuing guarantees of origin.

On the other hand, there are many NRA's with many responsibilities such as regulator in Albania which, according to the law on RES, has the responsibility to:

- Approve the general conditions of the standard contract for support.
- Develop and approve a methodology for the calculation of renewable energy obligation and also define the value of renewable energy obligation.
- adopt the grid and market measures, with the proposal of the Transmission System Operator and the Distribution System Operator, to minimize the electricity interruption generated from energy renewable sources and the methodology for the assessment of restricted electricity volume.
- Define the network tariffs for renewable energy communities.
- As the national issuing body of the guarantees of origin in the Republic of Albania has to approve the rules for issuing the guarantees of origin and set-up a system for issuing, transferring, redeeming and revoking/cancelling GOs regarding the energy produced from renewable energy sources.
- perform the market readiness assessment of the Albanian Power Exchange to return the PPA into a CfD.
- Set the energy purchase price for the existing priority producers from the hydro resources with installed capacity up to 15 MW.
- Set the electricity purchase price for the existing priority producers from photovoltaic and wind sources, according to the methodology approved by the Council of Ministers.

In Bosnia and Herzegovina's entity Federation of BIH, regulator is responsible for licensing and determination of the status of an eligible producer for plants with an installed capacity of more than 1 MW, adoption of regulations for prosumers, adoption of regulations for RM and their calculation, determination of reference prices, feed-in tariffs, feed-in premiums, lower- and upper-income caps as well as lower and upper prices, monitoring. Over that, FERK adopts the Rulebook on the methodology for determining the maximum values of feed-in tariffs, replacement market prices and cap values of feed-in premiums, and based on this rulebook, FERK submits to the Federal Ministry of Energy, Mining and Industry a proposal for the calculation and values of the maximum feed-in tariffs and cap values of feed-in premiums, upper and lower income caps for incentives, upper and lower cap purchase prices, which Government of the Federation of Bosnia and Herzegovina, on the proposal of Ministry, passes a Decision on the values of maximum feed-in tariffs, cap feed-in premiums, upper and lower income caps for incentives, upper and lower purchase price caps.

In Bosnia and Herzegovina's entity Republic of Srpska, regulators responsibilities are licensing and determination of the status of an eligible producer for small plants, adoption of regulations for prosumers and determination of reference market prices, feed-in tariffs, feed-in premiums and monitoring. RERS determines the value RES fee that is calculated on each customer receipt,

and passes that decision on Government approval. Regulatory commission also participate in auction process, and in general over oversees the work of Operator for RES

In Bosnia and Herzegovina's entity Brcko District, according to the Law on RES and CoGen, regulator (SERC) issues a license for power plants with an installed power of more than 1 MW.

In Kosovo*, roles of the Regulator (ZRRE) in RES Support Schemes are:

- Tariff/Price Approval (sets or approves reference prices or maximum tariffs for RES auctions or premiums and ensures cost-reflective pricing and protection of consumer interests),
- Licensing of RES Producers (issues generation licenses for RES projects above the threshold defined by law and monitors compliance with licensing conditions),
- Regulatory Oversight of RES Fund (monitors the operation and financial sustainability of the Renewable Energy Support Fund and ensures transparency, accountability, and non-discriminatory access to support),
- Monitoring and Reporting (collects data and monitors the impact and costs of RES support schemes on the market and tariffs and reports to the government, Energy Community, and other stakeholders),
- Guarantees of Origin (acts as the issuing body or supervises the entity responsible for issuing GO's for renewable electricity),
- Ensuring Grid Access (regulates non-discriminatory access to the grid for RES generators and approves connection charges and conditions set by the Transmission and Distribution Operators),
- Consumer Protection (ensures that support scheme costs are allocated fairly, and that end-consumers are informed and protected).

In regard to RES support scheme, the National Energy Regulatory Agency in Moldova has following responsibilities:

- confirms, in accordance with the Regulation on the confirmation of the status of eligible small producer, the status of eligible small producer for persons who own or are to own a power plant/power plants with an installed/cumulative electrical power that does not exceed the capacity limit of 1 MW for PV and 4 MW for wind.
- establishes and maintains the register of eligible producers;
- develops and approves the model contract for differences, the model regulated contract for the purchase of electricity from renewable sources, the model contract for the supply of electricity from renewable sources, as well as the conditions for the procurement of electricity from renewable sources, which are included in the annex to the electricity supply contract signed under the terms of Law no. 107/2016 on electricity;

- establishes, in the Electricity Market Rules, the method of distributing among electricity suppliers the energy purchased by the central electricity supplier and/or the financial obligations resulting from the difference between the wholesale electricity market price and the fixed prices/tariffs established in accordance with this law;
- calculates, approves and proposes to the Government the ceiling prices for electricity from renewable sources that will be used for the organization of auctions, as well as the calculations related to them, performed depending on the production technology;
- delegates a representative to participate as a member of the auction commission;
- calculates and approves the fixed tariffs for the implementation of the support scheme.

In North Macedonia, regulator ERC has a role in the feed-in tariffs procedure. It grants the status of a preferential producer and adopts decision for feed-in tariff. The conditions for issuing status for preferential producers and the level of feed-in tariffs are set by the Government.

According to the Laws of Ukraine "On Alternative Energy Sources" and "On the Electricity Market," NEURC is vested with powers, in particular:

- setting the "green" tariff for electricity generated at power facilities, including commissioned construction stages of power plants (start-up complexes), generating units of private households, consumers, including energy cooperatives, from renewable energy sources (excluding blast furnace and coke oven gases, and in the case of hydropower — only electricity produced by micro-, mini-, and small hydropower plants);
- quarterly recalculation of the fixed minimum "green" tariff in the national currency based on the average official exchange rate of the National Bank of Ukraine;
- setting a surcharge to the "green" tariff for compliance with the level of use of Ukrainian-made equipment;
- approving the service to increase the share of electricity generation from renewable energy sources and the cost of such service under the market premium mechanism, provided by business entities that have been granted the "green" tariff or have acquired support through auctions;
- issuing, trading, and redeeming guarantees of origin for electricity produced from renewable energy sources.

In Armenia, the Public Services Regulatory Commission of Armenia approves the methodology for calculating and revising feed-in tariffs for electricity supplied by power plants using renewable energy resources and benefiting from a statutory purchase guarantee. The Commission also carries out licensing in the energy sector in accordance with the procedures it establishes.

3 GUARANTEES OF ORIGIN

In today's energy landscape, transparency is no longer optional—it's essential. As consumers increasingly demand cleaner energy and accountability from providers, electricity suppliers are required to disclose the origin of the energy they sell. This disclosure is made possible through the system of **Guarantees of Origin (GOs)**, a standardized mechanism that certifies whether electricity was generated from renewable sources. Since the physical flow of electrons in the grid cannot be traced to their source, GOs serve as a **reliable tracking tool**, ensuring that every megawatt-hour of claimed green energy is backed by verified production. By cancelling GOs corresponding to the amount of electricity supplied, suppliers demonstrate their commitment to sustainability and empower consumers to make informed choices. This system not only supports the growth of renewable energy but also strengthens trust in the energy market.

3.1 Certification system

Based on NRA's response, all CP's have the electricity certification system based on Guarantees of Origin (GO's) regulatory framework in place but not all fully in line with RED II Directive and with functional electronic register. Eight out of nine CP's which provided the data, already issue GO's and have established electronic Register of GO's. Armenia, as an Energy Community Observer, still doesn't have GO's regulatory framework in place. Although, under the Comprehensive and Enhanced Partnership Agreement (CEPA) between the EU and the Republic of Armenia, which entered into force on 1 March 2021, Armenia undertakes to gradually align its legislation with: Directive 2009/28/EC on the promotion of the use of energy from renewable sources (within six years of CEPA's entry into force); Directive 2009/72/EC on common rules for the internal electricity market, repealing Directive 2003/54/EC (within eight years); and Regulation (EC) No 714/2009 on conditions for access to cross-border electricity networks (timeline to be determined), the proposed new draft laws "On Electricity" and "On Renewable Energy and Energy Efficiency" will nonetheless incorporate a certification system based on Guarantees of Origin.

The GO's development leader in the region is ***Serbia*** *with a full membership status in Association of Issuing Bodies (AIB)*. Serbia has a functional electronic GO system in place, operated by Elektromreža Srbije (EMS), aligning with RED II requirements to a significant extent. However, full recognition of these GOs within the EU is still pending. On 8th of September 2017, EMS JSC Belgrade was officially designated as the Competent Body for the GO system in Serbia and started with the first GO issuance in 2018 when became the first in the Western Balkans to issue GOs in practice by using the fully electronic Register. On 22nd of April 2021, EMS reaffirmed its role, confirmed in a national data sheet published by AIB.

Bosnia and Herzegovina has the electricity certification system based on GO's in place starting from July 2023 and has obtained an Observer status to the AIB Electricity Scheme Group. The EU Directive 2018/2001 related to GO's is transposed in national legislation.

GO system *in Georgia* was introduced by the end of 2023 and issuance of the certificates were commenced from January 2024. The TSO, Georgian State Electrosystem, became an observer member of the AIB HUB at the end of 2023, within the framework of which it has the opportunity to familiarize itself with the specific operations of the AIB HUB and to receive information on the trade of guarantees of origin across Europe.

*Kosovo** has established a Guarantees of Origin system as of July 2024, in line with the EU RED II Directive. The national GO registry is operational and technically compliant with AIB/EECS standards. However, Kosovo's* GOs are not yet mutually recognized by the EU due to pending legal and regulatory harmonization. Main barriers include lack of full disclosure rules, administrative alignment, and EU recognition procedures. A roadmap for recognition is under development within the Energy community framework. Kosovo* obtained an Observer status to the AIB Electricity Scheme Group

Moldova still doesn't have functional and operational GO certification system but the regulatory framework is in place since ANRE (NRA) approved the Regulation on GOs on 15th July 2025. Now NRA is issuing the GO based on an internal system developed. Until 2025, the issuance of guarantees of origin was carried out by the central supplier. ANRE is currently working on establishment of the informational system/register of guarantees of origin in Moldova that will be connected to the regional system/register of guarantees of origin of the Energy Community Contracting Parties and will offer the possibility of transferring guarantees of origin between them. This Register will be fully compatible with the CEN EN-16325 standard and with the system of the Association of Issuing Bodies (AIB). Based on the information provided by ANRE, Moldova is not a member nor a observer in AIB and there is no clear timeline regarding the joining at the moment. But, on the other side, AIB presented the statuses of CP's on the official webpage where Moldova has been labeled as Observer.

In Montenegro, regulatory framework for GO's has been implemented in 2011 and started operational in 2013 inline with RES Directive 2009/28/EC except for using the registry based on Excel spreadsheet. In August 2024, when the Law on RES was adopted, Montenegro transposed RED II EU Directive in primary legislation with implementation period ending in August 2025 when all related bylaws should have been adopted. Montenegro obtained the status of AIB member and applicant to Electricity Scheme Group in AIB.

In North Macedonia, system of guarantees of origin has been introduced since 2018 and was upgraded in 2022. The system will be adjusted with the adoption of the new RES Law in order to

fully align with the requirements of RED II. North Macedonia obtained an Observer status to the AIB Electricity Scheme Group.

