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iC consulenten Ukraine
Volodymyrska str., 61 b,
Kyiv 01033, Ukraine
T: +38 044 38 44 337
www.ic-consulenten.com.ua

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PROJECT NUMBER: Project number 61x190353

PREPARED BY: **iC consulenten Ukraine**
Volodymyrska str., 61 b,
Kyiv 01033, Ukraine
T: +38 044 38 44 337
www.ic-consulenten.com.ua
e.rybak@ic-group.org

PREPARED FOR: **German Energy Agency**

Ms. Rita Ehrig
Chausseestrasse 128a
10115 Berlin
Germany
Fax: +49 (0)30 726 165 699
Email: ehrig@dena.de

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EDITOR: Elena Rybak, Sergey Novoselov, Vitaliy Shapovalenko

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ABBREVIATIONS

BCM- Bilateral contracts market;

BM- Balancing market;

CHP- Combined Heat and Power Plant;

DAM- Day-ahead market;

DSO- Distribution system operator;

ECS – Energy Community Secretariat;

ECT Energy Community Treaty;

EU – European Union;

IDM- intraday market;

MinEcoEnergy – Ministry of Energy and Environmental Protection

NEC – National Energy Company

NEURC- National Energy and Utilities Regulatory Commission of Ukraine;

PPA – Power Purchase Agreement

PSO- Public Service Obligation;

RE – Renewable Energy;

RES- Renewable energy sources;

SAEE- State Agency on Energy Efficiency and Energy Saving of Ukraine;

SE- State Enterprise;

TPP- Thermal Power Plant;

TSO- Transmission system operator;

UES- Unified Energy System;

1. PART 1: STATUS QUO OF THE ELECTRICITY MARKET IN UKRAINE

1.1. BACKGROUND

The analysis of the Ukrainian energy policy in the field of renewable energy and key issues of stakeholders involved has been commissioned by DENA in frames of the project "System transformation for an optimised integration of renewable energies in Ukraine". The project is aimed to provide technical consultation for optimised system integration to the transmission grid operator Ukrenergo. iC consulenten has been assigned by DENA to contribute with policy analysis relevant to the technical aspects of integration of renewable energy into the grid from the perspective of various market stakeholders and the grid operator.

The purpose of this overview is to provide a brief analysis of the current energy market policy developments in Ukraine with the focus on renewable energy. The results of this analysis will be further used to prioritise areas of intervention through a series of stakeholder meetings and a workshop planned for February 2020.

1.2. ELECTRICITY MARKET: BEFORE AND AFTER REFORM

The development of electricity generation from renewable energy sources (hereinafter - RES) in Ukraine began in 2008 after the adoption of the Law "On Amendments to Certain Laws of Ukraine on Establishing a Green Tariff". This law obliges suppliers (energy market) to purchase electricity generated by the following RES:

- small hydropower plants (with installed capacity up to 10 MW);
- wind farms;
- solar power plants;
- power plants that use biomass as fuel.

At that time, there were three separate business segments operating in the electricity market of Ukraine: electricity generation, transmission, and distribution (Figure 1). Regulation of this market was carried out by the National Electricity Regulatory Commission of Ukraine[1].

According to the model of the electricity market that existed before July 1, 2019 (Figure 1), the generated electricity was supplied to the Unified Energy System (hereinafter referred to as the UES). The key entities responsible for the functioning of the UES were State Enterprise "Energorynok" (hereinafter referred to as SE) and National Energy Company "Ukrenergo" (hereinafter referred to as NEC). SE Energorynok served as the sole buyer of electricity produced by power generating stations and resold it to regional distribution companies. Electricity produced using RES was purchased at the "green tariff" in accordance with the established procedure.

NEC Ukrenergo as a governmental institution (natural monopoly) transported electricity from power generators to power supply companies via bulk (high-voltage) and distribution (low-voltage) power grids. Regional companies (so called "oblenergo") distributed electricity to regions to end customers. Distribution companies were natural monopolies in their regions.

[1] Eventually, it was rearranged into the National Energy and Utilities Regulatory Commission of Ukraine (NEURC). Available at: http://www.nerc.gov.ua/

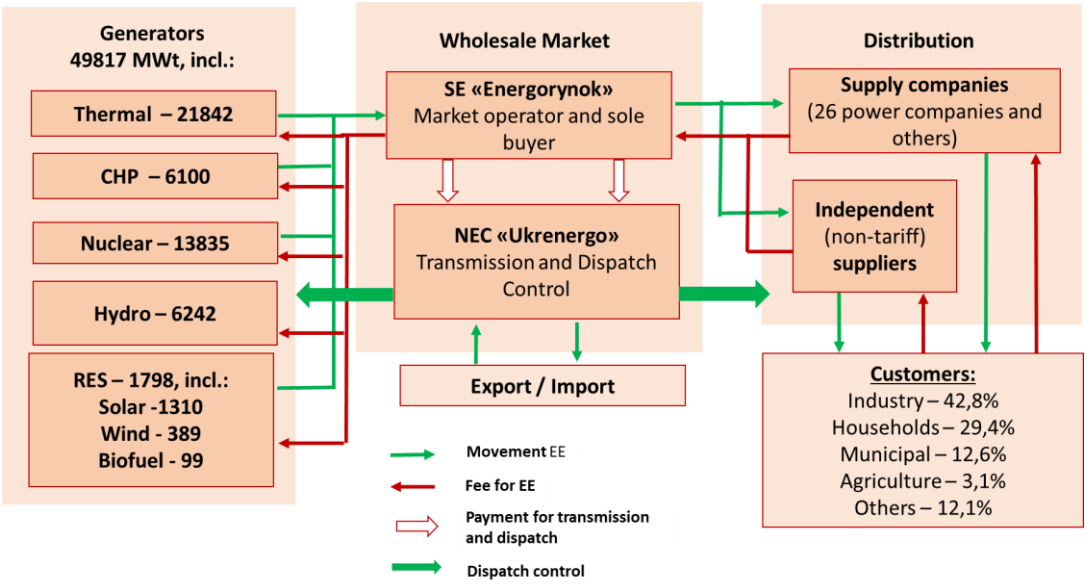

Figure 1. Scheme of electricity market functioning until 01.07.2019

The actual growth of RES and plans for further expansion (at least 25% by 2035[2]) are taken into account in the process of implementation of a **new model of the electricity market** started on 1 July 2019, which is one of the priorities of the Energy Strategy of Ukraine for the period until 2035. Within the new model of the electricity market, organizational and legal principles for introducing competitive mechanisms of functioning of the electricity market, free choice of contractors, and ensuring the right of the consumer to choose freely an electricity supplier, as well as the guaranteed purchase of all electricity produced by renewable energy facilities, are established.

