

ANALYTICAL REPORT

Overview of RES development in electricity market: obstacles and general recommendations

2022

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INTRODUCTION

Renewable energy is a critical sector of Ukraine's energy policy. Its development is set forth in applicable legislation, including strategic documents. Renewable (also called "green") energy has a crucial role both nationally and locally. The benefits it offers include:

- energy independence and phasing out energy source imports;
- strengthening the country's energy security overall and in each local community individually;
- climate change mitigation and adaptation;
- reduced negative environmental impact;
- upgraded energy infrastructure.

As Russia began its full-scale military invasion into Ukraine on February 24, 2022, all these goals and aspirations have become yet even more crucial for the country. War forced us to admit vulnerable places of the Ukrainian energy sector as a result of the enemy's attacks on infrastructure and network elements. Millions of people and companies in cities and local communities all over the country have been left without electricity. Emergency shutdowns are introduced as a last resort measure to manage stability of the energy system and achieve the balance between energy production and energy consumption. Decentralized energy supply solutions, in particular those that involve hybrid systems of energy generation and accumulation from renewable sources, are becoming more and more of interest for both industrial and household consumers. Renewable energy is also found in action plans for Ukraine's post-war recovery and development¹.

The countries that follow the European Green Deal demand "green" energy. These countries include the neighboring Poland, where coal accounts for a significant share of energy production. Europe is facing new challenges due to Russia's full-scale invasion into Ukraine, but not due to it alone. Before, transition from fossil fuels to carbon-neutral energy was only addressed from the climate crisis standpoint; but now the entire democratic world united against the Russian energy that finances the war in Ukraine and is Russia's leverage to blackmail and influence the European Union (EU) because of its support to Ukraine. Russian oil and gas should be gradually substituted with new technologies (such as hydrogen) and more of renewable energy sources (RES).

In view of all this, there are more than enough pre-conditions for the future development of renewable energy in Ukraine.

In this report we provide a brief review of the key factors that impact the RES development in Ukraine's energy sector on various stages. Based on this analysis, we make conclusions and provide recommendations for RES support and maintaining the investor's focus on this sector during the post-war recovery. The recommendations were produced taking into consideration the conditions both for the existing RES projects that were launched before the active phase of Russia's war against Ukraine and are being actively implemented, and for the future RES projects. This study does not cover the sector of private households that will be addressed separately.

¹ For materials of the Energy Security Working Group to Draft Plan of Ukraine's Recovery of the National Council for Ukraine's Post-War Recovery, see <https://www.kmu.gov.ua/storage/app/sites/1/recoveryrada/ua/energy-security.pdf>.

Section 1. Goals and mechanisms of RES support in Ukraine

2008 is a starting point to analyze how Ukraine's renewable energy has been developing; because it was back then when the legislation was introduced² to create incentives for the production of electricity from renewable sources using the feed-in tariff mechanism, also known as "feed-in" tariff. It is applied, regardless of capacity, to generating facilities that produce electricity from solar, wind, biomass, biogas, geothermal energy, as well as hydro power plants with capacity below 10 MW.¹

Ukraine has been a full-fledged member of the Energy Community since February 1, 2011³. In line with the relevant commitments⁴, **the National Action Plan for Renewable Energy Development (2020 NAP)** was approved⁵; the Plan set the **target to increase the RES share up to 11% of the overall consumption by 2020**.

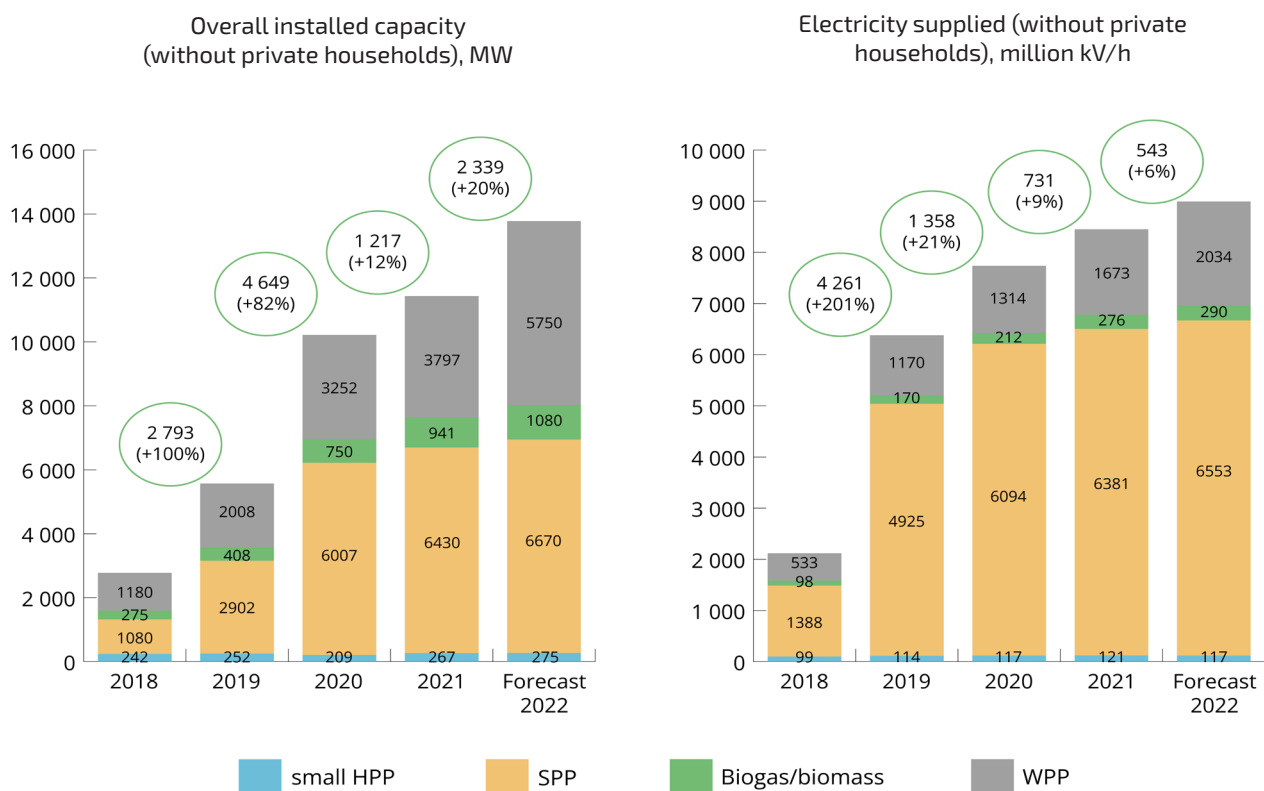


Fig. 1. RES development in numbers: actual 2018 to 2021 data and expected 2022 data (without installations of private households). Source: NERC 2021 annual report bulletin, June 2022.

² Law of Ukraine on Amendments to Certain Laws of Ukraine as Applicable to Feed-In Tariff N 601-VI of September 25, 2008: <https://zakon.rada.gov.ua/laws/show/601-17/sp:max50:nav7:font2#Text>.

Law of Ukraine "On amendments to the Law of Ukraine on Electricity to promote the electricity production from alternative energy sources" N 5485-VI of July 21, 2020. <https://zakon.rada.gov.ua/laws/show/5485-17#Text>.

Law of Ukraine on Electricity Market N 2019-VIII of April 13, 2017: <https://zakon.rada.gov.ua/laws/show/2019-19#Text>.

³ Law of Ukraine "On ratification of the Protocol of Ukraine's Accession to the Energy Community Treaty": <https://zakon.rada.gov.ua/laws/show/2787-17#Text>.

⁴ According to the Energy Charter Treaty and Protocol to Decision D/2012/04/MC-EnC on implementation of Directive 2009/28/EC.

⁵ Approved by Resolution of the Cabinet of Ministers of Ukraine N 902-x of October 1, 2014.

Also, **Ukraine's 2035 Energy Strategy envisages that the share of RES will grow up to 17% by 2030 and up to 25% by 2035⁶.**

Additionally, on July 30, 2021, the Government approved the **Updated National Determined Contribution under the Paris Agreement (NDC2)⁷**. To achieve the established goal, **the share of RES must reach 30% by 2030.**

However, draft **2030 National Action Plan for Renewable Energy Development (2030 NAP)⁸ sets the relevant RES target at 27%.**

Therefore, **the RES development targets stated in the draft 2030 NAP must be revised in accordance with the NDC2, and addressed in the updated 2050 Energy Strategy.**

The total share of RES in energy production grew from 7.9% in 2015 to 11.3% in 2020, taking into account hydropower plants (HPPs) and pumped storage power plants (PSPPs) with capacity above 10 MW, or so called large HPPs⁹.

According to the Regulatory Authority¹⁰, as of the beginning of 2022 the actual share of RES in the overall energy generation was 14.7% with HPPs and PSPPs, and 8% without HPPs and PSPPs. Total capacity of RES plants is 11,435 MW, including: solar power plants 6,430 MW; wind power plants 3,797 MW, biogas and biomass 941 MW, small hydro power plants 267 MW. Additionally installed capacity of all generating installations of private households: 1,200 MW. Annual output of RES electricity (excluding generating installations of private households) was 11,436 million kWh. This led to overachieving the goals of Ukraine's 2035 Energy Strategy.

Dynamics of RES development in 2018 to 2021 is shown on Fig. 1 (excluding large HPPs, i.e. only the generating facilities to which feed-in tariff mechanism applies).