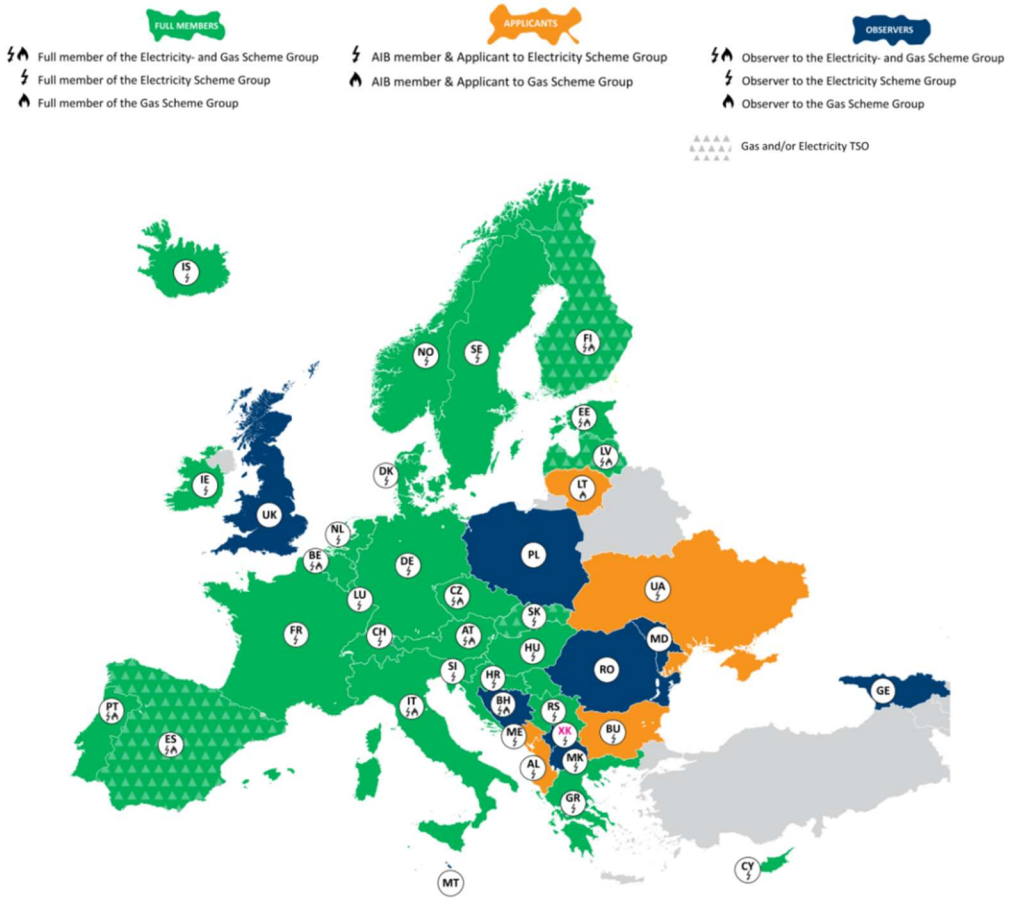
While implementing the EU's 4th Energy Package, *Ukraine* has created a system for issuing guarantees of origin for electricity produced from renewable energy sources, taking into account the requirements of Article 19 of the RED II Directive, with amendments. In May 2024, the Ukrainian Energy Regulator became the member of the European Association of Issuing Bodies (AIB). At the same time, NEURC initiated the procedure for obtaining membership in the AIB Electricity Scheme Group, which will ensure international trade in guarantees of origin within the AIB. In August 2024, the Regulator launched an electronic Register of Guarantees of Origin using an IT solution applied in EU member states – the Ukrainian register complies with European rules and practices.

Recognition of issued Guarantees of Origin in other countries is very important aspect that should be provided. This would facilitate GO's trading and additionally stimulate electricity generation from RES. Full membership in AIB gives EU countries a basis for mutual recognition and enables cross-EU GO trading. Unfortunately, RED II Directive brought some GO's export limitations to non-EU countries but, nevertheless, there are more opportunities based on mutual legal recognition between individual countries. In this regard, the regional electronic GO's register to facilitate the trade in practice.

At this moment, only Serbian GO's are recognized EU countries (AIB members) with a certain limitations. Serbian GOs began exporting to other countries in 2023, though these exports are currently limited in their legal recognition (e.g., usable for disclosure only in some markets like Switzerland). In the rest of CP's, GO's are not recognized in other countries although activities for mutual recognition are conducted, through the inter-state contracts based on reciprocity or through the AIB.

In the following picture, the statuses of EU countries and CP's is shown. Based on the ANRE response, they don't have neither member nor observer status and didn't take any steps towards becoming AIB member but, nevertheless, we are presenting AIB data with the ANRE information as an additional disclaimer.

Figure 21



The source: AIB, Member list webpage

3.2 European standard EN 16325

The **EN 16325 standard**, developed by the European Committee for Standardization (CEN), provides a harmonized framework for the **Guarantees of Origin (GOs)** used to certify the source of electricity generated from renewable energy. It defines the structure, content, and handling of GOs to ensure they are **reliable, transparent, and verifiable** across European markets.

The **European Energy Certificate System (EECS)**, managed by the **Association of Issuing Bodies (AIB)**, builds upon EN 16325 by implementing its principles within a **pan-European operational system**. EECS provides the rules and infrastructure for issuing, transferring, and cancelling GOs across participating countries, ensuring **cross-border compatibility and market integrity**.

Together, EN 16325 and EECS form the backbone of Europe's renewable electricity certification system, supporting consumer confidence, regulatory compliance, and the growth of green energy markets.

EN 16325:2025 is legally binding European standard that defines the rules for Guarantees of Origin (GOs) across multiple energy types, including electricity, gas, hydrogen, heating, and cooling. Current standard was published on 1st of July 2025 and replaces standard EN 16325:2013+A1:2015 which covered only electricity. This standard is based on EECS principles and developed in collaboration with both public and private stakeholders. EECS (European Energy Certificate System) is a contractual system used by the Association of Issuing Bodies (AIB) for more detailed and flexible implementation.

Standard EN 16325 from 2013 is in force in Bosnia and Herzegovina, Montenegro and Ukraine. In Georgia,TSO operates GREXEL platform which complies with the EN 16325 standard which will soon be the case with Moldova too, after signing of the contract with the software supplier – „Grexel Systems Oy" and the Register becomes operational, it will be fully compatible with the CEN EN-16325 standard. National ratification of EN 16325 as a formal standard in Kosovo* has not yet occurred. The same status of this standard is in North Macedonia but it is envisaged that with the RES Law the standard will become part of the national legislation.

3.3 Governance

The competent body responsible for issuing GO's differs from Contracting party to Contracting party. As the most common case, it is national regulating authority (Kosovo*, Moldova, Ukraine and Bosnia and Herzegovina's entity Republic of Srpska). In Georgia and Serbia, TSO is appointed as competent body for issuing GO's, while in Montenegro and North Macedonia, it is a Market operator. In Bosnia and Herzegovina's entity Federation of Bosnia and Herzegovina, competent body is Operator for renewable energy sources and efficient cogeneration.

The issuing of GO's is based upon the measuring data provided by competent measuring body. In practice, which is the case in all Contracting Parties, this body is system operator who is responsible for measurements to be accurate and to ensure availability to competent bodies responsible for issuing GO's.

Monitoring of activities related to Guarantees of Origin is responsibility of national regulatory authorities in all CP's except in case of North Macedonia where no body has been authorized or responsible to monitor the GO but with the new RES law, this issue should be resolved.

3.4 GO's in relation to support scheme and self-producers

Treatment of generating facilities under the support scheme differs from CP to CP. In general, there are two approaches. The first one is not to issue GO's to facilities under the support scheme and is applied in Bosnia and Herzegovina and North Macedonia. The second approach is based

on issuing GO's even to facilities under the support scheme but with a mechanism used which is disabling them to additionally benefit from GO's.

In Albania, as prescribed by Article 22 of RES Law, where a Priority Producer benefits from support measures under this Law, the market value of the guarantee of origin for the same generation shall be returned to Renewable Energy Operator (REO). If the generators benefit a supporting measure to purchase energy, the guarantee of origin is issued to REO. REO shall decide if it is going to sell the guarantee of origin directly to the supplier or to the customer or on a competitive procedure. In Georgia, according to the Law of Georgia on the Promotion of the Production and Use of Energy from Renewable Sources, the Government of Georgia is authorized, based on the submission of the Ministry, to fully or partially revoke the right of an energy producer to benefit from the support scheme if the producer receives a guarantee of origin for the same energy generated from renewable sources. This has not been case so far in Georgia. In Kosovo*, generating facilities under support schemes cannot trade GOs independently. GOs from these facilities are managed by the Renewable Energy Operator and cannot be sold separately from the electricity to prevent double counting.

In Moldova a slightly different and complex approach is used. Law no. 10/2016 provides that:

- The market value of a guarantee of origin for the same production must be taken into account when establishing support schemes.
- In the event that financial support is offered within a competitive bidding process, the principle set out in paragraph (1) is deemed to be respected, and the market value of the guarantee of origin is taken into account accordingly. The guarantee of origin is issued to the eligible large producer (CfD) respectively even after the expiry of the 15-year period for which it benefited from the support scheme.
- In the case of the eligible small producer (feed-in tariff), the guarantee of origin is issued to the central electricity supplier. ANRE shall, with a certain periodicity, order the central electricity supplier to sell unexpired guarantees of origin directly to suppliers or final consumers or within a competitive process. The revenues generated from the trading of guarantees of origin are used by the central electricity supplier to reduce the regulated price for electricity from renewable sources paid by electricity suppliers.

If the guarantees of origin will not be traded within the auction, they will be used to demonstrate the share of electricity produced from renewable energy sources in the total electricity supplied to all consumers with whom they have signed electricity supply contracts.

In Montenegro, GO's have been issued to generating facilities under support scheme but they cannot use it for trading nor to have any additional benefit. They are obliged to transfer them to off-taker (Market operator in this case) along with the electricity and afterwards, Market operator

is selling electricity and its GO's as a package to suppliers. Finally, suppliers perform cancelation of GO's and disclosure. In Serbia, generating facilities supported by FiT or FiP do not trade their GOs. Instead, GOs from these plants are cancelled centrally by EMS on behalf of final consumers, so the renewable attribute benefits all Serbian consumers through disclosure. Only non-subsidized plants can market their GOs.

In Ukraine, guarantees of origin of electricity produced from renewable energy sources issued for the volume of electricity sold to the Guaranteed Buyer under the feed-in tariff or for which a service is provided under the feed-in premium mechanism are transferred to the property of the guaranteed buyer simultaneously with the purchase and sale of such amount of electricity. Guarantees of origin of electricity produced from renewable energy sources by generating installations of private households with an installed capacity not exceeding 50 kW, for the volume sold to the universal service supplier under the feed-in tariff, become the property of the respective universal service supplier simultaneously with the purchase and sale of such electricity. The Guaranteed Buyer and the universal service supplier are obliged to sell such guarantees of origin, and the revenues from the sale are directed to financing the fulfillment of special obligations for the development of electricity production from renewable energy sources. This approach is defined by Article 9-7 of the Law of Ukraine "On Alternative Energy Sources".

Related to self-consumers, in almost all CP's the GO's are not issued for produced electricity except in case of Kosovo* where GO's have been issued even in the case of self-consumption scheme for the excess of produced electricity delivered to the grid and in Ukraine where GO's may be issued for self-consumption schemes. It should be noted that guarantees of origin are issued only based on certified commercial metering data from metering points equipped in accordance with the requirements of the Code of Commercial Electricity Metering, as provided by the commercial metering administrator.

In Ukraine, GO's may be issued for self-consumption schemes. Guarantees of origin are issued only based on certified commercial metering data from metering points equipped in accordance with the requirements of the Code of Commercial Electricity Metering, as provided by the commercial metering administrator.

3.5 GO Register and Production Devices Register

In line with the EU Renewable Energy Directive and the Energy Community acquis, Contracting Parties are establishing national GO registers to ensure the reliable issuance, transfer, and cancellation of GOs within their electricity markets.

Each national GO register serves as a centralized digital system that tracks the origin of electricity produced from renewable sources. These registers are closely linked to a production devices

register, which contains verified data on all eligible RES installations—such as installed capacity, commissioning date, technology type, and location. Accurate registration of production devices is a prerequisite for issuing GOs, ensuring that only certified renewable electricity is labeled and traded as such.

To facilitate cross-border exchange and harmonization, the Energy Community has developed a regional GO platform that connects national registers and enables standardized GO transactions across Contracting Parties. This regional integration enhances market transparency, supports consumer trust in green energy claims, and lays the foundation for future participation in the EU-wide GO system.

By combining robust national infrastructure with regional coordination, the Energy Community is advancing its renewable energy goals while aligning with European best practices for electricity disclosure and certification.

Fully operational electronic GO registry is in place in almost all Contracting Parties, except in Kosovo* and Moldova where it is not operational yet. In Serbia, on 16th of November 2020, EMS joined the AIB Hub, enabling cross-border exchange of GOs and facilitating international trading. However, full recognition of these GOs within the EU is still pending.