According to the Law "On the Electricity Market of Ukraine"[3] new principles of electricity purchase and sale were introduced to achieve the set goals, using the following organizational elements (

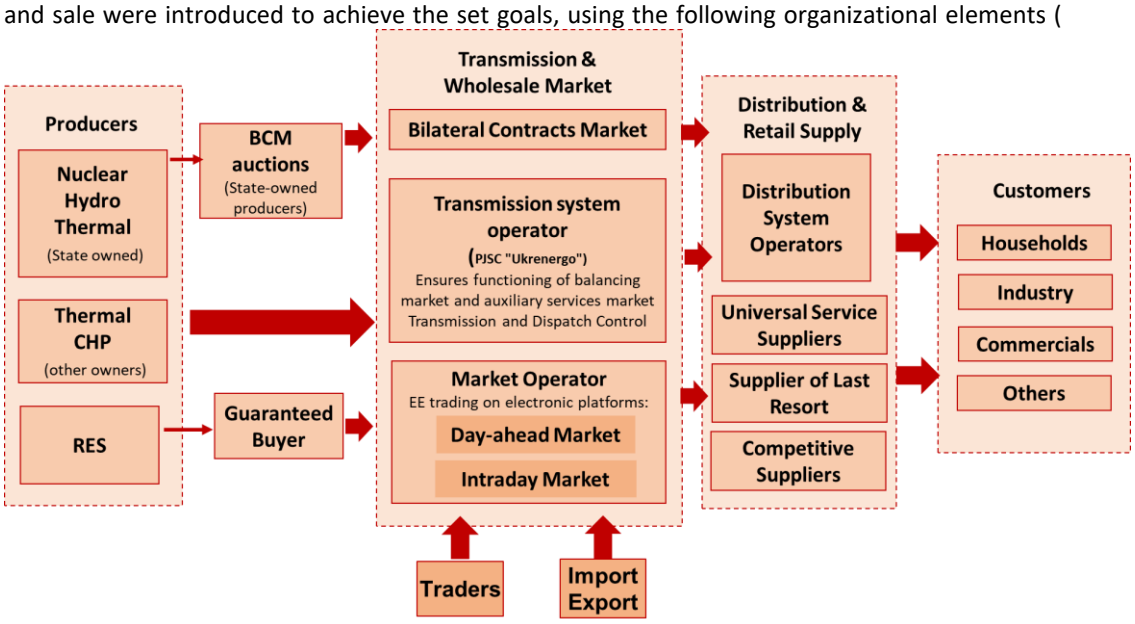

Figure **3**):

- **the bilateral contracts market** (BCM), in frames of which part of the electricity produced at state-owned generation facilities is sold through auctions outside the organized market segment.

[2] The Energy Strategy of Ukraine until 2035 "Security, Energy Efficiency, Competitiveness" Available at: http://mpe.kmu.gov.ua/minugol/control/publish/article?art_id=245234085

[3] The Law "On the Electricity Market of Ukraine", No.2019-VIII, 13 April 2017. Available at: https://zakon.rada.gov.ua/laws/show/2019-19

Bilateral contracts are concluded for a long-term period with an equal supply schedule. Electricity purchased at the BCM is sold to the household consumers at prices set by the NEURC;

- **the day-ahead market** (DAM), where electricity is bought and sold on the next day following the trading day. Functionally, it is an exchange market that determines a single electricity price according to the margin pricing based on the balance of aggregate demand and aggregate supply. Bidders may submit bids for the day-ahead market auction within 7 calendar days before the day of delivery and until 11:00 am on the day preceding the day of delivery;
- **the intraday market** (IDM), where the electricity purchase and sale are carried out continuously after the end of trading at the day-ahead market and during the day when electricity is supplied physically.
- **the balancing market** (BM), where participants buy and sell electricity the production or consumption of which was not initially planned. It allows to solve problems related to balancing electricity production and consumption.

The State guarantees the purchase of all electricity produced by RES facilities under the new market model. The **Guaranteed Buyer** is obliged to buy electricity from producers who operate on the "green" tariff[4] as well as from producers selling at the auction price.
The “green” tariff is set for variety of renewable energy powers plants until 31 December, 2029. The figure below depicts the existing tariffs.

Feed-in (Green) Tariffs in Ukraine per Draft Law 8449-D, EUR/MWh (version 1)

Technology / Commiss. Year	01.01.2017-31.12.2019	01.01.2020-31.12.2020	01.01.2021-31.12.2021	01.01.2022-31.12.2022	01.01.2023-31.12.2024	01.01.2025-31.12.2029
Biomass	123.86	123.86	123.86	123.86	123.86	123.86
Biogas	123.86	123.86	123.86	123.86	123.86	123.86
Geothermal	150.25	135.17	135.17	135.17	135.17	120.09
Mini hydro (0.2-1 MW)	139.48	125.48	125.48	125.48	125.48	111.48
Small hydro (1-10 MW)	104.47	94.24	94.24	94.24	94.24	83.47
Solar (ground based)	150.25	112.55	108.78	105.01	101.24	97.47
Solar (roof/facade based)	163.71	122.79	118.48	114.71	110.4	106.63
Wind (>2 MW turbines)	101.78	90.47	90.47	90.47	90.47	79.16

* based on the Draft Law approved for the second reading by the Parliament Fuel & Energy Committee on 27.02.2019
** rate of the green tariff depends on the power plant's commissioning date and is fixed until 31.12.2029
*** information on renewable power plants with small installed capacity is not included
Source: IMEPOWER

Figure 2. Feed-in tariffs in Ukraine. Source Imepower.