1.1. General description of the main support mechanism

Such development of RES was made possible by the approved mechanism of support¹¹ that incorporates two main elements:

- 1) RES producers selling electricity to State Enterprise "Guaranteed Buyer" (selling electricity at feed-in tariff)¹²;
- 2) special duty of the Guaranteed Buyer that is fulfilled as a service to increase the share of electricity production from RES for the benefit of the transmission system operator (TSO, Ukrenergo) (Special Duty Service).

⁶ Ruling of the Cabinet of Ministers of Ukraine "On approval of Ukraine's 2035 Energy Strategy "Security, Energy Efficiency, Competitiveness" N 605-r of August 18, 2017.

⁷ Ruling of the Cabinet of Ministers of Ukraine "On approval of the Updated National Determined Contribution of Ukraine under the Paris Agreement" N 868-r of July 30, 2021: <https://www.kmu.gov.ua/npas/pro-shvalennya-onovlenogo-nacionalno-viznachenogo-vnesku-ukrayini-do-parizkoyi-t300721>.

⁸ **Draft 2030 NAP** published on the State Agency of Ukraine for Energy Efficiency and Energy Savings' website on October 19 <https://sae.gov.ua/uk/content/elektronni-consultatsii>.

⁹ According to draft Analytical Review of Ukraine's updated national determined contribution under the Paris Agreement, April 2021.

¹⁰ BULLETIN TO NERC'S 2021 ANNUAL REPORT (2021 Annual Performance Report was approved at the open meeting of the Commission on May 31, 2022 (NERC resolution N 556).

¹¹ In accordance with the Law of Ukraine on Electricity Market, and the Law of Ukraine on Alternative Energy Sources.

¹² Electricity selling business requires licensing in accordance with the Law of Ukraine on Licensing of Certain Types of Business, with due regard of the applicable provisions of the Law of Ukraine on Electricity Market.

Due to this mechanism, the RES producers operating under feed-in tariff can sell all generated electricity to the Guaranteed Buyer (a state enterprise established by the Cabinet of Ministers of Ukraine for the special duty purposes)¹³. Also, the state provides the following guarantees to such producers:

- 1) feed-in tariff shall not be revised before December 31, 2029¹⁴;
- 2) compensation for the electricity that was not supplied as a result of the transmission system operator's commands to reduce the load¹⁵.

The Guaranteed Buyer re-sells the electricity it purchased at feed-in tariff at market rates on organized segments of the electricity market. If payments to the RES producers exceed the market selling price, the Guaranteed Buyer bills the difference to the transmission system operators as a special duty service fee.

In this case the transmission system operator may recover the costs associated with the special duty service fee from consumers at a rate equivalent to electricity transmission tariff.

Fig. 2 demonstrates various operations that can take place within the RES support mechanism.

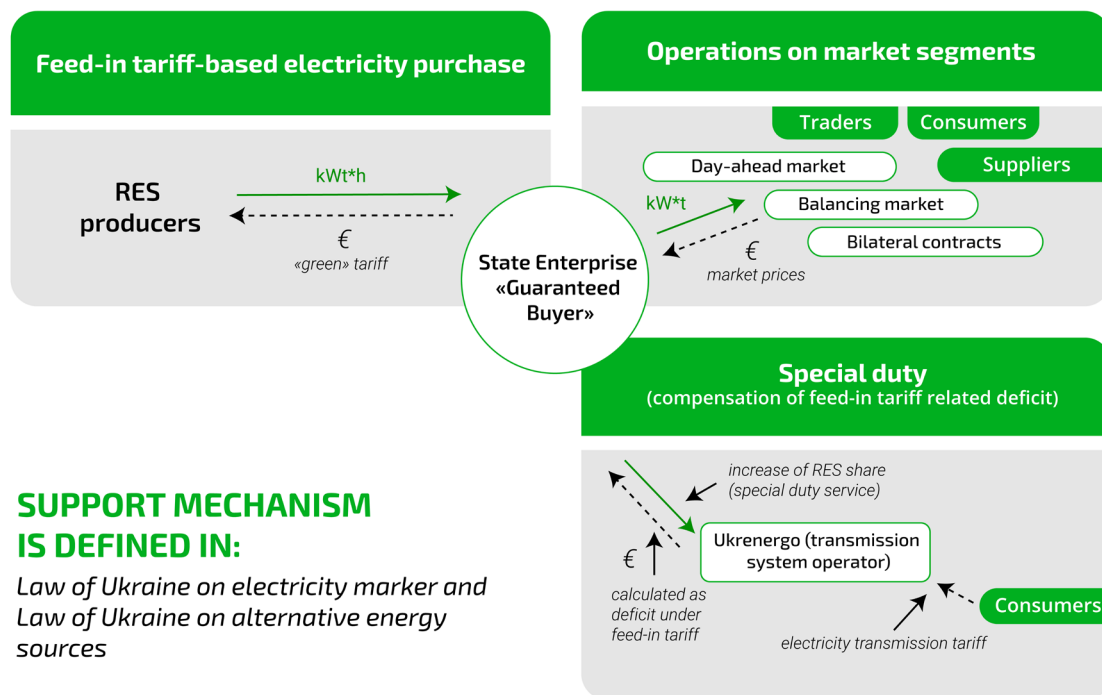


Fig 2. Feed-in tariff based RES support mechanism

Below we are reviewing each element of the feed-in tariff based RES support mechanism.

1.1.1. Feed-in tariff

Feed-in (“green”) tariff is set by the National Energy and Utility Regulatory Commission of Ukraine (NEURC) using the formula given in Article 9-10 of the Law of Ukraine on Alternative Energy Sources.

¹³ A designated state enterprise, “Guaranteed Buyer”, was tasked with the Guaranteed Buyer’s role referred to in Article 65 of the Law of Ukraine on Electricity Market, and Resolution of the Cabinet of Ministers of Ukraine N 324 of April 17, 2019.

¹⁴ Clause 1, Article 9-4 of the Law of Ukraine on Alternative Energy Sources.

¹⁵ Clause 5, Article 68 of the Law of Ukraine on Electricity Market.

Feed-in tariff is calculated as a retail electricity tariff for consumers as of 2009 (approximately 5.38 Euro cents per 1 kV/h) multiplied by the feed-in tariff coefficient that is set by Law depending on the relevant energy source based on the commissioning date of the power plant.

After the NERC has set the feed-in tariff, it remains applicable and unchanged until January 01, 2030, and will be reviewed quarterly based on the official UAH to EUR exchange rate established by the National Bank of Ukraine (NBU).

The Regulatory Authority may additionally set a 5% or 10% increment to the feed-in tariff if the producer provides sufficient evidence, as required by applicable laws of Ukraine, that the generating facility has certain equipment of Ukrainian origin¹⁶.

1.1.2. Supplies of electricity to the Guaranteed Buyer

For electricity to be sold at feed-in tariff, the RES producers must:

- become participants of the electricity market;
- sign a standard form feed-in Power Purchase Agreement (PPA) with the Guaranteed Buyer;
- join the Guaranteed Buyer's balancing group by signing an agreement;
- submit hourly electricity output schedules to the Guaranteed Buyer on daily basis.

The procedure for the Guaranteed Buyer's purchase of electricity produced from RES and the standard form of Power Purchase Agreement are approved by the NEURC Resolution N 641 of April 26, 2019.

This agreement imposes on the Guaranteed Buyer an obligation to offtake all electricity produced by the RES producers at the feed-in tariff set by the NEURC. In turn, the RES producer must sell its full power output to the Guaranteed Buyer only within the entire feed-in tariff effective period (until January 01, 2030).

No party may make any changes or amendments unless the Regulatory Authority (NEURC) makes the relevant changes to the standard form of this agreement. It may only be terminated by consent of both parties, or by a court judgment made under the applicable laws¹⁷.

1.1.3. Responsibility for imbalances

The Market Rules¹⁸ define that all market participants are responsible for their electricity imbalances (the difference between forecasted and actual electricity outputs).

¹⁶ NERC resolution N 2932 of December 10, 2015.

¹⁷ Case-law of the Supreme Court of Ukraine shows that unless otherwise envisaged in the agreement court may terminate the agreement in case of a significant breach of its terms and conditions by either party as set forth in Article 651 of the Civil Code of Ukraine; or in case of any essential change in the circumstances that the parties relied on when entering into the agreement (Article 652 of the Civil Code of Ukraine); or as otherwise directly governed in the applicable law or in the agreement.

¹⁸ Clause 1.5.1 of the Market Rules approved by the National Energy Regulation Commission N 307 of March 14, 2018.

The RES producers who meet the feed-in tariff electricity selling conditions must join the Guaranteed Buyer's balancing group and submit their hourly electricity output schedules on daily basis. If the actual hourly output is different from the forecasted output, the producers have to reimburse the cost of imbalance handling to the Guaranteed Buyer¹⁹.

The reimbursement rate was 50% in 2021 and reached 100% in 2022.

The reimbursement calculation formula to be used by the Guaranteed Buyer is set in the NEURC Resolution N 641 of April 26, 2019.

A RES producer who did not pay the amount to be reimbursed ceases to be a member of the Guaranteed Buyer's balancing group. Accordingly, such producer no longer can sell electricity at the feed-in tariff²⁰.

1.1.4. Market operations

The Guaranteed Buyer sells all electricity purchased from the RES producers in 4 segments of the electricity market.