The GO registries in CP's are dominantly based on Grexel platform. In Georgia, GREXEL platform is used to manage the regional certificate system among the Energy Community countries, which involves the transfer of certificates between the countries participating in the system. Kosovo* uses a fully digital, national GO registry operated with Grexel since July 2024. It follows the AIB/EECS standards for automated issuance, transfer, and cancellation of GOs. The registry supports regional integration within the Energy Community and enables transparent, efficient renewable energy certification. At the moment in Moldova, NRA is currently issuing the GO based on an internal system developed (excel based). ANRE is in the process of collaboration/signing of the contract with the software supplier – „Grexel Systems Oy" in order to implement and operationalize the registry of guarantees of origin in Moldova. In Montenegro, the software solution used by the market operator is G-REX, from the company Grexel. which is part of the EEX group.

The Registry software supports various types of certification such as EECS, ERGaR and CertifHy, but also the EC (Energy Community GO) certification that the Market Operator is using at the moment, which enables import and export to countries of the Energy Community that are not yet full members of AIB. The software solution used by the Market Operator is fully harmonized with the registries of all EU countries, so that by becoming a full member of the AIB or the EU, the Market Operator will be able to respond to all new requirements with the existing system.

In North Macedonia, GO Register, maintained by the market operator, is based on GREXEL platform and shall record all issued, transferred, recognized, revoked and cancelled guarantees

of origin. The Register shall be maintained in electronic form. The Register shall at least contain the data related account holder, electricity production license holder, Unique registration code of the power plant and important data related to issued, expired or revoked GO's, including the data on recognized guarantees of origin from other countries. In Serbia, The GO registry model is a centralized electronic "bookkeeping" system that ensures unique, trackable, tradable, and cancellable certificates for every MWh of renewable energy. It prevents double counting, enables market trading, and underpins green energy claims in line with EN 16325 and RED II.

The GO's register in Ukraine was created using the G-REX software developed by Grexel Systems Ltd (Finland). The G-REX system used in Ukraine is fully digital. Users have access to their accounts via a secure online interface. The register supports a bilingual interface — Ukrainian and English. All actions related to the issuance, circulation, cancellation of guarantees of origin are carried out exclusively through the software used for the operation of the register.

Based on NRA's response, competent authority for operating GO's registry is the same institution who is responsible for issuing GO's.

Although there are electronic GO registries in place in CP's, based on the provided information's by NRA's, there is an intention or it has already been done, to join Energy Community regional project of electronic GO registry in Albania, Georgia, Kosovo*, Moldova, Montenegro and Ukraine.

For the GO's to be valid and recognized as such, in terms of AIB and EU legislation, it is necessary that the production facilities for which the GO's are issued meet the conditions and that adequate measurement of the produced electricity is ensured. All production facilities that meet preconditions for issuing GO's must be registered in Production devices register.

Based on NRA's responses, production devices register does not exist in Kosovo* and Moldova. Kosovo* does not have a separate production devices registry. Data on renewable energy installations is managed by the Energy Regulatory Office (ERO) through licensing records and linked with other systems like municipal plans and the cadastral agency. In Moldova, no registry of production devices are in place, but NRA has the information about the plants in excel format. In the new informational system/register of guarantees of origin the production devices will be introduced electronically in a separate compartment.

In all other CP's, production devices register exists as a part of electronic GO's register or as a separate register. Production devices register is a part of GO's register in Albania. In Montenegro and Serbia, it is part of the GO Registry rather than a fully separate standalone database, but it functions as a distinct module: all devices must be registered and validated before GOs can be issued.

In Ukraine, a register of generation facilities and consumer installations (including active consumers) using renewable energy sources for electricity production (the RES Register) operates, approved by the NEURC Resolution of 27.12.2023 No. 2624. The RES Register serves as the basis for registering generating installations in the register of guarantees of origin. A user of the guarantees of origin register is entitled to register a generating installation located within the domain of Ukraine, provided that the relevant data has already been entered into the RES Register.

In North Macedonia, there is a separate registry maintained by the Ministry of Energy named as Register of Power Plants Producing Electricity from Renewable Energy Sources. The register of power plants is kept in electronic form. The register sheet at least contains the data related to owner and power plant identification, technology, capacity and production, and information on whether the producer of the power plant uses support measures for renewable energy sources specified by the Energy Law.

3.6 Disclosure

In a rapidly evolving energy market, **electricity supplier disclosure** has become a cornerstone of transparency, consumer empowerment, and environmental accountability. As electricity is delivered through a shared grid, consumers cannot physically trace the source of the power they use. This disconnect creates a critical need for a standardized system that allows suppliers to disclose the **origin and environmental attributes** of the electricity they sell.

Supplier disclosure refers to the obligation of electricity providers to inform end-users about the **energy mix**—the proportion of electricity derived from renewable, fossil, or nuclear sources. This information is essential for consumers who wish to make **informed choices**, support **sustainable energy**, or comply with corporate sustainability goals.

To ensure credibility and consistency, disclosure systems across Europe and beyond rely on **Guarantees of Origin (GOs)**—electronic certificates that verify the source of electricity generation. By cancelling GOs equivalent to the volume of electricity supplied, suppliers demonstrate that the energy sold as "green" is backed by actual renewable production. This mechanism not only supports **market integrity** but also aligns with broader climate and energy targets.

In this context, supplier disclosure is not merely a regulatory requirement—it is a vital tool for building trust, promoting renewable energy, and enabling a transparent energy transition.

Related to disclosure in CP's, it is not introduced in national legislation in Albania, Bosnia and Herzegovina entity Republic of Srpska and North Macedonia.

In Georgia, disclosure is introduced in line with the Directive 2019/944. It was introduced in 2024 and from august consumers are receiving the bill where the information on energy sources are disclosed to the final consumers. Suppliers have an obligation to include in the bill the information

on the energy sources they consumed previous year. Suppliers shall calculate the energy mix once a year, respectively the bill is updated every year. The first disclosure has been made in August 2025. Kosovo* has introduced a disclosure framework aligned with Directive 2019/944 through its 2024 renewable energy law. The Energy Regulatory Office (ERO) operates the GO system to ensure transparency and inform consumers about renewable electricity sources. As of now, Kosovo's* suppliers have not yet made mandatory renewable energy disclosures to consumers. The GO system is active, but disclosure obligations for suppliers are not yet enforced.

In Montenegro, disclosure has been fully introduced in 2021 when rules and methodology for calculation of shares and residual mix came in force. It is in line with CEP. Starting from 2021, supplier, for every category, calculates the shares of energy sources in the total energy in their supply mix, taking into account Residual mix calculated by Market operator. Once per year, suppliers, along with the bill, deliver to their customers a report on the contribution of all types of energy to the total electricity mix delivered to them. Disclosure is introduced in Serbian legislation. It obliges suppliers to inform customers about the electricity mix and renewable share based on GOs. The system is in line with the CEP (Directive 2019/944), making Serbia the first Energy Community CP to have full disclosure rules and residual mix methodology comparable to EU practice. Suppliers in Serbia have already made disclosure. Since 2022, disclosure is provided on bills and marketing materials, based on cancelled GOs and the residual mix calculated by EMS. Serbia is currently the only Energy Community CP with disclosure implemented in practice, fully aligned with EU CEP rules.

In Ukraine, provisions on information disclosure are stipulated by the NEURC Resolution of 27.12.2023 No. 2626, which approved the Procedure for Disclosure of Information to Electricity Consumers on the Structure of Energy Sources. According to the NEURC Resolution dated 27.12.2023 № 2626, once a year by June 1 of the year following the reporting period, the electricity supplier shall provide consumers with the information about the energy source used for electricity generation, electricity volumes and share in total consumption structure as part of the invoice.

In electricity markets where Guarantees of Origin (GOs) are used to certify renewable energy, the concept of the residual mix plays a vital role in ensuring accurate and transparent supplier disclosure. While GOs allow suppliers to prove the origin of electricity sold as renewable, not all electricity in the grid is backed by such certificates. The residual mix represents the portion of electricity for which no GOs have been claimed or cancelled—typically including energy from fossil fuels, nuclear sources, and untracked renewables.

For disclosure purposes, suppliers must account for both the electricity backed by GOs and the remaining volume sourced from the residual mix. This ensures that the total energy mix disclosed to consumers reflects reality, avoiding double counting and greenwashing. The residual mix is calculated annually at the national or regional level, often coordinated by entities like the

Association of Issuing Bodies (AIB), and is essential for maintaining the integrity of energy origin claims.

By incorporating the residual mix into disclosure calculations, suppliers provide a **complete and credible picture** of their energy sourcing, enabling consumers to make informed decisions and supporting broader goals of transparency and sustainability in the energy sector.

Disclosure is made possible through **Guarantees of Origin (GOs)** but to be in full capacity, existence of calculation of the **residual mix**—a crucial element in ensuring accurate and credible information, is more than important.

The **residual mix** represents the share of electricity in a country's consumption that cannot be explicitly tracked through GOs. It accounts for electricity from unknown or non-certified sources and is used to prevent double counting of renewable attributes. Calculating the residual mix is essential for assigning a realistic carbon intensity and energy source profile to electricity that lacks specific origin claims.

By applying a harmonized methodology for residual mix calculation, Member States and Energy Community Contracting Parties can ensure that **electricity disclosure is fair, consistent, and aligned with EU climate and consumer protection goals**. This process not only supports informed consumer choices but also strengthens trust in renewable energy markets and the credibility of green claims made by suppliers.

Based on NRA's response, not all CP's calculate residual mix alltough disclosure is in place.

In **Albania**, GO's are issued for renewable electricity only. The methodology of calculation of the national residual mix is not in place yet, as is not foreseen under the current legislation framework. Legislatory amendments which are in process will include the adoption of this methodology. In **Kosovo***, GOs are planned to be issued only for renewable energy sources. However, the methodology for calculating the national residual mix is not yet in place, but is expected to be developed as part of future AIB integration steps. In **North Macedonia**, GOs are issued only for RES and started in 2025. The methodology of calculation of the national residual mix is not in place. In **Ukraine**, guarantees of origin of electricity are issued exclusively for electricity generated from renewable energy sources, in accordance with the current legislation. The methodology for calculating the residual energy mix is currently under development and will be approved following the adoption of relevant amendments to Ukrainian laws

In **Georgia**, GOs are issued only for renewables. To avoid double counting Residual Mix Calculation methodology is approved by GNERC. TSO is responsible for calculating Residual Mix. The methodology is drafted based on the AIB recommendation.

Moldova's GOs are issued only for RES sources. According to the notion related in Law no. 10/2016 on renewable a guarantee of origin is an electronic document issued with the aim of

demonstrating to a final consumer that a quantity of electricity supplied to him was produced from renewable energy sources.

Regulation on the calculation of energy consumption from renewable sources approved by Government decision No. 74/2025, provides the methodology of calculation of the national residual mix. GO's in Montenegro are issued for electricity produced from RES only. To facilitate disclosure, the Rules on the method of calculating, displaying and publishing the share of all types of energy sources in the produced or delivered electricity and calculation monitoring has been introduced which contain the methodology of calculation of the national residual mix which is based on AIB's European Residual Mix Calculation rules.

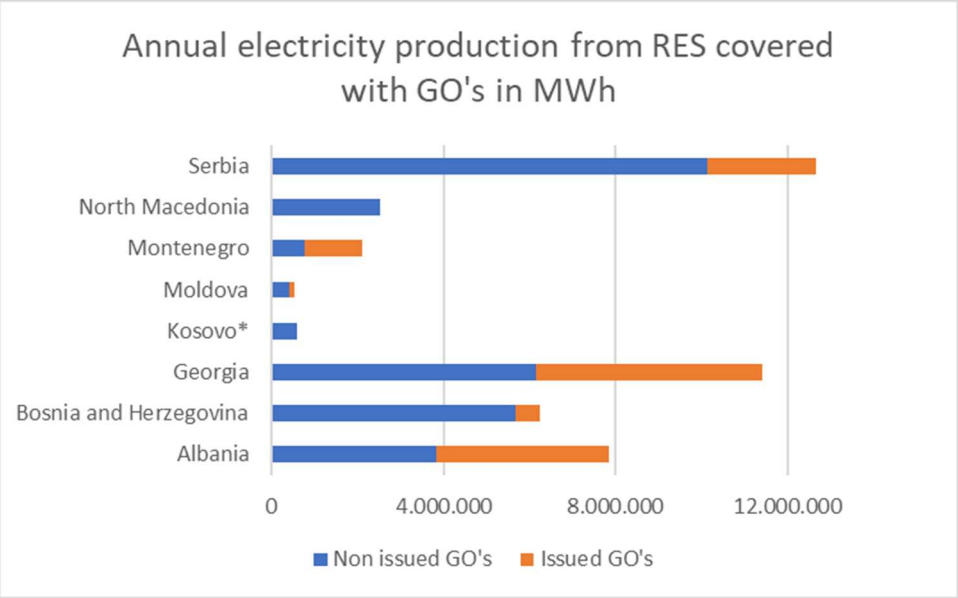
GO's in Serbia are issued only for electricity from renewable energy sources (RES) — such as hydropower, wind, solar, and biomass. Serbia applies a methodology for calculating the national residual mix in accordance with AIB's European Residual Mix Calculation rules.