At the same time, it is also Guaranteed Buyer responsibility to organize the support quotas allocation auctions in accordance with the Law of Ukraine "On Alternative Energy Sources".

More detailed information on the structure and functioning of the new electricity market and the definitions of major market participants can be found in Annexes 1 and 2. The Figure below presents the schematic functioning of the new electricity market.

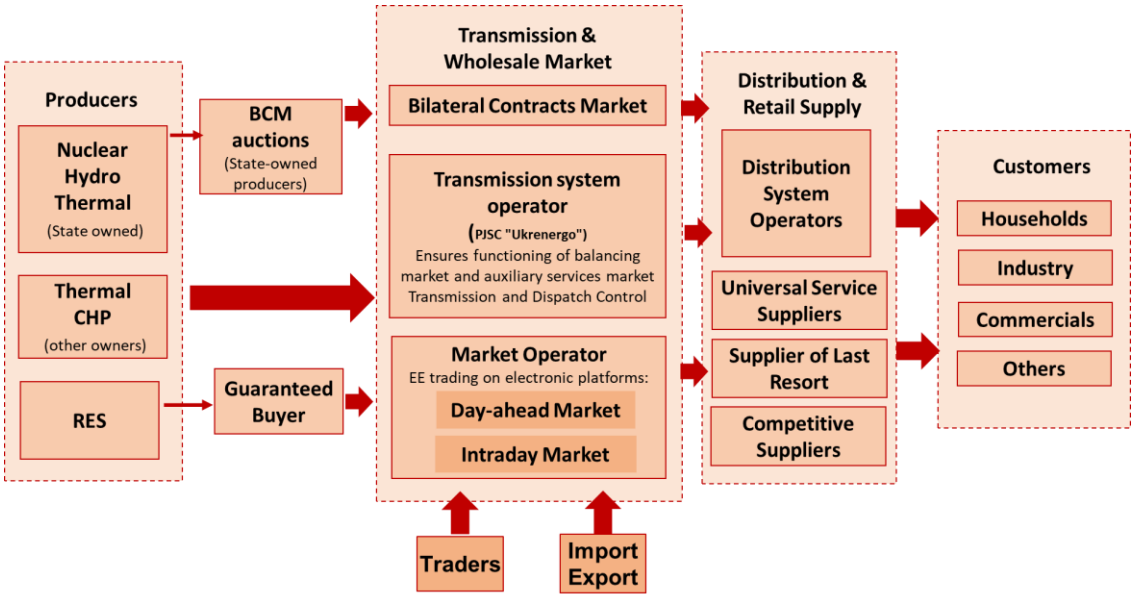

Figure 3. Scheme of electricity market functioning after 01.07.2019

Despite certain advantages of the new model of the electricity market and the introduced mechanisms, in the process of its functioning starting from 1 July 2019, some **problematic aspects** have been identified and need further attention.

Price increase for industrial consumers by 20-30%[5] due to the following factors**:**

- Limited availability for low-cost nuclear power produced by Energoatom NJSC for industrial enterprises. Under the new model, industrial enterprises are able to purchase only 10% of such electricity (the remaining 90% is used to cover the household electricity needs). As a result, industrial consumers are forced to buy more expensive electricity generated by thermal power plants;
- a high tariff of the distribution system operator (DSO) for electricity transmission (today it is 31 kopecks per 1 kWh);
- a growing share of electricity from renewable energy sources (hereinafter – RES) in the overall energy balance. The SE Guaranteed Buyer buys it at a weighted average price of UAH 4800 per 1 MWh, which is three times higher than the market price.

The shortage of electricity in the day-ahead market (DAM) and the intraday market (IDM). This is due to the fact that most of the electricity generated by thermal generation is realized in the bilateral contracts market. As a result, this creates a shortage of supply in the above market segments. At the same time, TPPs are not interested in selling electricity at a night tariff because its price is more than two times lower than a "day" tariff. In addition, TPPs can sell produced electricity at a higher price (by 15%) in the balancing market.

The balancing capacity shortage due to increased electricity production from RES plants. In particular, electricity production from RES increased by almost 108%[6] (Table 1) against the backdrop of the overall decline in electricity production by 1.4% over the first nine months of the year compared to the same period in 2018.

Poor technical condition of main electricity, generation, transmission, and distribution engineering facilities.

[5] The electricity price for the household consumers did not change: NEURC and the Government have fixed the mechanism of electricity supply to the household consumers at the tariffs that had been in force before.

[6] The official website of the Ministry of Energy and Environment. Information on electric energy complex operation in September 2019. Available at:
http://mpe.kmu.gov.ua/minugol/control/uk/publish/article?art_id=245406407&cat_id=245183225

In Ukraine, there are more than 40 power plants (except for power plants which use RES), including 4 nuclear power plants, 16 large hydro power plants and hydroelectric pumped storage power plants, 15 thermal power plants, 5 large CHPPs, and others. All of the main power generation facilities, i.e. thermal and nuclear power plants, were built in the Soviet era, and most of them must be modernised or decommissioned in the coming years. According to the estimates in the Energy Strategy of Ukraine until 2035[7], by 2025 Ukraine will have an excess of power generating facilities, and after 2025 it will need to modernise them. If the modernization process is not carried out, the facilities, which provide approximately 80% of the current production (20-25 GW), can be decommissioned by 2035 without the possibility of extending their service life.

More than 90% of high-voltage overhead lines with the capacity of more than 220 kV and 55% of the main equipment of electrical substations have run out the estimated service life (25 years), and 56% of high-voltage overhead lines and 17% of electrical substations have been in operation for more than 40 years. The electricity distribution networks have run out 2 - 3 terms of the standard service life[8].