1. Bilateral contracts market (BCM).

Electricity purchase contracts in this market segment are executed based on an open bidding procedure. Demand is defined by bids made by buyers.

2. Day-ahead market (DAM).

On the "day-ahead market", electricity is sold through an electronic automated algorithm based on the demand/offer ratio and marginal prices.

Electricity is traded on the day-ahead market using the following algorithm:

- determining the demand-to-offer ratio (rejecting bids with the most expensive proposals that exceed the submitted demand bids);
- setting marginal price of electricity on the day-ahead market at the level of the most expensive approved bid.

3. Intraday market (IDM).

Intraday market trade takes place in auctions where bids are made in an automated electronic system that is managed by the Market Operator.

4. Balancing market (BM).

Balancing market enables handling a positive or negative electricity imbalance. In case the Guaranteed Buyer was not able to sell electricity under bilateral contracts and/or on day-ahead or intraday market, the Guaranteed Buyer's imbalance is considered positive. Positive electricity imbalance shall be sold to transmission system operator on balancing market at a price based on the formula set in the Market Rules (it would normally be lower than the actual electricity selling price on day-ahead market).

However, the Guaranteed Buyer has no privileges in trading on electricity market compared to other market participants. The Guaranteed Buyer's trading strategy is defined at the sole discretion of the company's management.

¹⁹ Clause 6, Article 71 of the Law of Ukraine on Electricity Market and clause 1.2 of the Standard Form Feed-In Tariff Power Purchase Agreement.

²⁰ Clause 10.7 of the Procedure for Guaranteed Buyer's Purchase of Electricity Produced from Alternative Energy Sources.

1.1.5. Special duties and operations of the Guaranteed Buyer

Article 62 of the Law of Ukraine on Electricity Market defines that with the purpose of: 1) meeting the general economic interest in Ukraine's energy sector to meet the interests of citizens, society and the state; and (2) sustainable long-term development of the energy sector and competitiveness of Ukraine's national economy, special duties may be imposed on the market participants.

By its legal status, State Enterprise "Guaranteed Buyer" is a state commercial enterprise, and this implies certain specific aspects of its management by the state, but only to an extent applicable to controlling the use of the state-owned assets provided to it for business use. In all other aspects the Guaranteed Buyer is a business entity operating under the principle of full self-governance, and is independent from the state as represented by the Cabinet of Ministers of Ukraine.

Special duty fulfillment by the Guaranteed Buyer incorporates three elements:

- 1) offtake of electricity from producers at the established feed-in tariff;
- 2) selling the electricity purchased at the feed-in tariff on organized market segments;
- 3) providing the Special Duty Service (service of increasing the share of electricity production from RES) for Ukrenergo (TSO) to cover the financial deficit that emerged due to the difference between feed-in tariff electricity purchase and its market-based price.

All these operations of the Guaranteed Buyer are governed by the Procedure approved by the NERC Resolution N 641 of April 26, 2019.

The cost of Special Duty Service in the relevant payment period includes:

- 1) difference between (1) cost of electricity that the Guaranteed Buyer purchased at feed-in tariff, and (2) the Guaranteed Buyer's proceeds from selling electricity on day-ahead market, intraday market, balancing market, and under bilateral contracts;
- 2) additional expenses associated with the Guaranteed Buyer's operations (such as administrative expenses and imbalance handling expenses).

The transmission system operator may in future recover the costs incurred in connection with the Special Duty Service within the electricity transmission tariff; the rules of tariff calculation are set by the NEURC²¹.

The transmission system operator submits the relevant cost estimate to the NEURC with the purpose of setting the transmission service rate. Such cost estimate includes the costs and expenses associated with purchase of the Special Duty Service from the Guaranteed Buyer. The NEURC checks the cost estimate and confirms it under the tariff setting procedure.

1.1.6. Ukrenergo

National Energy Company "Ukrenergo" is a transmission system operator (TSO) whose main functions include dispatching control over the operation of Ukraine's Unified Energy System (UES), electricity transmission services, and maintaining operational security of the Ukrainian UES by removing electricity imbalances in the grid.

²¹ According to the NERC Resolution N 585 of April 22, 2019.

TSO's business operations do not rely on electricity production, distribution and supply, or trading operations²².

Ukrenergo is a 100% state-owned joint-stock company.

1.2. Enhancing the RES support conditions

With gradual increase of the RES generation on the market new challenges were arising and, unfortunately, these challenges were not sufficiently addressed in early stages of the support mechanism implementation. These challenges included:

- **difference in tariffs for producers** – not only RES as opposed to traditional types of generation (coal, nuclear, etc.) but also between solar generation and various feed-in tariff coefficients;
- **uneven development of stochastic generation** of RES (solar power plants and wind power plants) in different regions caused by the resourcing correlation (solar and wind maps) which impacts the projects marginality;
- **lack of maneuverable capacities** that would be capable of balancing the energy system (such as large HPPs) and, accordingly, lack of the energy system's technical ability of accepting, without limitations, the total output of the existing and new solar and wind power plants taking into consideration the intensity of their development.

At the same time, the biggest challenge was posed by the financial **deficit on the market** associated with lack of money to fully pay to the RES producers. As of the beginning of 2021, the Guaranteed Buyer's debt to the RES producers was approximately UAH 23 billion²³. Low level of payments posed a threat to the existence and development of renewable energy in Ukraine, resulting in a breach of the state guarantees set in the applicable legislation and therefore undermining the investors' trust in RES.

To enhance the support of "green" generation, in July 2020 the Verkhovna Rada approved legislative amendments²⁴ to establish the **right of the RES producers to participate in the support quota allocation auctions** for certain energy sources. The law imposes mandatory participation in the auctions for wind energy producers with installed capacity of over 5 MW, and over 1 MW for solar energy producers. Electricity producers using other types of RES can get involved in auctions. In August 2022, the "green" auction procedure was enhanced through amending the Procedure on Auctions for Support Quota Allocation²⁵.

The state must support such producers within 20 years after the RES facility was commissioned into operation through guaranteed electricity purchase within the quota and at the tariff established at the auction. Support quota will be approved by the Cabinet of Ministers of Ukraine for the next year, with an indicative four-year forecast. Quota for each RES type should be at least 10%. Annual quota allocation auctions must take place in accordance with the auction schedule for the relevant year between July 1, 2019, to December 31, 2029.

However, **no annual quota allocation auction has taken place as of November 2022.**

²² Clause 1, Article 32 of the Law of Ukraine on Electricity Market.

²³ <https://finbalance.com.ua/news/zeleniy-tarif-borh-harpoka-y-ukrenerho---239-mlrd-hrn>.

²⁴ Law of Ukraine "On amendments to certain laws of Ukraine in terms of enhancing the support of electricity production from alternative energy sources" N 810-IX of July 21, 2020.

²⁵ Resolution of the Cabinet of Ministers of Ukraine N 889 of August 02, 2022.

Section 2. Regulatory and legal factors impacting the RES sector in 2020 to 2022

In 2020, the debt history in the renewable energy sector prompted the need for a compromise between the state and investors to reduce the number of court proceedings against State Enterprise “Guaranteed Buyer” and to restore, at least to some extent, investors’ trust.

2.1. Memorandum of Understanding between the Ukrainian Government and RES producers

On June 10, 2020, the Energy Community Secretariat’s Dispute Resolution and Negotiation Centre mediated the Memorandum of Understanding signed by and between the Cabinet of Ministers of Ukraine, Ministry of Energy and Environmental Protection of Ukraine (hereinafter referred to as the Ministry), NEURC and associations of RES producers to settle the issues in the renewable energy sector (hereinafter the “Memorandum”).

By signing the Memorandum, the associations of RES producers agreed to retrospective reduction of the “feed-in” tariff and increased liability for imbalances, while the Government committed to pay the debts off, ensure timely payments of the Guaranteed Buyer to the RES producers, and prevent any future changes that will have an adverse impact on renewable energy projects.

In fact, the Memorandum was intended to become a roadmap to resolve the issues and create appropriate conditions for renewable energy development in Ukraine.

In view of this, the performance review is key to evaluate the sector’s development. The results of this performance review are shown in Table 1.