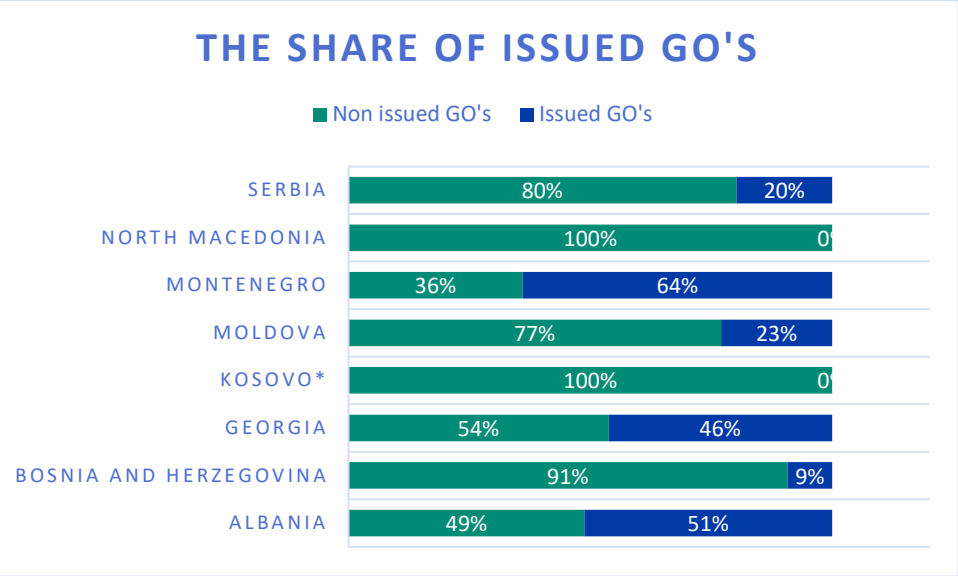
Based on the data provided by NRA's, 7 out of 9 CP's were issuing GO's in 2024. North Macedonia and Kosovo* started issuance in 2025. In 2024, more than 17 million GO's for electricity produced from RES were issued in all CP's. The number of issued GO's is presented in the next table:

	Albania	*Bosnia and Herzegovina*	*Georgia*	*Kosovo**	*Moldova*	*Montenegro*	*North Macedonia*	*Serbia*	*Ukraine*
Issued GO's	4012470	576464	5276673	0	122800	1351686	0	2509254	3718778

Taking into account that 43.887.958 MWh of electricity (excluding Ukraine data) has been produced from RES in Energy Community CP's in 2024, from which it can be concluded that almost 1/3rd of electricity produced from RES was covered with issued GO's in CP's (excluding Ukraine).

In next two graphs, the number of annual electricity production from RES covered and non-covered by GO's and the share in % of issued and non-issued GO's in overall CP's (excluding Ukraine) electricity production from RES, could be seen in Figures 22, 23:

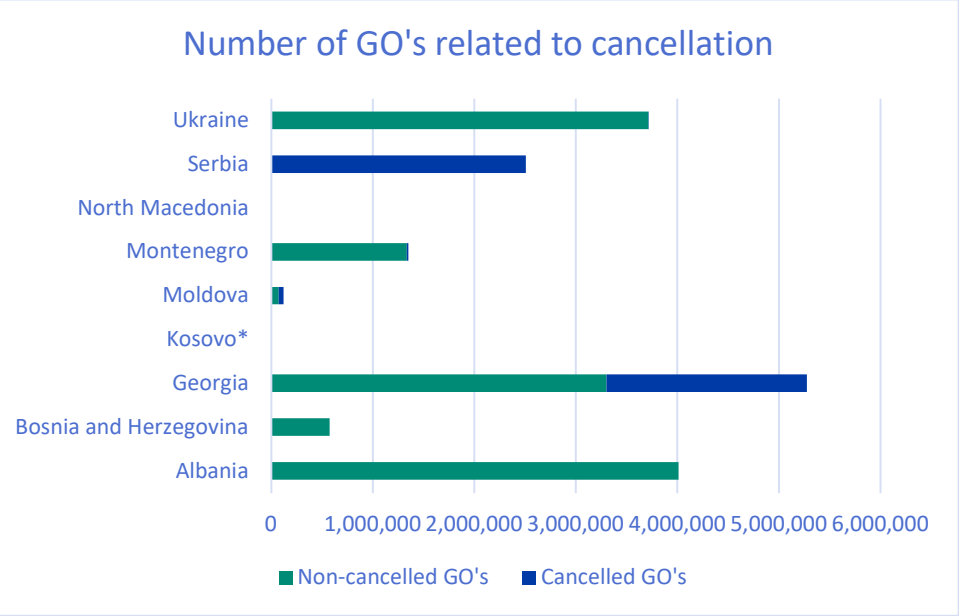


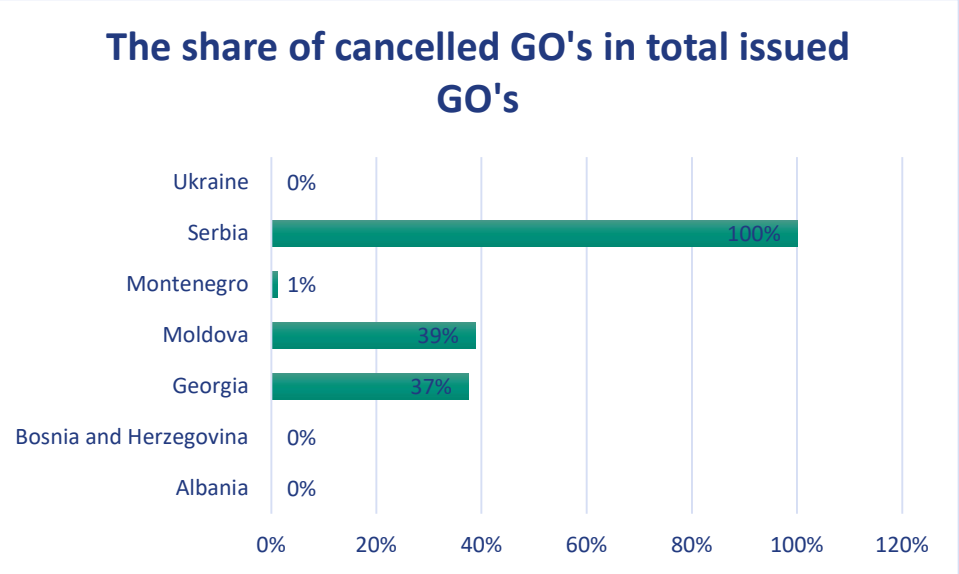


Related to the GO's cancellation data provided by NRA's who have issued GO's in 2024, Albania and Bosnia and Herzegovina didn't cancel any GO in 2024. The 2024 data related to cancelled GO's in CP's that were issuing GO's is presented in next table:

	Albania	*Bosnia and Herzegovina*	*Georgia*	*Moldova*	*Montenegro*	*Serbia*	*Ukraine*
Cancelled GO's	0	0	1975395	47641	16280	2509254	3836

In the next two in Figures 24, 25 the data related to cancelled GO's is shown.





Only in Serbia all issued GO's are used and cancelled which means the disclosure is fully functioning. In Moldova and Georgia, more than 1/3rd of issued GO's have been cancelled, in Montenegro just 1% and no issued GO's were cancelled in Bosnia and Herzegovina and Albania. It can be concluded that, although GO issuing procedure is in place, the GO's mechanism is uncomplete without cancellation and disclosure which is not fully functioning in the manner of GO's utilization, except in case of Serbia.

4 FLEXIBILITY

In the Energy Community context, flexibility is gaining strategic importance as Contracting Parties integrate greater shares of variable renewable generation and seek to maintain system

reliability and affordability. These power systems are generally smaller, less interconnected, and still rely heavily on legacy thermal and hydro assets, making them particularly sensitive to fluctuations in renewable generation.[6]

Since the adoption of the Electricity Integration Package (EIP) by the Ministerial Council in 2022, the Energy Community Contracting Parties have entered a decisive phase in aligning their frameworks for storage, aggregation, and demand-side flexibility with the European market rules. The EIP provisions oblige Contracting Parties to recognise flexibility as a market-based resource and to create enabling conditions for its use in grid operation and market balancing.

By 2025, Montenegro, North Macedonia and Serbia had enacted or finalised energy laws that fully incorporate flexibility provisions. These laws define storage and aggregation as licensed activities, permit DSOs to procure flexibility when economically justified, and restrict network-operator ownership of storage to fully integrated network assets. Ukraine has already established a legislative and regulatory framework aligned with the European models. Georgia, Albania, Bosnia and Herzegovina, Kosovo*, and Moldova remain at preparatory or early-transposition stages, either without dedicated flexibility chapters or still finalising draft amendments. Armenia, while not a Contracting Party, is also aligning its electricity-market framework with EU rules under the EU–Armenia Comprehensive and Enhanced Partnership Agreement. Overall, flexibility concepts have entered primary law in several Contracting Parties, but their practical implementation remains constrained by the absence of secondary legislation, including procurement rules, aggregator-settlement methodologies, and market-product definitions.

Within the Energy Community, two broad tiers of progress in developing flexibility frameworks can be identified. Front-runners such as Montenegro, North Macedonia, Serbia, and Ukraine have already transposed the key provisions of the CEP and established regulatory bases for aggregation, storage, and demand response, with partial market operation or pilots already underway. The second group, comprising Albania, Bosnia and Herzegovina, Georgia, Kosovo*, and Moldova, remains at an early implementation stage, where flexibility, although in some cases already embedded in legislation or draft laws, has yet to translate into active procurement, pilot projects, or commercial participation.

[6] Trinomics B.V., Artelys, & Energy Community Secretariat. (2022). *Study on flexibility options to support decarbonization in the Energy Community* (Final Report). Energy Community Secretariat. Available at: https://www.energy-community.org/documents/studies.html

Flexibility Readiness across Contracting Parties

Figure 26

Country	Legal	Storage	Aggregation	DSO Procurement	Smart meters	Dynamic
ME	■	■	■	■	■	■
MK	■	■	■	■	■	■
RS	■	■	■	■	■	■
UA	■	■	■	■	■	■
MD	■	■	■	■	■	■
BA	■	■	■	■	■	■
GE	■	■	■	■	■	■
XK*	■	■	■	■	■	■
AL	■	■	■	■	■	■

■ = Advanced ■ = Partial ■ = Absent

Among the front-runners, Ukraine has advanced furthest by already operating a comprehensive legislative and regulatory framework for flexibility. Storage and aggregation are defined in law, with six licensed storage operators and five active aggregators allowed to participate across all market segments. The amendments to the primary and secondary legislation, adopted in 2023-2025 set rules for aggregator participation, storage connection, and active consumer integration. DSOs and TSOs may own storage only as fully integrated network elements subject to regulatory approval, while operators of storage can provide balancing and ancillary services on a voluntary, market basis.

Montenegro stands out for having completed the full transposition of flexibility provisions through its 2025 Energy Law. Aggregation and storage are licensed activities, and DSOs are authorised to procure flexibility services from distributed producers, demand-management entities, and storage operators under transparent and non-discriminatory procedures, provided the regulator finds them economically justified and such procurement would not cause disruptions in the market or increase congestion in the system. Ownership of storage by DSOs

or TSOs is prohibited, except for fully integrated assets, and explicit single charging is implemented.

North Macedonia introduced a full flexibility framework in its 2025 Energy Law, covering storage, aggregation, and demand-side response. DSOs are required to include flexibility options and cost-benefit analyses in their five-year development plans, and may procure flexibility services from any market participant, including RES producers, storage operators, aggregators, or demand-response providers, on transparent and market-based terms once approved by the regulatory authority.

Serbia amended the Energy Law in 2024 to explicitly define storage, aggregation, and demand-side flexibility as market activities and oblige DSOs to procure flexibility if this is economically justified and the safe and reliable operation of the electricity system is not impaired. Secondary legislation is under preparation to operationalise these provisions and regulate aggregator–supplier settlement. Storage facilities may participate in energy, balancing, and ancillary-service markets, and double network charging has been removed.