1.3. IDENTIFICATION OF THE KEY MARKET STAKEHOLDERS

1.3.1. Institutional Ukrainian stakeholders in light of recent administrative changes

According to the Ukrainian legislation, the state policy-making and state policy implementation in the electricity market is carried out by the following institutional bodies within their powers:

- **The President of Ukraine** - defines the strategic goals and objectives of the state policy on the functioning and development of the state's energy complex;
- **The Verkhovna Rada of Ukraine** - defines the principles of the state energy policy, which are set by the laws of Ukraine. The Verkhovna Rada Committee on Energy, Housing and Utility Services plays the main role in the legislative process. Nine draft laws aimed at regulating various aspects of relations in the electricity market are now under its consideration[9];
- **The Cabinet of Ministers of Ukraine** - as the supreme executive body, ensures the implementation of the state energy policy, coordinates activities of the central executive bodies, issues directives that are mandatory for execution;
- **Ministry of Energy and Environmental Protection of Ukraine** (MinEcoEnergo) - is the main body in the system of central executive authorities responsible for state policy-making and state policy implementation in the electricity sector. A new Ministry of Energy and Environment was created in September 2019 and is result of merging the Ministry of Energy and Coal Industry and the Ministry of Ecology and Natural Resources. In contrast to the previous ministry, a new function of this Ministry is to ensure the state policy-making and state policy implementation in the field of efficient use of fuel and energy resources, energy conservation, renewable energy sources, and alternative fuels[10];
- **State Agency on Energy Efficiency and Energy Saving of Ukraine (SAEE)** – implements the state policy in the field of efficient use of fuel and energy resources, energy saving, renewable energy sources, and alternative fuels. In September 2019, it was transferred from the responsibility of Ministry of Regional Development to the Ministry of Energy and Environmental Protection;
- National Energy and Utilities Regulatory Commission **(NEURC)** – carries out state regulation in order to balance the interests of consumers and economic entities operating in the fields of energy and utilities. According to the decision of the Constitutional Court of Ukraine as of

[7] The Energy Strategy of Ukraine until 2035. Available at: http://mpe.kmu.gov.ua/minugol/control/uk/doccatalog/list?currDir=50358

[8] International practices in improving the efficiency of electricity transmission and distribution, optimization of electricity losses in power grids of all capacity levels. Available at: https://ua.energy/wp-content/uploads/2018/01/4.-Efektyvn_peredav_rozpod_elektroen.pdf

[9] The official website of the Verkhovna Rada of Ukraine Available at: http://w1.c1.rada.gov.ua/pls/zweb2/webproc6_current_main?id=&pid069=233

[10] Statute of the Ministry of Energy and Coal Industry of Ukraine. The Resolution No.847 of the Cabinet of Ministers of Ukraine dated 18 September 2019. Available at: https://zakon.rada.gov.ua/laws/show/847-2019-%D0%BF

13 June 2019[11], certain provisions of the Law of Ukraine "On the National Energy and Utilities Regulatory Commission" were recognized as not in conformity with the Constitution of Ukraine, and therefore some powers of this the body will be changed.

- **Ministry for Development of Economy, Trade and Agriculture of Ukraine** - regulates the energy market within the tasks related to policy-making and implementation of the state economic development policy, as well as implements the state policy in the field of technical regulation and standardization. The Ministry engages the Better Regulation Delivery Office (BRDO), which was created as an independent structure, to provide expert and analytical support for energy market reform processes;
- **Ministry of Finance of Ukraine** - regulates the energy market within policy-making and implementation of the state financial and budgetary policy, as well as implements the unified state tax and customs policy. In February 2019, the Ministry was granted the right to manage Ukrenergo NEC, which was a state-owned enterprise, and conducted its reorganization into a private joint-stock company. The Ministry ensures the issue of shares of the company and is its shareholder on behalf of the state. The establishment of PJSC will provide an opportunity to attract the loan funds through the Memorandum of Understanding with the EU.

In accordance with the Law of Ukraine “On the Electricity Market”, structural changes were made at the operational level of the electricity market. In April 2019, under the Government resolution, state-owned enterprises named Guaranteed Buyer and Market Operator were created on the basis of Energorynok State Enterprise.[12]

SE Market Operator[13] is an administrator of the indicative electricity market and is responsible for organizing the sale and purchase of electricity in the day-ahead market and in the intraday market, helping to maintain a balance between demand and supply. Also, there is a proposal to create an energy market monitoring administrator on the basis of Market Operator in the future.

SE Guaranteed Buyer[14] ensures the purchase of all electricity produced at electricity facilities, which use alternative energy sources (in the case of hydropower – produced only by micro, mini and small hydropower plants), at a set "green" tariff in accordance with legislation, as well as obtains profit from conducting business activities.

At the same time, the function of the **Transmission System Operator** is entrusted with the State Enterprise "Ukrenergo National Energy Company", which was transformed into a Private Joint Stock Company in July 2019[15]. According to its Statute, NEC Ukrenergo:

- carries out dispatching (operational and engineering) management of the modes of operation of the United Energy System (UES);
- ensures the functioning of the balancing market and the ancillary services market;
- performs the functions of the Commercial Electricity Metering and the Billing Administrator.

In addition, there have been series actions undertaken to reorganize regional distribution companies. On their basis, new separated companies have been established (primarily privately owned): Distribution System Operators and electricity suppliers.

According to the Law on Electricity Market:

- **Distribution System Operators** – secure reliable and effective operation, maintenance and development of distribution systems, as well as ensure long-term capacity of the distribution system in relation to meeting demand for electricity distribution

[11] The official website of the Constitutional Court of Ukraine. Available at: http://www.ccu.gov.ua/novyna/ksu-vyznav-nekonstytuciynymy-okremi-polozhennya-zakonu-ukrayiny-pro-nacionalnu-komisiyu-shcho
[12] The Resolution of the Cabinet of Ministers of Ukraine "On Establishing Guaranteed Buyer and Market Operator State Enterprises" dated 17 April 2019. Available at: https://www.kmu.gov.ua/ua/npas/pro-utvorennya-derzhavnih-pidpriyemstv-garantovanij-pokupec-ta-operator-rinku
[13] The official website of Market Operator State Enterprise. Available at: https://www.oree.com.ua/
[14] The official website of Guaranteed Buyer State Enterprise. Available at: http://www.gpee.com.ua/
[15] The official website of the State Enterprise "Ukrenergo NEC". Available at: https://ua.energy/about/statut/

- **Electricity Suppliers** – carry out electricity sales based on supply contract to the consumer. Suppliers also perform the functions of Universal Services Suppliers and Supplier of Last Resort.