Table 1: Key terms and conditions of the Memorandum: performance review

No	Commitment	Performance	Review
1	Amendments to the Law of Ukraine on Alternative Energy Sources, Law of Ukraine on Electricity Market, and other laws in order to implement the feed-in tariff restructuring mechanism, and to enforce other provisions of the Memorandum by August 1, 2020.	Law 810-IX was approved on July 21, 2020. The Law envisaged the following: <ul style="list-style-type: none"> retrospective reduction of feed-in tariff (through adjusting coefficients) depending on the production technology and the date when the power plant was commissioned into operation; increasing RES producers’ liability for imbalances; additional guarantees that the legislation (approved before August 1, 2020) applicable to RES projects will not be changed. 	Fulfilled

Table 1: Key terms and conditions of the Memorandum: performance review

№	Commitment	Performance	Review
2	Impact evaluation of the approved feed-in tariff restructuring conditions on the solvency of RES producers under loan programs intended to fund RES projects, and, if needed, revision of the relevant NBU regulations.	On August 18, 2020, the NBU approved resolution N118 "On enforcement of certain regulations of the National Bank of Ukraine related to credit risk assessment", which created flexible conditions for banks to restructure the loans given to the borrowers whose prime type of business of "green" energy production.	Fulfilled
3	Recovery of the existing debt for electricity that the Guaranteed Buyer owes to the RES producers by December 31, 2021, according to the following payment schedule: 40% in the 4th quarter of 2020; 60% quarterly by equal installments throughout 2021.	The debt owed by the Guaranteed Buyer was paid in full, however, not in line with the payment schedule provided in the Memorandum.	Fulfilled but not in line with the schedule
4	The Guaranteed Buyer's timely and full payment to the RES producers starting from the month following the effective date of Law 810-IX.	The Guaranteed Buyer was making payments with delays and with breaches of terms and conditions of the electricity purchase agreements made with the RES producers. As of November 01, 2022, the 2021 payment volume was 99.0%, and the 2022 payment volume was 50.2%. ²⁶	Being fulfilled with violations
5	Securing sufficient cash flow to ensure the Guaranteed Buyer's timely payments to the RES producers: <ul style="list-style-type: none"> • revision of Ukrenergo's (transmission system operator) rate for electricity transmission service; • addressing the use of other financial proceeds within one month upon the effective date of Law 810-IX as the latest. 	Throughout 2021 and 2022, the Regulatory Authority several times reviews Ukrenergo's tariff for electricity transmission service. Although financial deficiency, delayed payments, and debt owed by the Guaranteed Buyer to the RES producers demonstrate that Ukrenergo's tariff is not set correctly, and this does not allow covering the Guaranteed Buyer's financial deficiency. On September 21, 2022, Ukrenergo initiated a new revision of tariffs, referring to the increase of electricity price caps on the market without taking into consideration the Guaranteed Buyer's financial deficiency and its debt owed to the RES producers.	Being fulfilled with violations

Table 1: Key terms and conditions of the Memorandum: performance review

№	Commitment	Performance	Review
6	Drafting and approval of regulations required to set a procedure for compensation for the electricity that was not produced and was not supplied by the RES producers as a result of the transmission system operator's commands.	The NERC Resolution N1168 of June 24, 2019, sets a procedure for calculation and compensation for the electricity that was not supplied due to the transmission system operator's commands (clause 4.18.12). The amendments became effective as of January 1, 2021.	Fulfilled
7	Enabling the RES producers to: <ul style="list-style-type: none"> • withdraw from the Guaranteed Buyer's balancing group and freely sell electricity on the market; • return to the Guaranteed Buyer's balancing group and sell electricity at the feed-in tariff; • become a party responsible for balance, establish balancing groups or select the party responsible for balance that will provide electricity production forecast schedules. 	<p>Transitory provisions of Law 810-IX contemplated the CMU's obligation by November 1, 2020, to draft and submit to the Verkhovna Rada a draft law to allow the RES producers withdraw from the Guaranteed Buyer's balancing group. However, this has not been done by the time specified.</p> <p>Legislative grounds for the RES producers to withdraw from the Guaranteed Buyer's balancing group were only established on July 29, 2022, when Law 2479-IX was approved.</p> <p>The NERC's secondary regulations to grant the right to withdraw from the Guaranteed Buyer's balancing group are still being drafted and subjected to public debates. Therefore, in practice the RES producers may not apply the relevant legislative provisions (as of November 2022).</p>	Being fulfilled with violations
8	Implementation of RES support mechanism through auctions: <ul style="list-style-type: none"> • setting and approval of annual support quota within two months upon the effective date of Law 810-IX; • conducting support quota distribution auctions by the end of 2020. 	<p>On December 3, 2020, the Ministry submitted draft 2021 quota: wind power plants 150 MW, solar power plants 155 MW (together with regional quota and quota for small distributes generation), other types of generation (biomass, biogas and small hydropower plants) 60 MW.</p> <p>However, as of November 2022, the quotas have not been approved and no "green" auction has taken place.</p>	Not fulfilled

²⁶ For updated information about payments to electricity producers, see — https://www.gpee.com.ua/news_item/342.

²⁷ <https://ua.energy/peredacha-i-dyspetcheryzatsiya/taryfy/>.

Table 1: Key terms and conditions of the Memorandum: performance review

No	Commitment	Performance	Review
9	Avoiding any actions that negatively impact RES projects.	<p>On January 15, 2021, the NERC approved amendments to Resolution N641 and introduced a new formula to calculate the Guaranteed Buyer's imbalance. This formula defines the Guaranteed Buyer's imbalance to be compensated by the RES producers as a difference between the purchased electricity and the electricity sold on the market.</p> <p>The relevant NERC resolution of January 15, 2021, was revoked by judgment of the Supreme Court of Ukraine as of September 08, 2022, as illegitimate since it imposes an additional liability on the RES producers for the imbalances that are not caused by deviations from their generation schedules.</p>	Not fulfilled

Taking into consideration the review outcomes given in Table 1, terms and conditions of the **Memorandum have been fulfilled in part**, predominantly where it is possible to reduce the Guaranteed Buyer's costs related to payments at the feed-in tariff and to avoid critical implications for the RES producers, in particular regarding their insolvency and bankruptcy.

Provisions of the Memorandum that oblige the Guaranteed Buyer to pay to the RES producers fully and on time have been fulfilled with violations in terms of deadlines and establishing a justified Ukrenergo's tariff.

Other provisions of the Memorandum – such as **maintaining and enhancing investment attractiveness of RES projects in Ukraine, conducting "green" auctions, and avoiding further adverse effect to the RES projects implementation conditions** – have not been fulfilled as of November 2022.

2.2. Proceedings regarding constitutionality of the feed-in tariff

On July 3, 2020, 47 members of the Ukrainian Parliament filed an application to the Constitutional Court of Ukraine²⁸ regarding the compliance with the Constitution of Ukraine (constitutionality)²⁹ of the legislative provisions that set conditions for establishing the feed-in tariff for the RES producers.

The applicants claimed that by adopting the Law on Alternative Energy Sources the legislator violated Articles 6, 8, 19, 85, 92, and 116 of the Constitution of Ukraine in terms of exceeding the powers²⁹. This was reflected in the approval of the law which governed the imposition of tariffs that had to be included into the scope of competence of the executive branch of power. The Constitution of Ukraine establishes that the legislator defines the principles of state policy (including financial, pricing and investment policy), while the policy implementation is imposed on the executive branch of power. **Therefore, the applicants argued that the Verkhovna Rada, by establishing the entire feed-in tariff calculation mechanism at the law level, overtook the powers of the Cabinet of Ministers of Ukraine.** Establishing the feed-in tariff in the form of specific prices is the implementation of the state policy and not setting its principles. Therefore, approval of Law N 555-IV violated the provisions of the Constitution of Ukraine.

Other reasons that the applicants suggested as evidence that the support mechanism is unconstitutional included the following:

- introduction of the feed-in tariff does not correspond to the economy's social orientation goals and public interests as well as the constitutional demand to the state to be striving for the balanced state budget;
- establishing such feed-in tariff (it is rather related to its amount as of the time when the application was filed) for electricity produced in Ukraine and using Ukraine's natural resources, is economically unjustified and imposes unreasonably high costs on the state, which is a gross violation of the Ukrainian people's proprietary rights;
- state guarantees for not changing the legislative governance of the feed-in tariff for the business entities producing energy from RES are a violation of the principle of a fair and unbiased allocation of the public wealth;
- establishing a feed-in-tariff and its dependency on the type of RES and date when a facility was commissioned into operation creates unreasonable benefits that impact competition in business for certain business entities.

In turn, the **associations of RES producers provided their own explanations to the Constitutional Court as well as the expert opinions confirming the constitutionality of the legislation establishing the procedure for feed-in tariff implementation.**

For instance, constitutional law experts from the Center of Policy and Legal Reforms pointed out in their opinion that the³⁰ Verkhovna Rada did not directly establish the feed-in tariff in a monetary value (this has always been a duty of the NEURCA as the Regulatory Authority according to the applicable law), and never approved any decisions to the applicable law), and never approved any decisions to impose any temporary or permanent prohibitions for the Regulatory Authority to increase or reduce the feed-in tariff.

²⁸ https://ccu.gov.ua/sites/default/files/3_332_2020.pdf.

²⁹ Article 9-1 and Article 9-2 of the Law of Ukraine on Alternative Energy Sources N 555-IV of February 20, 2003, and Article 65 of the Law of Ukraine on Electricity Market N 2019-VIII of April 13, 2017.

³⁰ https://rpr.org.ua/wp-content/uploads/2020/12/RPR_Amicus_Pro-al-ternatyvni-dzherela-enerhii_.pdf.

The Law only defined the criteria (specifically, coefficients) that the Regulatory Authority could use to adequately and correctly establish the feed-in tariff that has a complex mathematical nature. Also, specific elements of the legislative criteria for defining the feed-in tariff may only be established by the Regulatory Authority.

In view of this, the expert opinion is that the legislative provisions are in line with the Constitution of Ukraine. When approving the relevant laws, the Verkhovna Rada defined the principles of state support for alternative energy (RES), sustainable development and environmental protection based on the authority envisaged by the Constitution.

In turn, state regulation of alternative energy (RES) business through establishing, as a law, legally defined rules for various groups of business entities may not be considered as a limitation of right to engage in business or as an infringement of market competition.

As of November 2022, the proceedings are still pending before the Constitutional Court.³¹ Since December 17, 2020, it has been on review by the Court's Grand Chamber.

The Law of Ukraine on the Constitutional Court of Ukraine defines that laws, other regulations, or any specific provisions of the same that have been recognized as unconstitutional shall become void as of the day when the Constitutional Court passed a judgment declaring the same unconstitutional, unless otherwise defined in the judgment, but in any case, not before such judgment was passed.