Among the early-stage implementers, Albania, Bosnia and Herzegovina, Georgia, Kosovo*, and Moldova, progress is confined to primary or draft legislation. While the legal foundations for flexibility are emerging, secondary rules, market platforms, and procurement mechanisms are largely absent.

Moldova's new Electricity Law, approved by Parliament and awaiting approval by the President, transposes all key EIP provisions on storage, aggregation, and demand-side flexibility. DSOs will be allowed to procure flexibility services through transparent and market-based procedures once secondary rules are adopted. Although no aggregators or storage operators are yet active, several connection permits have been issued for hybrid and standalone storage projects.

Albania's 2023 Law on Renewable Energy introduces limited provisions for energy storage and flexibility, but lacks a legal basis for aggregation, demand-side response, or DSO procurement of flexibility services. There are no operational storage facilities, demand-response programmes, or dynamic-pricing contracts, and aggregators are not recognised in legislation.

The Federation of Bosnia and Herzegovina (FBiH) Electricity Law introduces provisions on energy storage and aggregation. In the Republika Srpska (RS), no licence has yet been issued for an energy-storage facility, while in the Brčko District (BD), flexibility is recognised in the legal framework, reflecting that relevant provisions on energy storage have been transposed. DSOs are not authorised to procure flexibility services, and no aggregators are licensed. A temporary model enables virtual power plants to access the market via the TSO, though active flexibility programmes have not emerged.

Kosovo's* Energy Strategy 2022–2031 identifies storage, demand-side response, and flexibility as strategic priorities, yet an operational framework is still absent. DSOs are not permitted to procure flexibility services, and aggregation is not defined in law. There are no active storage facilities or demand-response programmes. Consumers have fixed day and night tariffs. The smart meter rollout has begun, but remains at a preliminary stage.

Georgia's current legal framework does not yet recognize aggregation, storage, or demand-side flexibility as distinct market activities. Smart meter rollout is currently in progress.

Armenia, while not a Contracting Party, is progressing in alignment under its Comprehensive and Enhanced Partnership Agreement with the European Union and is gradually aligning with the EU electricity and renewable energy acquis. Draft laws on Electricity and on Renewable Energy and Energy Efficiency are expected to introduce legal provisions for storage, aggregation, and demand-side response. No flexibility mechanisms, aggregators, or DSO procurement arrangements are yet operational.

Across the early-stage implementer Contracting Parties, flexibility remains at the policy design stage. Most have laid down legislative references but lack secondary acts, market procedures, or operational pilots. With these foundational frameworks taking shape, certain regional patterns emerge, most notably in how aggregation, storage regulation, and DSO procurement are being approached across the Contracting Parties.

Aggregation and market access

Even though independent aggregation is legally recognised in some of the Contracting Parties, its operationalisation remains limited. Serbia, North Macedonia, Montenegro, and Moldova define the aggregator as a market participant entitled to combine generation or demand and sell aggregated services across all market segments. Ukraine leads implementation, with five licensed aggregators already providing balancing and ancillary services under approved baseline and settlement rules. Elsewhere, aggregation remains on paper: no aggregator licences have yet been issued in Serbia, Montenegro, North Macedonia, or Moldova, pending the adoption of secondary legal acts. Electricity Law in FBiH recognises aggregation, yet no operational framework exists.

Energy storage regulation

Storage is legally defined and transposed across all front-runner jurisdictions. Montenegro's 2025 Energy Law and Serbia's 2024 Energy Law transpose Directive (EU) 2019/944 provisions, explicitly prohibiting double network charging and restricting DSO/TSO ownership to fully integrated assets used solely for system operation. North Macedonia allows storage participation in balancing markets and has two large-scale battery projects (1,000 MW/2,330 MWh and 1,600 MW/3,728 MWh) which obtained licences at the end of September 2025. Additionally, it does not apply network fees to electricity supplied to the grid by a storage operator.

Ukraine has six licensed storage operators providing balancing and ancillary services, and does not apply double charging to storage operators. Moldova's Electricity Law, pending enactment, introduces storage as a licensed activity and enables its use for ancillary services. Both the TSO and DSOs have already issued connection permits for hybrid generation-plus-storage projects. Bosnia and Herzegovina foresees storage in its Transmission Network Code and allows storage operators to participate in the wholesale electricity market. Both Albania and Georgia lack operational installations or clear legal definitions for storage activities. The region, therefore, shows broad legal recognition of storage activities, but narrow commercial deployment.

DSO procurement of flexibility

The transition from network reinforcement to market-based procurement is emerging as a pivotal step in modern power system reform. Serbia's Energy Law obliges DSOs to procure flexibility services, while North Macedonia mandates a five-year distribution-development plan including regulator-approved cost–benefit analyses of flexibility options. Montenegro allows DSO procurement on transparent and non-discriminatory terms, subject to regulatory verification of economic justification, and Moldova's draft law follows a similar approach. Across the Contracting Parties, no active DSO tenders have yet been executed, and cost-recovery mechanisms remain undeveloped. In Albania, Bosnia and Herzegovina, Georgia and Kosovo*, DSOs are not authorised to procure flexibility at all. Regulators across the region have yet to establish tariff or incentive mechanisms that ensure cost and revenue neutrality between grid reinforcement and flexibility procurement, a prerequisite for network operators to adopt non-wire solutions at scale.

Demand-side response and dynamic pricing

Demand-side flexibility remains largely undeveloped, with legal bases now in place in some of the Contracting Parties, but implementation lagging. Dynamic pricing is available in Ukraine, Serbia and Montenegro. North Macedonia legally obliges suppliers with more than 200,000 customers to offer dynamic-price contracts to smart-metered consumers. However, none of these Contracting Parties currently report any household or non-household consumers subscribed to dynamic pricing contracts, indicating that implementation remains at a preparatory stage. In Moldova, consumers supplied under the universal service may request the application of time-of-use (ToU) tariffs established by the regulatory authority, provided they cover the cost of the smart meter. In addition, a UNDP-supported smart metering pilot is currently being implemented, under which beneficiaries are also supplied at ToU prices approved by the regulator. Kosovo* applies fixed day/night tariffs with consumption thresholds (800 kWh per month). Current ToU arrangements remain transitional, whereas full dynamic-price contracts require smart metering systems compliant with the Electricity Directive, which sets functional and interoperability requirements, and corresponding supplier obligations. None of the Contracting Parties operates structured industrial or residential DSR programmes with verified participation or activated capacity. In practice, load flexibility remains largely conceptual and has yet to translate into measurable market activity.

Energy communities and local flexibility actors

Only two Contracting Parties have introduced energy community concepts that could evolve into distributed flexibility providers. Montenegro's Energy Law establishes the energy community of citizens as a licensed entity entitled to participate in all energy markets, share internally generated electricity, and act collectively as an active buyer. Moldova's Law on Renewable Energy and Regulation on Renewable Energy Communities, approved by the regulatory authority, outline governance principles for joint self-consumption and local trading. Although currently limited to a few jurisdictions, these initiatives will require broader attention to support citizen participation, community-level balancing, and local resilience.

Other flexibility instruments

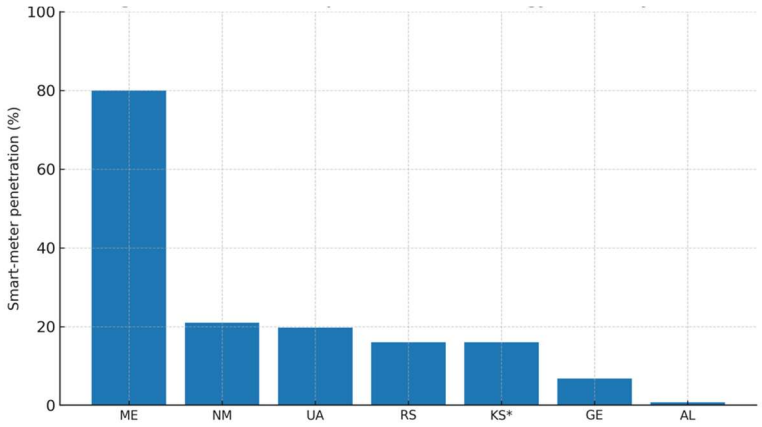
Two Contracting Parties have reported alternative flexibility tools. Bosnia and Herzegovina operates a temporary virtual power plant model under the Independent System Operator, enabling distribution-connected generators to access the national market. North Macedonia also recognises the concept of a "virtual producer", defined as a market participant that commercially and technically integrates electricity producers, prosumers, and storage operators connected to the distribution network, enabling centralised management of their generation and participation in the market. The virtual producer aggregates renewable producers through contractual arrangements, manages their output, and sells it on their behalf while providing balancing services in line with the Balancing Rules. As of 2024, thirteen virtual producers were registered. These alternative initiatives remain limited in scale but provide practical precedents for future local flexibility markets.

Smart metering and digitalisation

The smart meter rollout defines the operational boundary of flexibility. Montenegro leads with roughly 80 percent of end-users equipped with smart meters. North Macedonia reports almost 21 percent coverage and is completing a national cost–benefit study by the end of 2025. Serbia and Kosovo* stand at 16 percent, Ukraine at 19.7 percent, and Georgia's coverage is 6.8 percent. Albania's smart meter rollout is below 1 percent, while Moldova is currently implementing a rollout through a UNDP programme, targeting 7 percent by 2027. Only Georgia, Kosovo* and Montenegro have completed cost–benefit assessments, while Moldova will use its UNDP pilot as a basis for national cost–benefit assessment preparation. However, functional compliance with Article 20 of the Electricity Directive is not universal: only Albania, Georgia and North Macedonia have confirmed full alignment. Ukraine has transposed most functional and technical requirements into its Electricity Metering Code, while North Macedonia, Montenegro, Kosovo*, and Moldova report partial compliance. This entails that key functionalities, such as hourly or 15-minute data resolution, secure consumer access, interoperability, and remote control, are missing in some of the Contracting Parties.

Figure 26

Smart-Meter Penetration Across the Energy Community



Cross-sector coordination and outlook

Flexibility readiness across the Energy Community is now shifting from legislative design to institutional implementation. Most Contracting Parties have completed or nearly completed primary-law transposition, and regulators are finalising secondary acts on measurement and verification of flexibility delivery, settlement rules for aggregation, DSO procurement procedures, and storage-tariff methodologies. Digital readiness, including interoperability, data exchange, and the rollout of smart metering systems, has emerged as the principal bottleneck. To translate the new legal provisions into real flexibility services, progress in transposition must therefore be matched by investment in digital infrastructure, market readiness, and capacity-building among system operators, regulators, and market participants.

Effective flexibility depends on the simultaneous presence of five mutually reinforcing enablers, presented in table below.

Figure 27

Core Flexibility Enablers Across the Energy Community

Key Enabler	Current Regional Status
Aggregation & market access	Legal in **UA, ME, RS, NM, MD, BiH** Implemented only in **UA**
Energy storage regulation	Defined in **UA, ME, RS, NM, MD** Operational only in **UA**
DSO procurement of flexibility	Legal in **RS, NM, ME, MD** No tenders executed
Demand-side response & dynamic pricing	Legal references in **UA, RS, ME, NM, MD** Dynamic pricing in **UA, RS, ME, NM** No structured DSR programmes
Smart meter coverage	Coverage ≈ **ME 80 %, NM 21 %, RS 16 %, KS*** 16 %, **UA 19.7 %, GE 6.8 %, AL < 1 %**

While the Contracting Parties have moved beyond the stage of legislative drafting, they continue to face systemic obstacles that prevent flexibility from becoming an operational market product. The *Annex: Deep Dive on Flexibility in Energy Systems* provides an overview of European approaches and best practices, together with an assessment of the main barriers observed in the Energy Community Contracting Parties and areas where targeted reforms could unlock further progress.

Annex: Deep Dive on Flexibility in Energy Systems

a. Flexibility in Decarbonising Power Systems

Flexibility has become an essential element of modern electricity markets transitioning towards decarbonisation. As renewable energy sources account for an increasing share of generation in both the EU and the Energy Community, the structure and operation of electricity systems are changing fundamentally. Renewable generation, particularly solar and wind, is inherently variable and largely non-dispatchable. Solar output is limited to daylight hours and fluctuates seasonally, while wind patterns also vary throughout the year, typically peaking in winter and weakening in summer. Unlike conventional thermal plants, these technologies contribute little to system inertia and therefore cannot stabilise frequency following sudden disturbances, resulting in a power system that is cleaner but potentially more volatile.