The list of this and other important stakeholders is further visualized in Annex 3.

1.3.2. International organizations and initiatives

Ukraine joined the Energy Community in 2011 and undertook series of obligation in terms of renewable energy development as well as liberalization of energy markets (electricity and gas). Further, the EU Association agreement enforced progress in these areas and more international support was provided to help Ukraine in the process.

Energy Community Secretariat (ECS) is actively maintaining dialogue with Ukrainian authorities and regularly comments in case the plans or decision of Ukrainian government contradict the Treaty or puts the effectiveness of reforms at risk[16]. Also the ECS supports the processes aimed to improve inter-transmission system operator cross-border trade mechanisms between Moldova and Ukraine as part of EU4Energy support for electricity market reforms in the countries[17].

Meanwhile, International Financial Institutions are preparing series of investment programmes that would strengthen grid capacities and overall condition.

EBRD launched a programme Ukrenergo Transmission Network Modernisation targeting to enable "Ukrenergo to upgrade its key transmission infrastructure, required for synchronisation with the European Network of Transmission System Operators for Electricity (ENTSO-E) and an integral part of Ukraine's ongoing alignment programme with the EU 3rd Energy Package"[18]. Also, according to the acting chairman of Ukrenergo Mr. Kovalchuk[19], they will also cooperate with EBRD for developing Battery Energy Storage Systems / energy storages in Eastern Ukraine.

The **World Bank Group**, International Finance Corporation, is currently launching a project "Storage Ukraine". The project aims to bring large storage projects to market, by a viable business model for energy storage in Ukraine and necessary regulation and commercial documents for the implementation of these projects on the competitive basis[20] by private sector investors.

Eurelectric (the Union of the Electricity Industry) is another international player that is not yet fully present and active in Ukraine. DTEK and the Association of Distribution System Operators (electricity) of Ukraine are members of the organization, which aims at supporting development and competitiveness of the electricity industry, promotes carbon-neutral electricity mix and demand-side management solutions.

[16] For instance, the latest statement was made regarding possible Electricity Market Law amendments, among them limitations on the RE off-take from the plants with the capacity of more than 150 MW without compensation to the producers, restriction of electricity exports and imports, and price caps on the wholesale market (https://www.energy-community.org/news/Energy-Community-News/2019/010/22.html)
In September, 2019 the Secretariat expressed concerns regarding increased electricity volumes to be sold under the Public Service Obligations (PSO) framework, risking the competitive market functioning (https://www.energy-community.org/news/Energy-Community-News/2019/09/05.html)
In June the big issue was the threat to independence of the Regulator (https://www.energy-community.org/news/Energy-Community-News/2019/06/25.html), namely the Constitutional Court of Ukraine on the 13th of June 2019 declared the regulator to be subordinated to the Cabinet of Ministers, which contradicts the Third Energy Package to which Ukraine is bound by its accession to the Energy Community (https://www.energy-community.org/news/Energy-Community-News/2019/06/25.html).
[17] Source: https://energy-community.org/news/Energy-Community-News/2019/09/019.html
[18] Source: https://www.ebrd.com/work-with-us/projects/psd/ukrenergo-transmission-network-modernisation.html
[19] Source: https://ua-energy.org/uk/posts/yebrr-ta-ifc-dopomozhut-ukraini-vprovadyty-systemy-nakopychennia-enerhii
[20] Source: https://Developmentaid.org

Finally, there are number of projects and initiatives which among others participate or initiate dialogues related to electricity market reforms and increasing share of renewable energy generation in Ukraine's system. One of the largest projects which is worth noting, is the **USAID Energy Security Project (ESP)** which started in July 2018 and will last until June 2023[21]. With the budget of USD 85 million, the project will support Ukraine's government among others, "to integrate into European energy markets, by helping key government agencies and the energy regulator to meet EU energy acquis requirements, including the Third Energy Package; improve energy security establishing competitive energy markets in electricity, natural gas and district heating sectors; and increase energy supply in Ukraine by facilitating private sector-led energy investments in, and increasing production of renewable energy sources".

1.4. ON-GOING AND UPCOMING CHANGES WITHIN THE ELECTRICITY MARKET REFORM IN UKRAINE AND ITS IMPACT ON THE INTEGRATION OF RENEWABLES

1.4.1. Renewable energy development current status and feed-in tariff

According to the National Renewable Energy Action Plan until 2020 (approved by the CMU decree #902-p from 01/10/2014) Ukraine targeted to ensure 11% of renewable energy in the total country final energy consumption. At the same time, the National Strategy of Ukraine until 2035 (CMU decree #605-p from 18/08/2017) Ukraine targets to achieve 25% of energy produced from renewable energy sources in the total primary energy supply. With these two documents the overall renewable energy targets of Ukraine have been set.

Between January and December 2018 the renewable energy market has experienced 54% growth in terms of installed capacity (large hydro excluded)[22]. This has been mostly an outcome of a favourable feed-in tariff (green tariff) set up in 2009. The first larger wave of projects came into operation during 2014 and then after slow-down period in 2015-2016 the growth began again. The power plants that are going into operation or will receive the pre-PPA until the end of 2019 will still be receiving green tariff until 2029 inclusive.

According to the Ministry for Energy and Environmental Protection (MinEcoEnergy), the total installed capacity of the renewable energy power plants reached 2,136 MW in 2018, with further increase to 3,773 MW as of 6 months of 2019. The expectation is that by the end of 2019 the total installed capacity will reach approx. 5,733 MW.[23]
The data on installed capacity of renewable energy power plant from the State Agency for Energy Efficiency and Energy Saving (SAEE) slightly differs from the one of MinEcoEnergy and is presented on Figure 4.