In view of this, should the Constitutional Court of Ukraine approves a judgment that certain provisions of the Law of Ukraine on Alternative Energy Sources and the Law of Ukraine on Electricity Market are unconstitutional, implementation of the feed-in tariff mechanism would not be possible until the amendments aimed to bring the laws in line with the Constitution of Ukraine are approved.

2.3. State support to business entities operating in the alternative energy (RES) sector

As defined in the Law of Ukraine on State Support to Business Entities, state support is any form of support provided to business entities through state or local resources which distorts or threatens to distort competition by favoring certain undertakings or the production of certain goods. The general rule defines that state support could only be given if declared eligible under applicable legislation or by a decision of the Anti-Monopoly Committee of Ukraine (AMCU).

In February 2021, an NGO and a few consumers (hereinafter the "applicants") applied to the AMCU for state aid to the RES producers through establishing a feed-in tariff.

In the applicants' opinion, the feed-in tariff mechanism should be recognized as state support under the Law of Ukraine on State Support to Business Entities as to the following:

- 1) the feed-in tariff mechanism implies selective support to the RES producers in form of guaranteed purchase of electricity at the established tariff;
- 2) it is favoring the RES producers compared to other electricity producers;
- 3) electricity is purchased at the expense of state-owned enterprises.

³¹ Clause 18 in the "Constitutional Submissions" list - <https://ccu.gov.ua/novyna/konstytuciyini-podannya>.

As part of addressing this issue, the AMCU received inputs and information from subject-matter expert renewable energy associations, the Ministry, NEURC, and leading EU state aid law and regulation experts.

● **The following counterarguments to the application were provided:**

First, the Law of Ukraine on State Support to Business Entities applies to business of rendering services that constitute general economic interest and are included in the List³². **In particular, it includes such operations as purchase of electricity produced by generating facilities using alternative energy sources with an established feed-in tariff and a relevant increments; as well as services of increasing the share of power generation from alternative energy sources** that are provided to Ukrenergo, by the Guaranteed Buyer.

Second, the money that the Guaranteed Buyer is using to pay to the RES producers are in fact received from electricity consumers as proceeds of business operations by the Guaranteed Buyer and Ukrenergo.

The definition of “state property” given in Article 141 of the Commercial Code of Ukraine does not extend to the funds of state commercial enterprises (of the Guaranteed Buyer in this case) that are received as business proceeds.

Also, Article 74 of the Commercial Code of Ukraine and the Guaranteed Buyer’s Chapter define that the state and the agency whose scope of authority extends to the state commercial enterprise shall not be accountable for its commitments. Therefore, **payments under the feed-in tariff cannot have any impact on the balance (increase or decrease of funds) of the state budget or any local budget.**

In view of this, payment of the feed-in tariff from the state resources, that has to be established to qualify the feed-in tariff as the state aid, appears questionable.

Third, the Law of Ukraine on Electricity Market, secondary regulations, and the feed-in tariff electricity purchase agreement between the RES producer and the Guaranteed Buyer oblige the RES producer to sell all of its produced electricity to the Guaranteed Buyer. This means that the RES producers selling electricity at the feed-in tariff cannot make agreements and/or submit bids in other market segments, and, consequently, compete with other electricity producers. Therefore, **the existing feed-in tariff mechanism does not imply a risk of deterioration of competition in the electricity market.**

As of November 2022, **there is no publicly accessible information regarding any approved AMCU decisions that may negatively impact the RES producers’ projects.** Pursuant to the Law of Ukraine on State Support to Business Entities, these may include: (i) a decision to temporarily suspension of the feed-in tariff as an illegal state support until it is recognized as eligible for competition; (ii) providing the AMCU recommendations to amend the feed-in tariff mechanism in order to bring it in line with the laws on state aid; (iii) providing recommendations to terminate the feed-in tariff mechanism.

³² The list was approved by the CMU’s resolution N 420 dated May 23, 2018.

2.4. Electricity market regulation during the active phase of war in 2022

With the outbreak of the full-scale Russian aggression, the Ministry and the NEURC approved several regulations aimed to stabilize the electricity market. However, **approval of some of these regulations had signs of illegitimacy and made a negative impact on the RES producers.**

2.4.1. Temporary procedure for connecting to electrical grids

On March 26, 2022, the NERC approved resolution N 352 and established a temporary procedure for connecting to electrical grids during the martial law (hereinafter the “Temporary Procedure”), which, in particular, envisages the following:

- suspending of Section IV of the Distribution System Code³³ and the Methodology (procedure) for Calculation of Fee for Transmission System and Distribution System Connection³⁴ that govern the procedure for connecting electricity facilities to electrical networks;
- right of distribution system operators, where they are unable to provide connection services under the existing agreements, to notify their customers of being unable to meet their obligations due to events of force major pending the official termination of such events;
- where consumer electricity facilities were connected using the temporary procedure during the martial law, such facilities shall be re-connected using the general rules described in the Distribution System Code once the martial law is over.

On October 18, 2022, the NERC at its meeting approved amendments to resolution N 352 of March 26, 2022³⁵ that prohibited temporary connection of generating facilities. At the same time, the Temporary Procedure defines that connection may only be allowed if the networks have capacity reserves at 10(6) to 35 kV voltage.

Implementation of the temporary procedure for connecting power generating installations to electrical grids:

- enables execution of agreements for connecting generating facilities only to 10(6) – 35 kV grids, provided that there is a capacity reserve available;
- features signs of being illegitimate and violating Article 6 and Article 21 of the Law of Ukraine on Electricity Market that:
 - envisage that the procedure for connecting electric facilities may only be defined in the Distribution System Code and Transmission System Code;
 - provide for nondiscriminatory engagement and removing barriers to connecting generating facilities to electrical grids;
 - restrict the NEURC’s authority to impose/approve the connection procedure other than (in this case the changes are approved by separate NEURC resolutions) through amendments to the Distribution System Code or Transmission System Code.

³³ Approved in the NERC resolution N 310 of March 14, 2018.

³⁴ Approved in the NERC resolution N 1965 of December 18, 2018.

³⁵ [NERC resolution N1317 of October 18, 2022 - https://zakon.rada.gov.ua/rada/show/v1317874-22#Text.](https://zakon.rada.gov.ua/rada/show/v1317874-22#Text)

Furthermore, by giving the distribution system operators a recommendation to notify their customers of being unable to connect under the existing agreements, the NEURC disregards the need to extend the relevant grid connection agreements by the period of time equal to the duration of the relevant events of force majeure.

2.4.2. Electricity market price regulation

The European-wide growth of electricity (see Fig. 3) and energy source prices has obviously impacted the Ukrainian market.

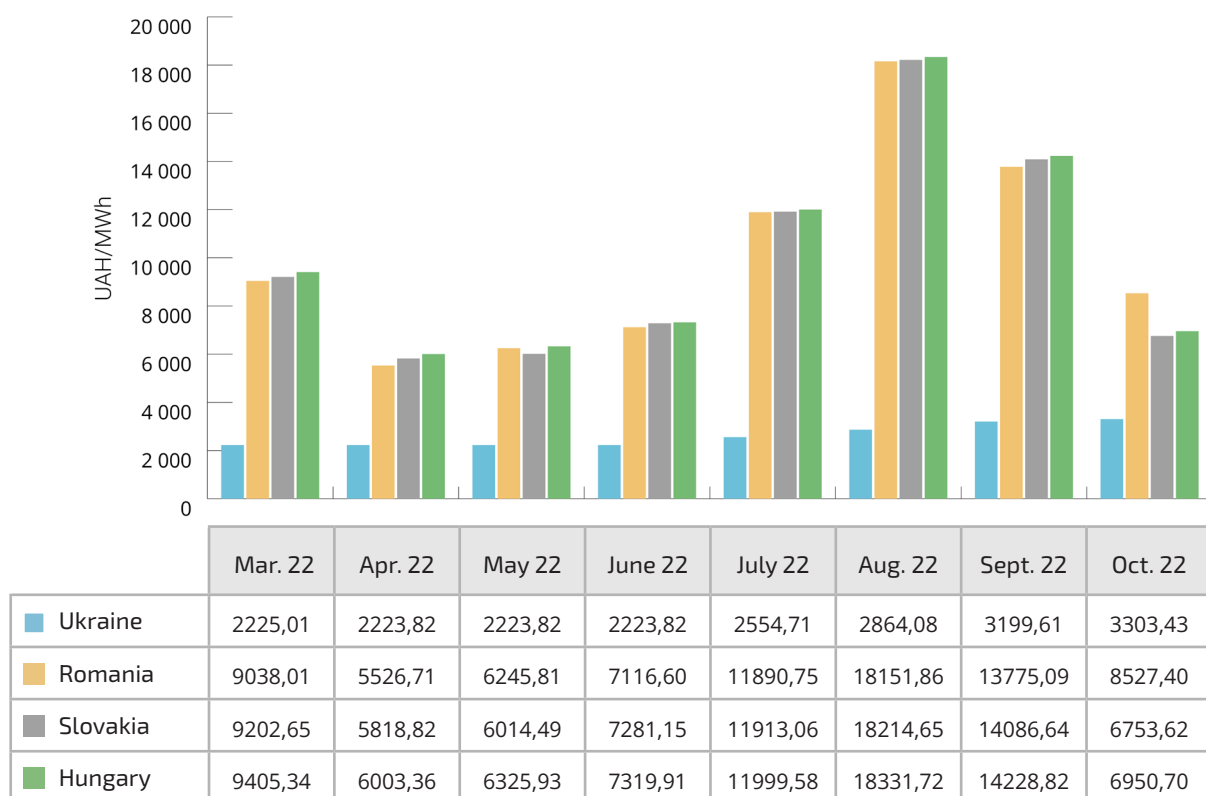


Fig. 3. Electricity prices on DAM (Base Product): Ukraine, Romania, Slovakia, and Hungary. monthly report of Market Operator "DAM and Intraday Market Highlights", March to October 2022

In October 2022, the NEURC approved two draft decisions:

1) to increase price caps in the DAM³⁶:

- for minimum load hours (00:00 to 07:00 and 23:00 to 24:00) – from 2,000 to 2,476 UAH/MWh;
- for peak load hours (from 07:00 to 23:00) – from 4,000 to 4,952 UAH/MWh.