Flexibility, therefore, ensures the ability to maintain a secure, efficient, and affordable power system despite these fluctuations. It entails the capacity to adjust electricity generation, consumption, or storage in real time, ensuring that supply and demand remain balanced and network constraints are managed. Insufficient flexibility may result in the curtailment of renewable generation, heightened price volatility, and increased costs for balancing and grid reinforcement.

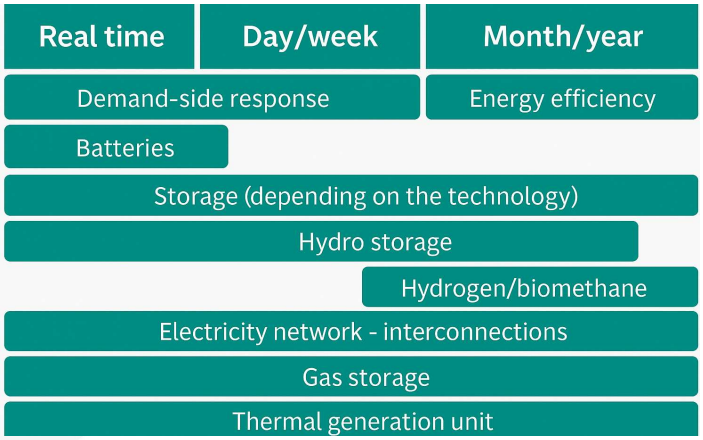
Recent European assessments confirm the magnitude of this challenge. ENTSO-E projects that by 2030, daily flexibility requirements will total around 450 TWh annually, decreasing to about 350 TWh when interconnection effects are considered.[7] Across countries, short-duration downward flexibility needs correspond to 8–27 percent of installed variable-renewable capacity, while downward ramping flexibility ranges between 5 and 17 percent, reflecting system-size and resource-mix differences.[8] This trend is reinforced by the progressive phase-out of fossil-fuel power plants, which historically provided balancing and reserve capacity.

The need to develop flexible resources is further exacerbated by the ongoing electrification of transport, heating and industry, which will further increase demand, and make it more dynamic and volatile.[9] These developments increase the need for rapid, decentralised flexibility at the distribution level. As electricity demand becomes more variable and consumption increasingly occurs closer to end-users, for example, through electric vehicles, heat pumps, and distributed generation, local responsiveness becomes essential to maintain system stability and efficiency.

[7] ENTSO-E (2024), *System Flexibility Needs for the Energy Transition*. Available at: https://eepublicdownloads.blob.core.windows.net/public-cdn-container/clean-documents/Publications/System_Needs/entso-e_System_Needs_Energy_Transition_v10.pdf
[8] *Ibid.*
[9] Centre on Regulation in Europe (CERRE) (2025). *Flexibility in the Energy Sector.* Available at: https://cerre.eu/wp-content/uploads/2025/05/CERRE-Report_Flexibility_Final.pdf

As shown in the figure below, flexibility needs arise across different time horizons: from real-time balancing and intraday adjustments to seasonal storage, and can be met through a diverse mix of technologies.

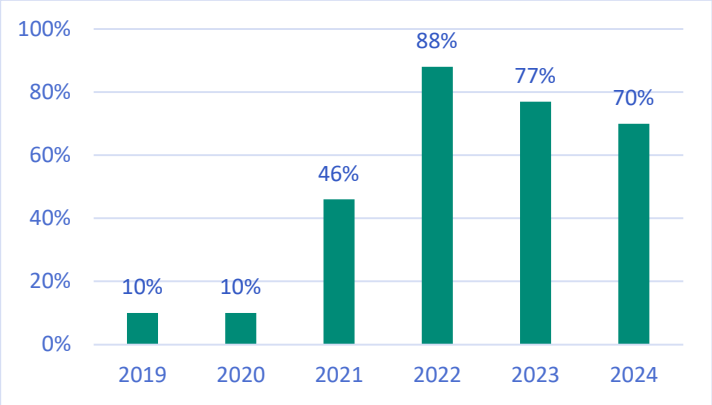
Flexibility Services Provided by Various Technologies



Source: ACER (2025)

Frequent negative wholesale-price episodes across EU electricity markets indicate that existing flexibility mechanisms still do not respond effectively to price signals.[10] As renewable penetration grows and system inertia declines, the resulting increase in forecast-error uncertainty heightens the need for fast-acting flexibility services, including frequency containment, storage, demand-side response, and voltage-control capabilities. This trend is reflected in the recent surge of market price volatility shown in figure below.

Volatility as represented by the annual percentage of days when the electricity price varies over 50 EUR/MWh in a day, EU-27/EEA(Norway)



[10] European Parliament. (2025). *Increasing Flexibility in the EU Energy System.* Policy Department for Transformation, Innovation and Health, Directorate-General for Internal Policies. Available at: https://www.europarl.europa.eu/RegData/etudes/STUD/2025/769347/ECTI_STU(2025)769347_EN.pdf

Source: ACER (2025)

While flexibility has long existed from a system perspective, its recognition as a distinct market activity is relatively recent. Regulators are now defining new roles and remuneration mechanisms to reflect the shift from one-directional, fossil-fuel-based systems to decentralised networks with variable renewables, prosumers, and storage. As markets evolve and digitalisation expands, flexibility has become a key enabler of reliability, affordability, and renewable integration. The following section outlines how regulatory and market frameworks in the EU are integrating flexibility.

b. EU Framework and Practices

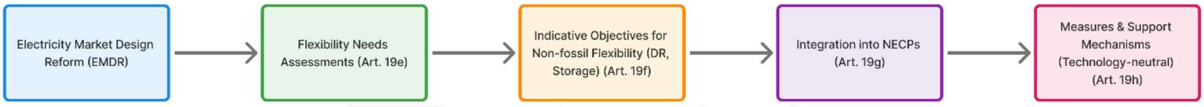
i. Legal Framework

A decarbonised electricity system can remain reliable only if it utilises flexibility from all available sources, including generation, storage, and demand, through transparent and competitive market mechanisms. The 2019 Clean Energy Package (CEP) translated this principle into law, embedding flexibility as a structural component of both market design and network governance. The Electricity Directive (EU) 2019/944 (hereinafter 'the Electricity Directive') and the Electricity Regulation (EU) 2019/943 (hereinafter 'the Electricity Regulation') together transform flexibility from an operational option into a structural obligation. The Electricity Directive foresees the right of final customers, aggregators, and storage operators to participate directly in all electricity markets. It also requires TSOs and DSOs to procure flexibility services competitively whenever this is more efficient than conventional grid reinforcement. The Regulation complements these provisions by mandating non-discriminatory balancing markets and recognising demand-side response and storage as resources equivalent to generation in all market processes.

Since 2019 the EU has progressively refined its regulatory framework to translate the concept of system flexibility into measurable policy instruments. The Electricity Market Design Reform (EMDR) embeds new governance tools to integrate flexibility into both planning and investment processes. Under Articles 19(e) to 19(h) of the amended Electricity Regulation, Member States are required to conduct national flexibility-needs assessments in accordance with a common methodology, determining the magnitude, temporal and locational distribution, and types of flexibility needed for cost-effective integration of renewable generation. Based on these assessments, Member States must establish an indicative national objective for non-fossil flexibility, including demand-response and energy-storage contributions. These objectives, together with the supporting measures, are expected to be reflected in the National Energy and

Climate Plans (NECPs).[11] Where market signals alone prove insufficient to meet the identified flexibility needs, Member States may apply non-fossil flexibility support schemes under Article 19(g), subject to the design principles laid out in Article 19(h), in order to safeguard competition, cost-effectiveness, and investment certainty.

EU Flexibility Governance Flow



Another important milestone in the process of harmonising flexibility markets across Europe was the joint proposal by the EU DSO Entity and ENTSO-E for a *Network Code on Demand Response*, submitted to ACER for review in May 2024.[12] The draft code seeks to standardise flexibility products, define baseline methodologies for their participation, and establish rules for aggregator access and participation by distributed energy resources. It further envisages enhanced data-exchange mechanisms and coordination between transmission and distribution system operators. Once adopted and implemented, these provisions will provide the technical and procedural foundations for a more integrated European framework for market-based procurement of demand-side flexibility.

As a result of these legislative and technical efforts, flexibility is evolving from a conceptual aspiration into an operational foundation of the European power system. The next phase of progress depends on effective national implementation, where regulatory principles must be translated into market practice and measurable system outcomes.

ii. Implementation across Europe

Since the adoption of the CEP, the practical implementation of flexibility mechanisms across Europe has accelerated. Local flexibility markets are also becoming an integral part of network planning and operation in an increasing number of Member States, as DSOs increasingly use flexibility services to defer network reinforcement, manage congestion, and enhance the efficiency of grid investment. Pilot projects and market platforms indicate a steady expansion of distributed flexibility resources, supported by the rapid growth of battery storage.[13] Europe's total battery energy storage capacity reached approximately 61 GWh by the end of 2024, with utility-

[11] European University Institute. (2021). *Flexibility in power systems*. Florence School of Regulation. Available at: https://fsr.eui.eu/flexibility-in-power-systems/

[12] ENTSO-E, EU DSO Entity, & ACER. (2025). *Network Code on Demand Response and related initiatives* [Policy and regulatory updates]. Available at: https://www.entsoe.eu/news/2024/05/08/dso-entity-and-entso-e-submit-joint-network-code-on-demand-response/

[13] Centre on Regulation in Europe (CERRE) (2025). *Flexibility in the Energy Sector.* Available at: https://cerre.eu/wp-content/uploads/2025/05/CERRE-Report_Flexibility_Final.pdf

scale systems providing an ever-larger share of frequency-containment and intraday balancing services.[14]

To operationalise these developments, countries have adopted different designs for procuring and integrating flexibility services. Although approaches vary, they are generally built on common principles of competitive procurement, technology-neutral eligibility, and transparency. Three main models can be distinguished across Europe:

a. DSO-led local flexibility tenders, as in the United Kingdom, the Netherlands, and France, which procure distributed flexibility competitively to manage local congestion and defer network reinforcement;
b. Aggregator-based balancing/capacity mechanisms, such as Italy's UVAM, mobilise demand response and distributed energy resources for balancing and capacity markets; and
c. Integrated redispatch frameworks, such as Germany's Redispatch 2.0, embed procurement directly in coordinated TSO–DSO operations.

Several countries have introduced or piloted DSO-led local flexibility tenders and joint TSO–DSO congestion-management platforms, such as Piclo Flex in the United Kingdom, GOPACS in the Netherlands, and UVAM in Italy.[15] The table below illustrates examples of national flexibility frameworks across Europe.