The share of electricity produced from renewable energy in the total final energy supply is expected to increase from 1.9% in 2018 to 4% and 6% in 2019 and 2020 respectively.

Most of the renewable energy plants are the large scale solar PV technology followed by a growing number of wind parks. The share of biomass is fairly small, but has been gradually increasing. The same is true for small scale individual PV installations of private households. As of the second quarter of 2019, almost 12 thousand households have invested in solar PV plants with the installed capacity of 276 MW. For comparison, in the end of 2017 it was only 3,010 households and installed capacity of 51 MW[24].

[21] Source: https://www.usaid.gov/ukraine/energy-energy-security
[22] 2019 KPMG-Ukraine Ltd.."Renewables in Ukraine", July 2019
[23] Presentation of MinEcoEnergy, at the meeting with Investor, October, 2019
[24] State Agency for Energy Efficiency and Energy Saving

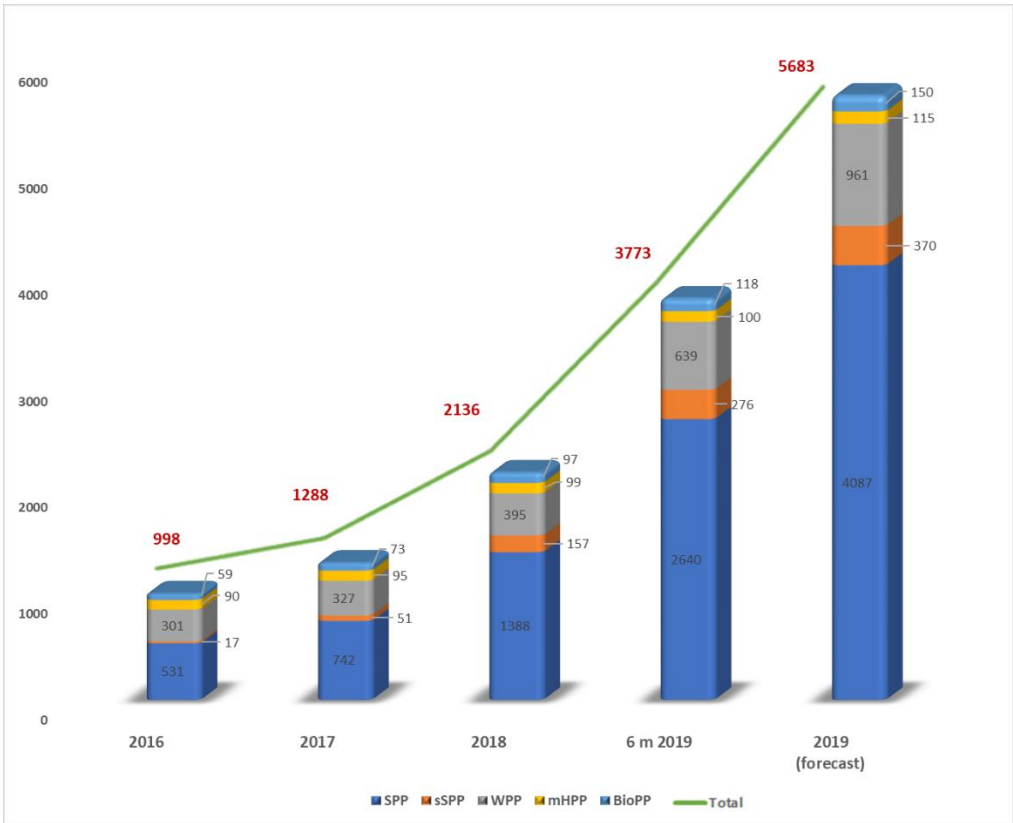

Figure 4. Installed capacity (MW) of alternative energy power plants in Ukraine between 2016 – 2019. Source: State Agency for Energy Efficiency and Energy Saving. October 2019.

The total investment in renewable energy since 2014 amount to approximately EUR 3.34 billion. The Figure below presents percentage breakdown of investment into various types of alternative energy plants.

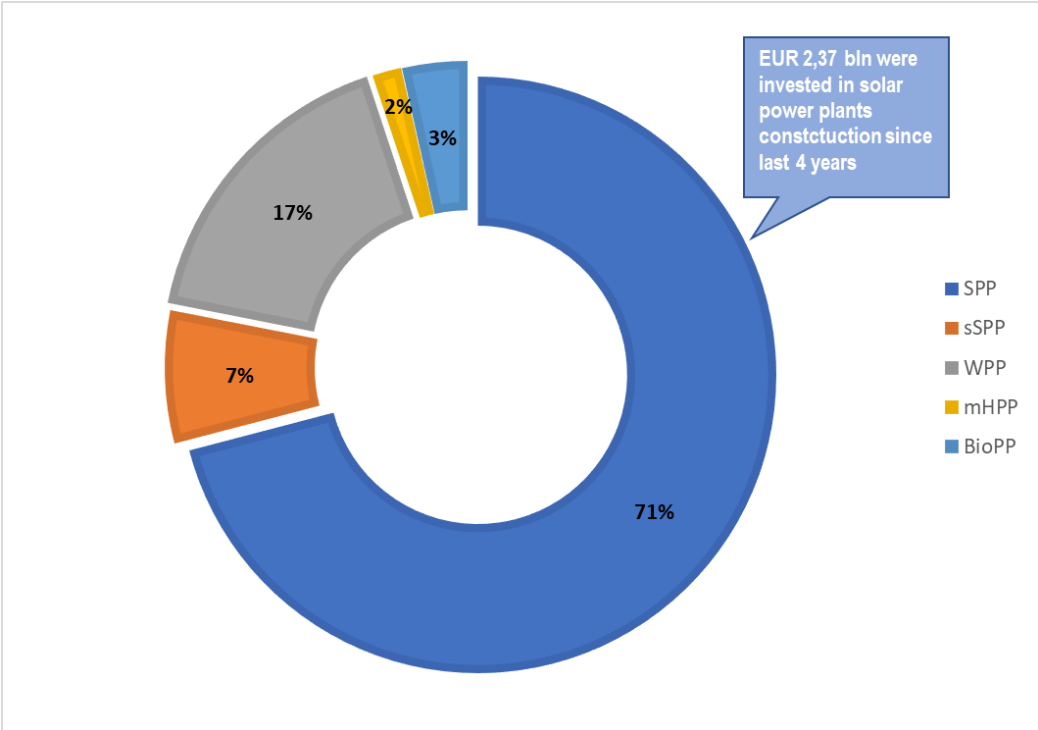

Figure 5. Investments to the installation of RE capacities in Ukraine (2015-9 months 2019) Source: State Agency for Energy Efficiency and Energy Saving, October 2019.