2) to increase Ukrenergo's tariffs due to the expected increase of average weighted market prices as indicated above:

- for electricity transmission service — from 345.64 to 397.85 UAH/MWh;

³⁶ News release about the approved decision published on the Regulatory Authority's website — <https://www.nerc.gov.ua/news/oprilyudnyuyetsya-proyekt-postanovi-shchodo-vstanovlennya-granichnih-cin-na-rinku-na-dobu-napered-vnutrishnodobovomu-rinku-ta-balansuyuchomu-rinku>; current price caps are specified in the NERC resolution N 332 of February 25, 2022 (as amended on February 27, 2022).

³⁷ News release about the approved decision published on the Regulatory Authority's website — <https://www.nerc.gov.ua/news/oprilyudnyuyetsya-proyekt-postanovi-shchodo-pereglyadu-tarifuv-na-poslugi-z-peredachi-elektrichnoyi-energiyi-nek-ukrenergo-z-01122022>.

- for dispatching services — from 62.13 to 239.97 UAH/MWh.³⁷

In the relevant substantiation, the NEURC points out at the **expected increase of the average weighted DAM price in December 2022 up to 4,423 UAH/MWh, and up to 5,528.75 UAH/MWh on the balancing market.**

At the same time, household consumers are paying significantly less for electricity – 1,680.00 UAH/MWh, or 1,440.00 UAH/MWh in case of monthly consumption of up to 250 kWh. The cost includes electricity transmission and distribution services; the Regulatory Authority is considering a possible increase of the price of these services³⁹.

If the relevant draft decisions of the Regulatory Authority to increase tariffs for electricity transmission and distribution are approved, the cost of these services for end consumers as part of the overall electricity prices may range from 1,205.61 to 2,505.69 UAH/MWh depending on the distribution tariff of the distribution system operator⁴⁰. At the same time, an economically substantiated cost of electricity for end consumers should include the market purchase cost and the electricity supplier service cost, in addition to distribution and transmission costs. This means that even the fixed price of UAH1,680.00/MWh for household consumers does not fully cover the entire prime cost of electricity.

Such cross subsidizing on the electricity market:

- may be classified as violation of Article 61 and Article 62 of the Law of Ukraine on Electricity Market and consolidates the practice of “manual” market regulation;
- creates a deficit of liquidity and distorts competition on the electricity market;
- contributes to financial deficit of market players that might be covered with the Guaranteed Buyer’s money.

2.4.3. Establishing algorithms for payments to the RES producers

On March 4, 2022, the Ministry of Energy approved decree N 103 “On settlements on the electricity market” that obliged the Guaranteed Buyer during the martial law to use the money (except to an extent necessary for the enterprise’s business operations) received as proceeds from sales of electricity, including the electricity produced from RES, to pay to Energoatom (as the 2020 and 2021 electricity debt recovery) and Ukrenergo.

The Ministry of Energy’s decree N 140 of March 28, 2022, revoked the previous decree N 103 of March 04, 2022, but established threshold amounts of money to be transferred from the Guaranteed Buyer’s current account to the RES producers for the electricity produced. These amounts depended on the established percentage of the average weighted feed-in tariff for 2021 for the producers of energy from the relevant source, i.e.: solar power plants 15%, wind power plants 16%; small hydropower plants 35%; biogas 40%; biomass 60%.

After payments to the RES producers were made, the remaining funds of the Guaranteed Buyer were transferred to Energoatom and Ukrenergo.

³⁸ According to the Cabinet of Ministers resolution N 483 of June 05, 2019 as amended on November 01, 2022.

³⁹ News release about the approved draft NERC resolutions on revised tariffs for electricity distribution services effective as of December 01, 2022 — <https://www.nerc.gov.ua/news/oprilyudnyuyutsya-proyektii-postanov-shchodo-pereglyadu-tarifiv-na-poslugi-z-rozpodilu-elektrichnoyi-energiyi-z-01122022>.

⁴⁰ This example is taken from calculation of distribution system operator’s distribution tariffs for Class II voltage. Electricity distribution tariffs are established for every distribution system operator that is conducting the relevant licensed operation within the specified territory (within one Oblast in the majority of cases).

According to the Ministry of Energy's decree N 206 of June 15, 2022, the share of payments to the solar and wind power plants operators was increased up to 18% of the average weighted feed-in tariff for the previous year, and up to 75% for the biomass energy producers. The remaining funds were allocated pro rata among all RES producers.

As a result, the level of settlements of SE Guaranteed Buyer with renewable energy producers in March-September.

September 2022 amounted to an average 42% which led to economic difficulties for renewable energy producers, who found themselves on the verge of insolvency and were forced to cut production and turn to creditors for debt refinancing.

Approval of the above decrees by the Ministry of Energy (N103, N140 and N206) created a negative practice of "manual" limitation of settlements on the electricity market. Furthermore, the Ministry of Energy's decisions urged the Guaranteed Buyer to take actions that may be classified as violations of the Law of Ukraine on Electricity Market, Law of Ukraine on the Protection of Economic Competition, and the relevant licensing terms and conditions regarding the following:

- prohibition of cross subsidizing;
- anti-competitive actions against the RES producers;
- conditions related to the proportional settlements among the RES producers.

As a result, **the Guaranteed Buyer's debts to the RES producers were on average paid off at the level of 42% from March to September 2022**, which created economic challenges for the RES producers who found themselves close to insolvency and had to cut down their production and seek debt refunding from lenders.

2.4.4. Feed-in tariff adjustment to the exchange rate

The feed-in tariff is established by the NEURC quarterly taking into account the average UAH/EUR exchange rate (official NBU exchange rate) for the last 30 calendar days preceding the last meeting of the NERC in the previous quarter.⁴¹

In 2022, the NEURC approved a decision to establish the feed-in tariff taking into consideration the change of the EUR exchange rate only on September 30, 2022.

Therefore, the NEURC has violated its commitment to review the feed-in tariff according to the EURO exchange rate in the 2nd and 3rd quarters of 2022.

2.5. Key implications of the actions taken for RES producers

The legal and regulatory measures taken in relation of RES producers over the past three years have created a number of risks and obstacles for the sector's subsequent development. The war in Ukraine has obviously made the situation even worse. Below is the summary of key implications and their impact on the RES projects.

⁴¹ According to the Law of Ukraine on Alternative Energy Sources.

2.5.1. Technical risks

Following the full-scale invasion of the Russian Federation into Ukraine, thousands of facilities and network elements have been fully or partially destroyed, and some of them are located in the occupied territories⁴².

The general evaluation is that 40% of energy infrastructure has been damaged as of the end of October 2022. These include power generating facilities, transmission lines and node substations of main and distribution networks. Some facilities are beyond economic repair. All this has affected the operation of the energy system that is facing the threat of disbalance, when some of the Ukrainian regions may have energy surplus while other regions will be having energy deficiency. As a result, consumers across the entire country are facing limitations in form of emergency shutdowns.

Given the significant changes in the energy system in terms of the energy mix, grids configuration technical capability for long-range electricity transmission, as well as for planning the recovery of relevantly powerful RES facilities that were damaged and the development of new plants (solar and wind power plants) of industrial scale is quite difficult or even impossible. There are **technical risks for connecting these power plants to the existing grid facilities and their future operation in view of the restricted electricity output into the network due to the deficiency of balancing capacity in the system.**

2.5.2. Economic risks

Economic risks for RES projects (both for the projects in progress and the new projects) are defined by limited capability for financial and economic forecasting.

In particular, due to an unpredictable governance of the electricity market where decisions often appear illegitimate, potential investors are not capable of:

- forecasting electricity sales volumes due to the lack of objective data that would enable strategy planning for a competitive market, as well as risks of regulatory limitations that call for long-term planning of market operations;
- forecasting the selling price of electricity due to the lack of objective price signals, distortion of market pricing due to price caps, and special obligations aimed to reduce the cost of electricity for end consumers.

These risks cannot be mitigated or compensated through the lack of clearly defined support mechanisms for RES projects and/or mechanisms to stimulate demand for electricity from renewable sources (such as feed-in premium or “green” certificates/guarantees of origin).

In practice, state guarantees and agreed arrangements with investors are not fulfilled timely and fully. The existing support mechanisms show certain gaps, which is negatively impacting the projects’ economic performance.