[14] SolarPower Europe. (2025, February 12). *New report: European battery storage grows 15 % in 2024 — EU Energy Storage Action Plan needed.* SolarPower Europe. https://www.solarpowereurope.org/press-releases/new-report-european-battery-storage-grows-15-in-2024-eu-energy-storage-action-plan-needed
[15] Centre on Regulation in Europe (CERRE) (2025). *Flexibility in the Energy Sector.* Available at: https://cerre.eu/wp-content/uploads/2025/05/CERRE-Report_Flexibility_Final.pdf

Examples of National Flexibility Frameworks in Europe

Country	Platform	Core Function	Quantitative Scale	Institutional Highlights / Sources
United Kingdom	**Piclo Flex** – national marketplace used **by DSOs and ESO (National Grid)**	Competitive procurement of local flexibility for congestion and voltage management	> 3 GW contracted flexibility; > 30 GW registered flexible capacity from 250 + flex sellers	Used in 14 geographic areas in UK operated by 6 DSOs. Flexibility integrated into regulated business plans as non-wire alternatives
Netherlands	**GOPACS** (TenneT – TSO + regional DSOs)	Integrates intraday trading with local-congestion bids to avoid redispatch costs	114–181 GWh traded flexibility (2024); ≈ €10 million annual redispatch savings	Automated link with EPEX Spot; activation time < 15 min; operated nation-wide under TenneT coordination
Italy	**UVAM** – Virtual Mixed Units (Terna – TSO)	Aggregator framework pooling distributed energy resources and flexible loads for balancing and capacity markets	272 UVAMs enabled and managed by 32 aggregators (2021), qualified for 1,565 MW upward and 194 MW downward balancing capacity; ≈ 425 MW flexibility assigned via 2022 auction	Integrated into Terna's TIDE balancing platform and eligible for participation in the MACSE capacity market. UVAMs allow aggregators to combine storage, industrial loads, and renewables for market-based balancing.
France	**Flexibilité Programmes** (Enedis – DSO & RTE – TSO)	Market-based procurement of balancing and local-flexibility services from demand-side resources and storage	In 2023, demand-side response provided ≈ 10 % of FCR, 1 % of aFRR, and 36 % of mFRR/RR procured volumes; ≈ 500 MW of battery storage certified for FCR and 28 MW for aFRR (end 2023); Enedis local-flexibility tender (2024) procured ≈ 46 MW capacity across 30 departments	RTE and Enedis jointly develop a national flexibility ecosystem combining balancing-market participation and DSO-led local tenders. Flexibility and hosting-capacity maps are published to support congestion management and integration of DERs
Germany	**Redispatch 2.0 Framework** (TSOs + DSOs)	Mandatory redispatch of all ≥ 100 kW units through a coordinated TSO–DSO platform	Total congestion-management measures (redispatch + feed-in management + countertrading) ≈ 6.7 TWh in Q3 2023 → ≈ 5.3 TWh in Q3 2024 (-22 %); annual cost ≈ € 2.7 billion (2024)	Operates via the Netzdatenaustausch data hub for TSO–DSO coordination and automated activation of flexibility measures. Enables pre-emptive redispatch based on forecast grid congestion and data-driven balancing, reducing curtailment and enhancing distributed flexibility integration.

Sources: EEA-ACER (2024); CERRE (2025); European Parliament (2025); Terna (2023); RTE (2023); Arosio & Falabretti (2023); Piclo (n.d.); Enedis (2024); (Bundesnetzagentur (2024)

Empirical evidence confirms that flexibility integration generates substantial economic benefits. A 2022 study on demand-side flexibility in the EU estimates that €11.1–29.1 billion in annual investment needs could be avoided across the EU-27 between 2023 and 2030 through the deployment of flexibility solutions at the distribution level.[16] This represents 27 percent to 80 percent of currently forecasted grid-investment needs (€253–283 billion) in network upgrades otherwise required to integrate new loads and renewable capacity.[17] Modelling for the German system finds that coordinated TSO–DSO activation of DER flexibility could reduce redispatch costs by approximately €300 million by 2030 under high-RES scenarios.[18] Other European

[16] DNV. (2022). *Demand-side flexibility in the EU: Quantification of benefits in 2030*. Available at: https://www.dnv.com/publications/demand-side-flexibility-quantification-of-benefits-in-the-eu-232342/
[17] DNV. (2022). *Demand-side flexibility in the EU: Quantification of benefits in 2030*. Available at: https://www.dnv.com/publications/demand-side-flexibility-quantification-of-benefits-in-the-eu-232342/
[18] Pearson et al. (2022). The value of TSO-DSO coordination in re-dispatch with flexible decentralized energy sources: Insights for Germany in 2030. *Applied Energy*, 326, 119905. Available at: https://doi.org/10.1016/j.apenergy.2022.119905

analyses estimate that full activation of flexibility resources could save grid operators up to €4 billion per year in congestion-management and system-operation costs by 2030.[19]

At the transmission level, flexibility procurement is increasingly coordinated between TSOs and DSOs through interoperable digital platforms. Two European initiatives, Equigy and CoordiNet, demonstrate various approaches to the coordination challenge.

The Equigy crowd-balancing platform (Germany, Austria, Netherlands, Italy, Switzerland) enables small-scale and aggregated flexibility, such as household batteries and electric-vehicle fleets, to participate in balancing markets (FCR, aFRR, mFRR). By using a common digital interface, Equigy validates activations across borders to prevent double contracting and effectively connects distributed flexibility with system-level markets, establishing a model for cross-TSO interoperability.[20]

The CoordiNet project (Sweden, Spain, Greece) tested operational coordination between TSOs and DSOs for local congestion and balancing services. Its Swedish pilot (sthlmflex) established a *hierarchical dispatch* model, in which the DSO first procures local flexibility to relieve distribution-level constraints or voltage issues, and only then releases remaining capacity to the TSO's mFRR market.[21] The project also introduced a traffic-light signalling scheme (green for normal operation, amber for market-based activation, red for mandatory curtailment) providing clear operational hints and avoiding double activation or conflicting instructions.[22]

In practice, coordination between TSOs and DSOs is evolving toward two principal models. Hierarchical dispatch, as tested in Sweden, gives priority to local congestion management before national balancing, while co-optimisation models use shared algorithms to evaluate both local and system-wide needs in real-time. These multi-layered market designs require advanced data exchange, agreed activation hierarchies, and common settlement procedures to ensure resources are used efficiently without duplication.

iii. Aggregation and Demand-Side Flexibility

Demand-response schemes led by aggregators are emerging as a key mechanism for mobilising flexibility from consumers. In such models, an independent company, or in some cases a retail supplier, aggregates the flexible capacity of multiple customers and offers it as a single,

[19] Eurelectric & EY. (2024). *Grids for Speed: Creating the distribution grid for the energy transition*. Available at:
[20] Centre on Regulation in Europe (CERRE) (2025). *Flexibility in the Energy Sector.* Available at: https://cerre.eu/wp-content/uploads/2025/05/CERRE-Report_Flexibility_Final.pdf
[21] *Ibid.*
[22] BDEW. (2015). *Smart grid traffic light concept: Design of the energy system of the future.* German Association of Energy and Water Industries (BDEW). Available at https://www.bdew.de/media/documents/20150310_Smart-Grid-Traffic-Light-Concept.pd

dispatchable portfolio to the system operator.[23] From a regulatory perspective, baseline accuracy remains the foundation of reliable demand response settlement. The baseline represents the consumption or generation that would have occurred without activation and forms the reference for verifying delivered flexibility and settlement. Defining a "normal" baseline is complex, as consumption depends on weather, operations, and user behaviour, requiring a balance between simplicity, fairness, and data accuracy.

European pilots illustrate how verification practices have evolved from qualitative judgment to structured, automated approaches. In Sweden's CoordiNet project, early demonstrations relied on trust-based validation, later replaced by automated methods such as historical baselines, meter-before/meter-after comparisons, and forecast-versus-metered evaluations. [24] Each method showed trade-offs: while automation improves consistency, temperature-sensitive loads like heat pumps proved difficult to capture with static formulas.[25] Subsequent pilots refined these ideas. sthlmflex and Effekthandel Väst combined statistical baselines (five-day average) with user-defined alternatives, while the latter's MaxUsage product removed the baseline entirely, settling performance against a predefined power cap.[26] E.ON's BeFlexible introduced resource-specific rules, zero baseline for batteries and generators, and self-declared patterns for consumer, ensuring proportionality and clarity.[27]

These experiences show that no single baseline fits all resource types. Accurate forecasting, adaptive updates, and transparent dialogue between DSOs and flexibility service providers are essential for credible validation frameworks.

By contrast, California's mature demand-response programs use the "10-of-10" baseline, averaging the ten most recent non-event days and applying a same-day temperature adjustment. A review prepared for the California Independent System Operator found that while simple and auditable, this method can misstate delivered flexibility.[28] Event-related rebound effects distort

[23] Saviuc, I., Zabala López, C., Puskás-Tompos, A., Rollert, K., & Bertoldi, P. (2022). *Explicit demand response for small end-users and independent aggregators: Status, context, enablers and barriers* (EUR 31190 EN; JRC129745). Publications Office of the European Union. Available at: https://doi.org/10.2760/625919

[24] Etherden, N., Ruwaida, Y., & Hansson, K. (2022). *D4.7.2 – Final report of the Swedish demonstration: Ten key abilities for DSOs to unlock flexibility* (Version 1.0) [Project deliverable]. CoordiNet Consortium. Horizon 2020 Programme, Grant Agreement No. 824414. Available at: https://www.svk.se/siteassets/2.utveckling-av-kraftsystemet/forskning-och-utveckling/coordinet/coordinet_wp4_d4.7.2_final-report.pdf

[25] *Ibid.*

[26] Sweco & Energimarknadsinspektionen. (2025, April 7). *Kartläggning av lokala flexibilitetsmarknader* [Report]. Energimarknadsinspektionen. Available at: https://ei.se/download/18.6be87cd11961dff00ba48e1/1744696274662/Konsultrapport-Kartl%C3%A4ggning-av-lokala-flexibilitetsmarknader-Sweco.pdf

[27] *Ibid.*

[28] Recurve Analytics, Inc. (Glass, J., Suffian, S., Scheer, A., & Best, C.). (2022, February). *Demand Response: Advanced Measurement Methodology — Analysis of open-source baseline and comparison group methods to enable CAISO demand response resource performance evaluation.* Available at:

averages, adjustment caps limit accuracy during heatwaves, and the approach may even discourage continuous energy-efficiency efforts by lowering future baselines.[29] European pilots increasingly address these shortcomings by combining statistical transparent and context-sensitive approach, moving from fixed, one-size formulas toward dynamic, data-driven baseline systems better suited to diverse resources and real-time market conditions.

iv. Role of Independent Aggregators and Supplier–Aggregator Settlement

When an aggregator activates demand response, it changes both the customer's consumption and the supplier's energy position. Article 17 of the Electricity Directive provides states with the freedom to design supplier compensation mechanisms, provided that they are cost-based, proportionate, and non-discriminatory. Three main settlement models are now used in EU to keep suppliers neutral and define how aggregators are compensated:

a. Uncorrected model. No explicit adjustment to the supplier's balance; the aggregator's "negawatts" settle with the TSO or market operator. Used mainly for near-instantaneous services with negligible net energy, such as frequency containment;[30]
b. Corrected model with compensation. Consumers' metered load is ex-post corrected to a baseline, and the supplier receives payment for the avoided energy, often at a reference wholesale price;[31] and
c. Central settlement / Net-energy-transfer model. A neutral market operator shifts the activated energy volume from the supplier's BRP to the aggregator's BRP at a transparent wholesale reference price, ensuring neutrality without bilateral consent.[32]

The 2021 review found that most advanced Member States applied perimeter correction to address supplier imbalances and combine it with one of three compensation models, regulated, corrected, or contracted, to address foregone revenues.[33] Uncorrected settlement works best for low-energy products, such as FCR. Where compensation exists, it should strictly mirror actual costs and recognise system-wide benefits of demand response, in line with the Electricity Directive.

https://www.caiso.com/Documents/Demand-Response_Advanced_Measurement_Methodology_updated_Feb_2022.pdf

[29] *Ibid.*

[30] Nordic Energy Research. (2022, April). *The regulation of independent aggregators with a focus on compensation mechanisms* (Report No. NER 2022-04). By Aurora Sáez Armenteros, Hans de Heer, & Jørgen Bjørndalen. Oslo: Nordic Energy Research. Available at: https://doi.org/10.6027/NER2022-04

[31] RTE. (n.d.). *NEBEF compensation payment.* Portail Services RTE. Available at: https://www.services-rte.com/en/learn-more-about-our-services/nebef-compensation-payment.html

[32] *Ibid.*

[33] Schittekatte, T., Deschamps, V., & Meeus, L. (2021). The regulatory framework for independent aggregators. *The Electricity Journal, 34*(6), 106971. Available at: https://doi.org/10.1016/j.tej.2021.106971

v. Persistent challenges and lessons learned

Despite rapid progress, several systemic barriers still limit the scaling-up of flexibility across European electricity markets. These obstacles are interconnected: price distortions reduce investment, coordination gaps lower efficiency, and limited data access reduces participation. The following subsections summarise the main challenges and corresponding policy lessons.

Weak price signals make flexibility uneconomic — tariffs must reward when and where electricity is consumed.

Many Member States maintain network tariffs that are largely volumetric, failing to reflect the temporal or locational value of flexibility. Moreover, retail price regulation and wholesale interventions weaken the short-term price signals needed to incentivise demand-side and storage resources.[34] Adopting cost-reflective, time- and location-differentiated tariffs, and preserving dynamic pricing even during crisis measures, while safeguarding vulnerable consumers, is essential to make flexible resources commercially viable and to integrate them efficiently into system operations.

Fragmented coordination between TSOs and DSOs increases system costs — joint activation rules are needed.