According to the statements by Ukrenergo in summer 2019, the **technical conditions for grid connection given to potential renewable energy producers amount to 7.4 GW**, while the real **connection capacities** for solar and wind power plants are **estimated to be not more than 3GW** - 1.5 GW for solar and wind each.

To reach the 2035 Energy Strategy target of increased renewable energy capacity to the 15.6 GW (excluding large hydropower plants) the capacity of the united energy system for connection of renewable energy power plants **has to be increased by 12.6 GW** by 2035[25].

1.4.2. Auction system and quotas allocation

Since the launch of "green tariff" (feed-in tariff) law in 2009, and once the installed capacities of renewable energy generation started increasing, the debate within the country increased regarding feasibility of paying the highest green tariff in Europe. While the prices for electricity for industrial and residential consumers have been dramatically growing, some policy makers and industry players have been arguing that Ukraine cannot bear financial load resulting from such a support scheme for renewable energy. The technical challenges related to grid and balancing capacities to connect growing number of renewable energy generation plants also became high on agenda. The process for seeking options and alternatives for the feed-in tariff brought to the table "the auction system".

The Auction Law was eventually introduced in April 2019 and offered the new auction system for support quota allocation for alternative energy power plants receiving pre-PPA agreement after 31 December, 2019. The key features of the new model comprise:

- Bi-annual auctions starting 2020 in April and October[26]. (The test auction was planned to be carried out by the end of 2019, though as of the date of this document preparation there has been no information available regarding the plans and timeframe to carry out such test-auction. ***It is important to note***, that carrying out such test auction is an important pre-condition to ensure successful launch of auction systems already in April 2020)
- Quotas for various types of alternative energy sources to be set for five years ahead by the Cabinet of Minister of Ukraine based on proposal from MinEcoEnergy (with respective contributions from Ukrenergo and State Agency for Energy Efficiency and Energy Saving)
- The auction price would be valid for 20 years from the date of commissioning

In October 2019 the Ministry of Energy and Environmental Protection of Ukraine published the draft decree of Cabinet of Ministers "On the introduction of competitive conditions to stimulate electricity production from alternative energy sources" for public consultations. The document foresees the adoption of secondary legislation concerning organization of auction for support quotas allocation, namely:

- approval of the Procedure for holding auctions for support quota allocation;
- approval of the Procedure for the selection of e-site operators for the auction on support quota allocation;
- designation of the state-owned enterprise Prozorro. Sales as an administrator of the electronic trading system.

This set of secondary legislation aims to ensure the transparency of competitive procedure and competition during allocation of support quotas, while being easy to use for potential investors.

In October 2019, SAEE already presented the **initial suggestion to the quotas** for the coming years, starting with 400 MW in 2020, with the further 100 MW increase annually until 2024.

The 2020 quotas will be split by 200 MW for April 1 and October 1 each. The first 200 MW are suggested to include 50 MW for Solar, 100 MW for wind and the remaining 50 MW for other types

[25] Presentation Ukrenergo

[26] Relevant for plants exceeding the installed capacity of 1 MW for solar PV and 5 MW for wind power plants. Other power plants producing electricity from alternative energy sources could participate in the auctions on the voluntary basis.

of alternative energy. The quotas have to be further discussed or alternatives have to be suggested by Ukrenergo. Further, MinEcoEnergo will assess the suggestions by SAEE and Ukrenergo and submit them for approval of the Cabinet of Ministers of Ukraine.

While the overall framework seems to be in place, there is still a lot to be done and finalize prior to the smooth launch of the auction systems. Among necessary focus areas are:

- Launching the test auction until the end of 2019 with consecutive analysis of the problematic issues, lessons learnt and areas for improvement
- Approval of the size of support quota
- Approval of relevant procedures and secondary legislation, among which:
  - Procedure for holding auctions
  - For selection of e-site operator for the auction
  - Designating Prozorro.Sales as an administrator of the trading system
  - Finalization of the procedure for selecting a responsible bank for electricity market and setting requirements for the banks providing guarantees
- Organizational and technical preparations with respective provision of information to potential auction participants

1.4.3. Existing feed-in tariff system and possible retrospective changes

The new government elected in 2019 has made it one of their priorities to reduce energy prices for end consumers. Renewable energy as believed by some of the policy makers has a significant impact on the higher end-consumer prices. This has caused certain discussions about potential changes to the existing feed-in tariff model and for the power plants already in operation.

Short chronology:

- In September and throughout October the rumours were causing tension among existing and potential investors about retrospective changes of the existing green tariffs.
- The comments and position of governmental officials varied in their public statements.
- The industry associations, among others including American Chamber of Commerce and Industry, European-Ukrainian Energy Agency, Association of Renewable Energy, European Business Association, Ukrainian Wind Energy Association, etc. – have initiated a series of written and public statements and position papers explaining the potential negative consequences of any retrospective changes leading to international arbitration and increased losses for the Ukrainian government.
- International organizations, including EBRD, EU Delegation and Energy Community Secretariat have also in various forms expressed their concerns and related risks.
- On October 15, the head of the Verkhovna Rada Energy Committee at the industry round-table discussion stated that he does not support retrospective changes to the market.
- The following day, on October 16th the Committee passed the draft law, which among other, excluded large renewable energy power plants with the installed capacity over 150 MW from priority dispatch, while allowing curtailment without compensation[27].

While the overall issue has not yet been settled, after the series of public criticism certain governmental institutions reduced their efforts for pushing these amendments forward and invited the industry players for a further dialogue.