⁴² Ukrainian energy sector evaluation and damage assessment — https://www.energycharter.org/fileadmin/DocumentsMedia/Occasional/2022_09_30_UA_sectoral_evaluation_and_damage_assessment_Version_II.pdf

2.5.3. Legal and regulatory risks

Regulatory decisions and practices mentioned in this study **complicate the predictability of the sector's governance and hence make the implementation of market operation rules questionable.**

In terms of the degree of risk, the following practices might have the biggest negative impact:

- retrospective changes of legal and regulatory acquis for the existing projects (e.g., review of the established tariffs and/or amendment of rules governing liability for imbalances);
- non-compliance with the existing legislation or application of the regulation mechanisms imposed by it (e.g., new payment algorithms of the Guaranteed Buyer, tariffs that do not cover the legitimate expenditure in the sector, or lack of decisions to review such tariffs due to the change of exchange rate);
- ignoring court judgments.

In view of this, **legislative regulation and regulatory practices in the Ukrainian electricity market do not offer legal clarity and stable governance** for the existing and potential renewable energy projects.

Uncompleted tasks related to the implementation of the electricity market in line with the EU legislation distort the very market model itself and create risks for competition between all stakeholders, including the RES producers. It therefore has a negative impact on the RES sector development and overall does not contribute to the full integration of Ukraine's and the EU's electricity markets. The continued "manual" market governance also slows this process down and creates relevant risks, in particular due to the following:

- ongoing mechanism of imposing special obligations on the market players to fix electricity prices for household consumers;
- practice of establishing price caps on the market;
- introducing mandatory quantities for electricity sales in the defined market segments etc.

In addition to this, Articles 262 to 267 of the Ukraine-EU Association Agreement define that⁴³ **Ukraine must ensure the implementation of the EU legislation and regulations applicable to state aid**, i.e.: any aid granted through state resources which distorts or threatens to distort competition by favoring certain undertakings or the production of certain goods is incompatible insofar as it may affect trade between the Parties".

At the same time, the relevant provisions of the Ukraine-EU Association Agreement should be construed with due regard to the provisions of the Treaty on the Functioning of the European Union and the relevant case-law of the European Court of Justice as well as secondary legislation, framework provisions, guidelines, and other applicable administrative acts of the EU.

Lack of cohesion between the legislation applicable to electricity market (such as providing new support and state guarantees without tenders and competition impact assessments) and the relevant state aid rules may result in the challenging or termination of the relevant regulatory practices in process of implementation, and, consequently, in retrospective changes in the sector's regulation.

⁴³ For full text of the Association Agreement between Ukraine and the European Union, European Atomic Energy Community and their member states, see https://zakon.rada.gov.ua/laws/show/984_011#Text

Section 3. Recommendations on mitigating the risks for RES development

In general, the considered technical, economic and legal risks create barriers for the further development of RES projects. Their mitigation and elimination are quite possible under the circumstances of a comprehensive approach in planning and timely implementation of measures to tackle the issues the industry has accumulated.

Such measures could have been implemented in the short-term perspective — by the end of 2022. For many current projects, the implementation of which has begun earlier, but within the scope of which the construction stage has been temporarily suspended, a challenge asserts itself concerning the construction procedures' successful completion and the RES facilities' connection to the energy grid. Specifically, it happens so due to the need of extending the previously issued technical conditions essential for the connection, which cannot be implemented during the martial law (for instance, against the background of corresponding territories being under fire or in close proximity to the war zone).

It may be possible to implement most of the measures in the medium term — by the end of 2023. Successful completion of the existing RES projects and planning the new ones largely depend on market predictability. The assertion applies to technical requirements, financial and economic indicators alike.

Energy system's modeling in regards to the varied energy sources' respective generating capacities, which includes RESs, and the technologies for balancing, will enable identifying distinct scenarios for energy industry's development in the post-war age; said prognoses will become a baseline for customizing and updating the industry's strategic documents. At the same time, it is necessary to take into consideration RES long-term development goals approved in the relevant strategic documents, such as HBB2 (see Chapter 1). Also, measures to restore the energy system are crucial, which have to be taken into account when revising the plans for the development of distributions systems and transmission systems in the years ahead. It is possible to carry out appropriate planning gradually, keeping military activities in view (liberation of the occupied territories, mitigating the risks of mass shelling, etc.). The recommended term for the adoption of final strategic documents and plans for the development of the system is within 6 months after the termination (suspension) of martial law.

The factors facilitating the RES projects' economic predictability are as follows:

- abolition of special duties mechanism and implementation of measures aiming to equalize competition on the market;
- effective and practicable support mechanisms for both RES, and new generating capacities for balancing;
- ensuring legality and preventing violations and abuses in the process of regulating the electrical energy market; incorporating measures to expand opportunities for dealing (selling) electric energy on the foreign market (system of certificates of origin, or «green» certificates), and others.

Initiating elaboration of such measures is possible this year, with said measures' full implementation in 2023.

Over the long terms, that is, by the year 2024, it is recommended to focus on development and implementation of measures to ensure integration European and Ukrainian electricity markets. It is essential to agree on the conditions and possibilities for electricity exports from RES, upon which further model of 'green' energy incorporation model and further plan of action will depend. Further RES projects' development (and other forms of generation) will largely depend on compliance with the requirements of EU legislation, specifically, regarding the state aid in the electrical energy market.

Substantive advise for the removal of obstructions and attenuation of threats to the development of RES sector are summarized in Table 2.

Table 2: Analysis of the Memorandum's Key Terms' Implementation

THREATS / HINDRANCES		RECOMMENDATIONS	IMPLEMENTATION PERIOD
1. TECHNICAL RISKS / BARRIERS	Restrictions for outputting the power of RES facilities to the external grid due to the energy grid's low flexibility	1.1. REVIEWING ENERGY PLANS AND STRATEGIES	
		1.1.1. Conducting analytical modeling of the electricity network, which includes: <ul style="list-style-type: none"> • Identification of generating capacity needs by different types of energy sources; • Elaborating power system development scenarios with the gradual increase of RES's share in the overall generation mix, at least with reference to the targets outlined in the existent strategic documents, specifically, HBB2 (see Chapter 1); • Determining system balancing conditions using various technologies, in particular, energy storage systems; • Planning distribution systems, transmission systems, and interstate crossings' restoration and development. 	6 months after the termination (suspension) of martial law
		1.1.2. Based on the simulation results: <ul style="list-style-type: none"> • Renewal and approval of the energy industry's documents — the Energy strategy for the period up to 2050 and the National Action Plan 2030; updated RES goals laid out in the relevant documents to be taken into consideration accordingly; • Elaborating transmission system and distribution system networks' development plans. 	6 months after the termination (suspension) of martial law
		1.3. Formulating procedures that enable carrying out competitions for the construction of new generating capacities and energy storage systems and the implementation of distribution system operators (DSOs) and transmission system operators (TSOs) investments programs under the accelerated procedure.	2023–2024
	Limited opportunities for connecting the RES facilities' capacities to the energy grid	1.2. RECONCILING THE TEMPORARY ORDER AND THE LAW	
		1.2.1. Cancellation of the temporary order of connection of electrical installations to electric networks and implementation of connection only within the limits of the procedures provided for in the Code of distribution systems and the Code of transmission system. Determination of separate procedures for temporary connection of electrical installations of consumers, provision of electricity supply to temporarily displaced persons and / or enterprises that perform defense orders and / or have been relocated from front-line territories.	2022
Expiration of technical conditions for connection of RES facilities to electrical grids for projects started earlier	1.2.2. Adoption of amendments to the Law of Ukraine «On the Regulation of Urban Planning Activities» regarding the extension of the technical conditions for the grid connection of RES facilities for a period sufficient to complete the implementation of the relevant projects, after the restoration of the energy system to a level sufficient to provide output from these facilities.	2022	

Table 2: Analysis of the Memorandum's Key Terms' Implementation

THREATS / HINDRANCES		RECOMMENDATIONS	IMPLEMENTATION PERIOD
2. ECONOMIC RISKS / BARRIERS	Liquidity deficit in the electricity market	2.1. TO INCREASE PREDICTABILITY OF RES PROJECTS' ECONOMIC INDICATORS	
		2.1.1. Suspending special obligations to ensure energy and 'Price-caps' applicable in the electricity market, introducing measures to support vulnerable consumers under Article 61 of the LAW of Ukraine "On the Electricity Market."	2023
		2.1.2. Developing tools to limit the marginal profit of 'green' and nuclear generation (RESs and NPPs) on the electricity market in accordance with similar mechanisms operating in the EU countries ⁴⁴ .	2023
	Abuse of monopoly position and anti-competitive actions in the electricity market	2.2. IMPROVING TOOLS FOR THE COMPETITION PROTECTIONS	
		2.2.1. Conducting analysis of the electricity energy market's condition to determine its borders to define of effective measures' implementation to prevent abuse of the monopoly position and other anti-competitive practices in the electrical energy market.	2023
		2.2.2. Implementation of the REMIT regulations ⁴⁶ , which presupposes determining: <ul style="list-style-type: none"> • a list of violations / abuses in wholesale energy markets (for example, price manipulations and / or disclosure of insider information); • detailed authorisations of the NEURC and the Anti-Monopoly Committee of Ukraine regarding investigation of such actions; • fines, the size of which is proportional to the damage caused by the manipulations. 	2022-2023