Uncoordinated procurement of flexibility by transmission and distribution operators can lead to conflicting activations, duplication of resources, and inefficient use of distributed assets.[35] Even where coordination schemes exist, roles and activation hierarchies are frequently unclear. Establishing joint TSO–DSO planning and adopting harmonised activation protocols, such as the traffic-light or co-optimised dispatch models tested in EU pilots, can help avoid overlaps, improve transparency, and ensure that flexibility services are procured competitively and used where they deliver the greatest system value.

Limited digitalisation keeps consumers out of flexibility markets — data access and smart meters require universal adoption.

Incomplete smart meter deployment and weak interoperability prevent small consumers and new market actors from participating in flexibility markets. Even where meters are installed, restricted data access and the absence of real-time data-exchange functionalities hinder the

[34] European Parliament. (2025). *Increasing Flexibility in the EU Energy System.* Policy Department for Transformation, Innovation and Health, Directorate-General for Internal Policies. Available at: https://www.europarl.europa.eu/RegData/etudes/STUD/2025/769347/ECTI_STU(2025)769347_EN.pdf

[35] Schultis, D.-L., Doorman, G., & Tolstrup, K. (2024). *TSO–DSO coordination to leverage distributed flexibility: Requirements, design options, and our vision*. Magnus Energy. Available at: https://magnusenergy.com/wp-content/uploads/2025/03/brief-tso-dso-coordination.pdf

creation of dynamic, consumer-driven services.[36] Accelerating the full rollout of Electricity Directive-compliant smart meters, guaranteeing consumer data-sharing rights, and requiring suppliers to offer dynamic tariff contracts and aggregator access are critical to scaling participation.

Regulatory fragmentation limits scale — harmonised rules for storage and aggregation are essential for a single flexibility market.

Differences in how Member States define and regulate aggregators, storage operators, and dual-use assets, such as batteries or vehicle-to-grid systems, continue to fragment the internal flexibility markets. In several jurisdictions, electricity storage is still charged network tariffs twice (once for charging and again for discharging), while inconsistent qualification and settlement procedures restrict aggregator participation.[37] These regulatory discrepancies prevent business models from scaling across borders and markets.[38] Establishing harmonised, technology-neutral definitions for storage and aggregation, eliminating double charging of network tariffs, and aligning baseline and settlement rules will be essential to achieve an integrated European flexibility framework.

Weak incentives keep local flexibility at a small scale — DSOs need regulatory incentives to procure services.

In Member States, DSOs continue to lack the legal and financial incentives to procure flexibility as an alternative to traditional grid reinforcement. Under rate-of-return regulation, the Averch–Johnson effect often rewards capital expenditure over operational efficiency, incentivising DSOs to favour grid expansion instead of contracting distributed resources. Where flexibility frameworks exist, procurement often remains confined to isolated pilots rather than integrated into routine network planning. Integration of non-wire solutions into regulatory obligations and requiring DSOs to conduct transparent cost–benefit tenders comparing flexibility with reinforcement would facilitate the use of flexibility in network planning.[39] Furthermore, ensuring

[36] European Environment Agency (EEA) & Agency for the Cooperation of Energy Regulators (ACER). (2024). *Flexibility solutions to support a decarbonised and secure EU electricity system.* Publications Office of the European Union. Available at: https://www.eea.europa.eu/publications/flexibility-solutions-support-decarbonised-secure

[37] Agency for the Cooperation of Energy Regulators (ACER). (2023). *Report on electricity transmission and distribution tariff methodologies in Europe*. Available at: https://www.acer.europa.eu/sites/default/files/documents/Publications/ACER_electricity_network_tariff_report.pdf

[38] European Parliament. (2025). *Increasing Flexibility in the EU Energy System.* Policy Department for Transformation, Innovation and Health, Directorate-General for Internal Policies. Available at: https://www.europarl.europa.eu/RegData/etudes/STUD/2025/769347/ECTI_STU(2025)769347_EN.pdf

[39] European Parliament. (2025). *Increasing Flexibility in the EU Energy System.* Policy Department for Transformation, Innovation and Health, Directorate-General for Internal Policies. Available at: https://www.europarl.europa.eu/RegData/etudes/STUD/2025/769347/ECTI_STU(2025)769347_EN.pdf

CAPEX/OPEX-neutral cost recovery in tariff regulation would remove financial disincentives and align distribution-system performance targets with system-wide efficiency goals.[40]

Retiring conventional capacity creates flexibility gaps — long-duration and stability services must be planned and incentivised.

The progressive phase-out of fossil fuel and conventional dispatchable plants is impacting system inertia and reducing the availability of seasonal or long-duration flexibility. Existing market mechanisms and planning tools still focus largely on short-term balancing, overlooking multi-hour and multi-day storage requirements. National Flexibility Needs Assessments should explicitly quantify long-duration and stability-related flexibility requirements and integrate them into network-development and capacity-planning processes.[41] Targeted support for diverse storage technologies and system-stability resources, such as inertia and voltage-support services, is essential to maintain reliability in a fully decarbonised power system.

Cross-border balancing remains fragmented — market products and platforms are not fully aligned.

Despite ongoing efforts toward European-wide balancing-market coupling, several TSOs continue to procure national products that differ in design and restrict the participation of smaller or distributed flexibility resources. Minimum bid sizes above the EU threshold and early gate-closure times still apply in some markets, limiting responsiveness and cross-border exchange of balancing services.[42] As a result, available flexibility is not efficiently shared across the region, and the benefits of an integrated balancing market remain only partially realised. Ensuring consistent participation rules and harmonised balancing-product design, including smaller minimum bid sizes and shorter bid-validity periods, would enable broader access for distributed resources and enhance the efficiency of cross-border balancing.[43]

Addressing these persistent challenges requires aligning market rules, tariff design, and regulatory incentives. The table below summarises the principal challenges and corresponding reform directions emerging from EU experience.

[40] DNV & Agora Energiewende. (2024). *Boosting flexibility in distribution grids: Technical solutions and regulatory frameworks for a decarbonised power system*. Berlin, Germany: Agora Energiewende. https://www.agora-energiewende.org/fileadmin/Projekte/2023/2023-23_EU_boosting_flexibility/24-0184_Rev.2_DNV_Report_Agora_Energiewende_-_Boosting_flexibility_in_distribution_grids.pdf

[41] European Parliament. (2025). *Increasing Flexibility in the EU Energy System.* Policy Department for Transformation, Innovation and Health, Directorate-General for Internal Policies. https://www.europarl.europa.eu/RegData/etudes/STUD/2025/769347/ECTI_STU(2025)769347_EN.pdf

[42] Agency for the Cooperation of Energy Regulators (ACER) (2025). *Unlocking flexibility: No-regret actions to remove barriers to demand response: 2025 monitoring report*. https://www.acer.europa.eu/sites/default/files/documents/Publications/2025-ACER-Unlocking-flexibility-demand-response-barriers.pdf

[43] *Ibid.*

Key Barriers and Reform Directions for Flexibility Deployment in the EU

Barrier	Typical Impact	Reform Direction
Volumetric network tariffs and regulated retail prices	Weak temporal and locational price signals for flexibility	Introduce dynamic time-of-use and locational tariffs; maintain cost-reflective pricing even during crisis measures while protecting vulnerable consumers
Fragmented TSO–DSO coordination	Conflicting activations and inefficient use of distributed assets	Establish joint planning and shared activation protocols (e.g. traffic-light or co-optimised dispatch models) to prevent overlaps and conflicting activations
Regulatory fragmentation for storage and aggregation	Unequal treatment, double network charging, and inconsistent qualification across Member States	Harmonise definitions, baseline and settlement rules; apply single-charging principle
Misaligned DSO incentives under rate-of-return regulation	Curtailment or grid reinforcement preferred over flexibility procurement	Embed non-wire solutions into regulatory obligations; ensure CAPEX/OPEX-neutral cost recovery; include flexibility performance indicators in incentive-based revenue-cap regulation
Incomplete smart-meter rollout and limited data access	Low consumer participation and limited aggregator access	Achieve full functionality, guarantee consumer data-sharing rights, and mandate interoperable data standards and dynamic-tariff options
Inadequate planning for long-duration and stability flexibility	System-stability risks as dispatchable capacity retires	Integrate long-duration, inertia, and voltage-support needs into flexibility needs assessments and capacity-planning tools; support diverse storage technologies
Fragmented cross-border balancing markets	Limited exchange of balancing services and restricted participation of smaller or distributed resources	Harmonise balancing-product design and participation rules in line with EU standards; reduce minimum bid sizes and shorten gate-closure times to enable efficient cross-border activation of flexibility

vi. Barriers and Opportunities in the Energy Community

The Study on Flexibility in the Energy Community found that flexibility needs are expected to increase significantly by 2030 and 2040 across all timescales as the penetration of renewable electricity grows.[44] The study concluded that these rising flexibility requirements necessitate the introduction of new market mechanisms and reforms to facilitate the participation of distributed resources and demand response. Although hydropower remains the main source of flexibility in the region, its availability is constrained by hydrological conditions and cannot fully compensate for the growing daily and weekly variability associated with solar PV expansion. Cross-border interconnections represent a major potential source of flexibility. However, a considerable share

[44] Trinomics & Artelys. (2022). *Study on Flexibility in the Energy Community*. Available at: https://www.energy-community.org/dam/jcr:2db406e5-294f-4285-9209-ec90349ce5cb/Flexiblity_EnCreport_0722.pdf

of their capacity remains unused because of national grid congestion and regulatory barriers, which limit opportunities for cross-border exchange of flexibility.[45]

The key barriers identified through input are outlined in the table below, along with their implications for flexibility deployment.

Key Barriers for Flexibility in the Energy Community

Category	Barrier	Implication
Planning and Investment	No cost–benefit methodologies to compare flexibility procurement with grid reinforcement	Grid investments prioritised over market solutions
Storage Regulation	Double charging and unclear ownership limits	Discourages business models for storage operators
Aggregation Frameworks	Absence of licensing, baselines, and settlement rules	Independent aggregators remain inactive
Digitalisation	Smart-meter coverage < 10 % in most CPs; no common data standards	Restricts DSR and data access
System Coordination	Lack of formal TSO–DSO data-exchange procedures	Prevents integrated congestion management
Consumer Incentives	Flat or regulated tariffs with weak price signals	No motivation for consumers to provide flexibility

Addressing these barriers requires targeted legal, regulatory, and market actions. The following priority measures outline the practical steps Contracting Parties can take to translate flexibility from policy design into operation:

a. *Build the Legal and Institutional Framework*

- Finalise secondary legislation translating new energy law provisions on flexibility into market products, technical standards, and procurement rules.
- Introduce national flexibility needs assessments, setting indicative targets for non-fossil flexibility such as storage and demand response.
- Support DSO procurement by integrating flexibility assessments into grid-planning processes and applying transparent cost–benefit methodologies comparing flexibility with grid reinforcement. Embed cost-recovery mechanisms in tariff regulation.

b. *Develop Flexibility Markets*

[45] Trinomics & Artelys. (2022). *Study on Flexibility in the Energy Community*. Available at: https://www.energy-community.org/dam/jcr:2db406e5-294f-4285-9209-ec90349ce5cb/Flexiblity_EnCreport_0722.pdf

- Enable independent aggregators through clear settlement and baseline rules that allow balance-neutral participation across all markets.
- Clarify ownership and participation rights for storage and eliminate double network charging.
- Open flexibility procurement to regional and cross-border participation to expand resource sharing and strengthen system resilience.

c. Empower Consumers and Prosumers

- Introduce cost-reflective, dynamic tariffs that reward load shifting and distributed storage, supported by automated consumer tools.
- Facilitate active participation of consumers and prosumers through awareness programmes, supplier obligations, and simplified switching and data-access procedures.
- Promote energy communities as collective flexibility actors capable of providing local balancing and resilience services.

d. Digitalise the Grid and Enable Data-Driven Operations

- Accelerate smart-meter rollout to achieve full functionality with real-time data access and interoperability with aggregator platforms.
- Formalise TSO–DSO coordination protocols and introduce flexible connection agreements to optimise grid use and integrate variable renewables.
- Deploy targeted, technology-neutral incentives for non-fossil flexibility where market signals remain insufficient.

Taken together, these measures can provide an effective framework for translating flexibility from legislative concept into operational practice. They will help establish the legal clarity, market functionality, consumer engagement, and digital foundation required to make flexibility an integral feature of power-system management across the Energy Community.

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