⁴⁴ On October 30th, 2022, against the background of a significant increase in prices on the electricity market, the EU introduced a regulation limiting the marginal profit of electricity producers who did not use fossil fuels to EUR 180 per 1 MWh. Hence, prices on the market were not limited, but EU member states received the right to withhold (through PSO mechanisms (imposition of special obligations) or taxation) a share of the profit of energy companies that exceeded the established limit. At the same time, the corresponding mechanism in no way limited the right to set arbitrary prices on the electricity market. In addition, the limit of EUR 180 was determined based on the analysis of the economic indicators of the projects and ensured an adequate return on investment based on the LCOE indicator (Levelized Cost of Electricity). Source: https://www.consilium.europa.eu/en/press/press-releases/2022/10/06/council-formally-adopts-emergency-measures-to-reduce-energy-prices/?fbclid=IwAR3Z0xPYp8kzlja0FOKkuO-2jmwtoHeP1THsJDV_KF_fbNjVvIT4mu1tXuQ_τa <https://data.consilium.europa.eu/doc/document/ST-12999-2022-INIT/en/pdf>

⁴⁵ Regulation on Wholesale Energy Market Integrity and Transparency, a EU legislative act no. 1227/2011, dated October 25th, 2011

Table 2: Analysis of the Memorandum's Key Terms' Implementation

THREATS / HINDRANCES		RECOMMENDATIONS	IMPLEMENTATION PERIOD
2. ECONOMIC RISKS / BARRIERS	Restrictions on competition and regulatory practices eradicating the possibility of supply of electric energy	2.3. УЖИТИ ЗАХОДІВ ЩОДО ПРИПИНЕННЯ ОБМЕЖЕНЬ КОНКУРЕНЦІЇ	
		2.3.1. Identification and analysis of regulatory practices that lead to the restriction of competition on the market and / or limit the possibilities of supply of electrical energy to avoid their repetition and application.	2023
	Slowing down the integration of the energy markets of Ukraine and the EU and opportunities to export electricity	2.4. ENTERING THE FOREIGN MARKETS	
		2.4.1. Introduction of certificates of origin of electrical energy	2023
	2.4.2. Elaboration and execution of an action plan aimed to integrate the energy markets of Ukraine and the EU. Analysis of opportunities for the export of electrical energy and the implementation of appropriate measures.	2023-2024	
3. LEGAL RISKS / BARRIERS	Low level of legal certainty in the legal regulation of the electricity market	3.1. EXECUTING OF THE RES MEMORANDUM IN FULL	
		3.1.1. Ensuring the full implementation of the terms of the Memorandum dated 10.06.2020, specifically, regarding the establishment of the tariff for electrical energy transmission services at a level sufficient for full and timely settlements of SE «Guaranteed Buyer.	2022-2023
		3.2. REGULATING OF POWERS AND SETTING UP STATE AGENCIES' CLEAR RESPONSIBILITY FOR DECISION MAKING	
		3.2.1. Analysis of the legal acts on the electricity market for the benefit of determining and coordinating state authorities' powers and regulatory practices to safeguard legality and prevent violations and abuses in the course of market regulation.	2023
		3.3. A COMPREHENSIVE MECHANISM FOR COMPENSATION OF DAMAGES IN CASE OF ILLEGALITY РІШЕНЬ	
		3.3.1. Ensuring the strict implementation of court decisions regarding the application of the provisions of the Law of Ukraine «On the Electricity Market» and the introduction of mechanisms for compensation of losses of electricity market participants arising as a result of state authorities adopting illicit decisions.	2022

Table 2: Analysis of the Memorandum's Key Terms' Implementation

THREATS / HINDRANCES		RECOMMENDATIONS	IMPLEMENTATION PERIOD
3. LEGAL RISKS / BARRIERS	Lack of clear regulation of support mechanisms, stimulation of demand for RES projects	3.4. CREATION OF CONDITIONS FOR IMPLEMENTATION OF PREVIOUSLY STARTED RES PROJECTS	
		3.4.1. Extension of the validity period of the concluded agreements on the purchase and sale of electric energy (Pre-PPA) with SE «Guaranteed Buyer» for a period sufficient for the implementation of RES projects, which were suspended due to the full-scale russian aggression in 2022. Otherwise, identifying alternative support mechanisms.	2022
	Violation of legislation and regulatory acts in the field of state aid to business entities on the electricity market	3.5. IMPLEMENTATION OF EFFECTIVE SUPPORT MECHANISMS FOR RES PROJECTS	
		3.5.1. Analysis and implementation of mechanisms for supporting and stimulating demand for RES projects, in particular 'green' auctions, tenders for the construction of new generating facilities, 'green' certificates, feed-in premium etc.	2023
	3.6. BRINGING OF UKRAINIAN LEGISLATION IN COMPLIANCE WITH THE EU REGULATORY PRACTICES		
	3.6.1. Development of recommendations on the application of legal acts and secondary regulation of the EU in the field of state aid in the electricity market.	2023-2024	

CONCLUSIONS

Conditions for the development of RES investment projects in Ukraine's energy industry have originated in the incentives at the legislative level back in 2008. The European integration processes and certain obligations of Ukraine as a party to the Treaty on the Establishment of the Energy Community have facilitated the introduction of relevant support mechanisms. The factors determining the course of 'green' energy's development have been as follows: commitment to increasing the share of energy derived from RESs, as specified in the state-level strategic documents and the industry plans pertinent to energy industry and countering climate change. At the same time, all these documents need to be made consistent in terms of bringing them to a single RES target indicator for a certain period.

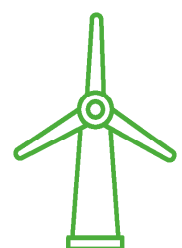


The key mechanism for stimulating RES projects within 'feed-in' tariff implementation of which has been delegated upon the Guaranteed Buyer had its natural course.

The investments to mainly solar and wind projects has contributed to the rapid saturation of the market with the corresponding types of generation, and further plans for even more substantial growth of these capacities with the new projects put on the agenda of the energy industry the question of the energy system's capability to connect and balance these facilities. The financial deficit, caused by the lack of funds to cover the difference between the cost of electricity purchased under the «feed-in» tariff and the market price, place the Guaranteed Buyers in debt before the RES producers. These two main and other factors have compelled the investors to engage in dialogue with the State. According to its results, in 2020, a number of commitments have been determined through the signing of the corresponding Memorandum, aiming to solve financial and other problems of the RES industry. The State, on its part, has demonstrated an interest in retaining the investors' confidence. At the same time, the conditions of the Memorandum have not been fulfilled in full. The improved support mechanism through 'green' auctions has never worked. Settlements for past periods have been carried out with a delay. New problems have emerged as a result of certain actions regarding market regulation, etc.

The beginning of the active phase of the war of the Russian Federation against Ukraine in February of 2022 has faced the RES industry with a number of amassed and actually unresolved problems, adding new losses and jeopardizing its operation and further development. As a result of Russian attacks on Ukraine's energy grid and destruction of industrial consumers' facilities, Ukraine's energy system is under permanent threat of imbalance. Therefore, the production of electric energy is forced to be limited or completely terminated in order to prevent critical consequences for the industry.

The main risks for RES projects are subdivided into three groups: (1) technical, related to the possibility of connecting and balancing 'green' facilities; (2) economic, related to the lack of market predictability and other factors that affect the economic indicators of projects; (3) legal, related to the legal uncertainty that has arisen in terms of regulation of the electricity market. All these risks were further exacerbated during martial law due to measures taken to stabilize the operation of the electricity market with corresponding priorities.



Therefore, there are risks for the operation of existing facilities, the development of previously started projects, and development of the of new renewable energy project facilities in the post-war period. In order to reduce risks and rehabilitate the industry, it is necessary to take care of measures that will contribute to eliminating the mentioned problems. Relevant recommendations are defined by risk categories and implementation horizon.

In the short term — by the end of 2022 — to ensure the conditions for the continuation of the implementation of projects started before the active phase of the war. First of all, this is the matter of extending the terms of technical conditions for connecting such facilities to electric grids. At the same time, start working on preparation for the implementation in the next two years of measures aimed to minimize economic and legal risks for existing and future projects. In general, this is the preparation of measures to complete the transition of the electricity market to a competitive model, which will ensure market predictability. Also, analyze the effectiveness of the mechanisms under development regarding RES and balancing capacities to ensure their effective development within the power system.

In the medium-term perspective — during 2023, in the absence of massive missile attacks on energy infrastructure facilities by the Russian Federation — it is necessary to update the data for modeling the energy system and energy development scenarios, in keeping the updated renewable energy objectives and the conditions for their achievement (in particular, with regard to balancing capacities), with bringing all strategic documents to a single target indicator for the development of 'green' electricity. Implement previously prepared measures to ensure a competitive market and create conditions for the balanced development of RES and the achievement of newly adopted targets. All these factors taken together could ensure the rapid development of RES projects in the post-war period.

In the long term perspective — starting from 2024 — it is required to ensure the implementation of measures for the integration of the electricity markets of Ukraine and the EU. This will enable export electricity produced in Ukraine. The demand for electricity from RES will grow, specifically given the European countries commitment to long term decarbonization policies. At the same time, it is important to coordinate all conditions in accordance with EU legislation in the energy sector in advance. Consolidation of European design of market rules, as well as expansion of sales opportunities for "green" electricity could significantly increase the RES industry's development in Ukraine

All recommendations for mitigating identified risks are summarized. When considering the recommendations for the relevant period and their amendment, the following should be taken into account: (1) current circumstances regarding the military aggression of the Russian Federation in the territory of Ukraine; (2) the requirements to develop and implement intermediate tasks necessary for the implementation of individual recommendations; (3) practice of regulation of energy markets both in Ukraine and in the EU.