Nevertheless, the uncertainty caused by lack of clear strategy and plans of the government have caused disturbance on the market, increased investor uncertainty and reduced confidence in further prospects of market development. It is nevertheless not clear if such activities have caused any specific investors to put their investment plans on hold as of October 2019.

[27] Following the round of reactions in response to draft law, Energy Community Secretariat published position with their analysis where the law contradicts the Energy Community Treaty. Source: https://energy-community.org/news/Energy-Community-News/2019/010/22.html

1.5. BARRIERS TO RENEWABLE ENERGY INTEGRATION - SUMMARY

The uncertainty of the policy makers' high-level policy position on existing mechanisms for promoting renewable energy through "green tariffs". Political and electoral factors have strong impact on the process of preparation and decision making . As a consequence, efforts to change at the legislative level the conditions for reimbursement of investment costs incurred by private businesses in previous years are a cause for concern and distrust on the part of business and potential investors.

Poor forecasting system for electricity production from renewable energy in Ukraine does not allow to predict accurately the level of generation of wind and solar power plants. In particular, the Report on Compliance (Adequacy) Assessment of Generating Capacities[28] introduced a forecast error of about 30%, with a standard rate of 50%. Therefore, the priority action for ensuring the integration of RES is the introduction of a system of accurate forecasting with the following deviations: 5-10% for the day-ahead market, 3-5% for the intraday market.

As of today, the estimated error used for forecasting electricity generation from RES is 30-50%.

A variable generation mode and low accuracy of renewable energy generation forecasts necessitate the use of balancing capacities. When the potential of hydro power plants and hydroelectric pumped storage power plants is exhausted, heat generation facilities of the secondary regulation will be used. In 2018, their use increased by 200 MW up to 850 MW, which has led to an increase in payments to TPPs/CHPPs for the manoeuvrability by UAH 1 billion[29].

Uncertainty of financing mechanism for the construction of highly manoeuvrable (balancing) facilities. According to NEC Ukrenergo, the estimated cost of constructing the required number of stations (gas turbine and gas piston stations) is about UAH **55** billion[30]. In order to attract investors to fulfill this task, the Government approved the Procedure for Conducting a Tender for Construction of a Generating Facility and Realising Demand Management Measures[31] in July 2019.

At the same time, the energy sector players[32] believe that investors who can build the necessary facilities need guarantees that they will be able to compensate their costs, i.e. the mechanism prescribed by law. To date, due to absence of such a mechanism and the uncertainty of operation under the new electricity market, such facilities are not under construction.

Although with the introduction of the new model the energy market has become more open to investors, due to the imposition of temporary price restrictions[33] the electricity market has not yet shown the proper investment signals for the construction of manoeuvrable generation facilities[34].

Imperfect regulation of the balancing market. The balancing market, which was established after the introduction of the new market model, involves the introduction of financial responsibility for electricity producers from RES for the deviation of their actual volumes of electricity output from the planned output daily schedules. According to the business, introducing financial responsibility

[28] Report on Compliance (Adequacy) Assessment of Generating Capacities. Available at: https://ua.energy/wp-content/uploads/2019/04/ZvitAdekvatnostiGenPotuzhnostej_31_03_2019.pdf
[29] Renewable energy support model in Ukraine should be improved taking into account world best practices. Available at: https://ua.interfax.com.ua/news/economic/567844.html
[30] The official website of the State Enterprise "Ukrenergo NPC". Available at: https://ua.energy/osnovni-podiyi/ukrenergo-proponuye-plan-s-rozvytku-vde/
[31] Resolution No. 677 of the Cabinet of Ministers of Ukraine "On Approval of the Procedure for Conducting a Tender for Construction of a Generating Facility and Realising Demand Management Measures" dated 10 July 2019. Available at: https://zakon.rada.gov.ua/laws/show/677-2019-%D0%BF
[32] The official website of VS Energy International Ukraine. Available at: https://vsenergy.com.ua/zagalna-informacija/
[33] Market rules (Section X. Final and Transitional Provisions), approved by the NEURC Resolution No. 307 of 14 March 2018. Available at: https://zakon.rada.gov.ua/laws/show/v0307874-18
[34] Restricted energy market: price cap for investors. Available at: https://www.finnishenergyhub.com/post

for green generation producers may cause great damage to the sector. Investors who have taken foreign currency loans for their projects will suffer significant "unexpected" losses due to such requirements, and their reduced solvency will lead to non-repayment of credit funds, outflow of investments in the sector due to its instability and will slow down the development of the industry at the most case or its complete decline at the worst case[35].

The incompleteness of the process of introducing new approaches to "green energy" pricing through the use of auction mechanisms for the construction of new generating facilities. In May 2019, the Verkhovna Rada of Ukraine adopted a law providing for measures to ensure competitive conditions for electricity production from alternative energy sources[36] (Auction Law). The implementation of these measures aims to reduce the excessive cost burden for electricity consumers in Ukraine, which will continue to grow rapidly with the commissioning of new power plants, and introduce the provision of state support to electricity producers from RES on a competitive basis (auction basis).

Regulatory restrictions to enter the market and RES activities. Despite the efforts of the Government to develop the electricity generation from RES, the market players have expressed their point of view about the need:

- To improve the availability of information on assessing the technological and engineering capacity of different types of RES in the regions of Ukraine and the possibilities of connecting to electrical networks;
- To optimise procedures of obtaining permits and specifications for connection to electrical networks.

In addition, under functioning of the new electricity market model, to ensure further reduction of regulatory influence through further improvement of the existing secondary legislation, in particular:

- pricing at the balancing market;
- implementation of PSO (Public Service Obligation) requirements

1.6. COMPARISON OF THE EXISTING UKRAINIAN SITUATION WITH THE SIMILAR INITIATIVES AND PROJECTS ON RENEWABLE ENERGY INTEGRATION IN EUROPE

In order to compare the existing Ukrainian situation and initiatives on renewable energy integration and changers on the local electricity market, the experience of Germany and Poland was taken as example.

Both countries were chosen as an example due to the following factors:

- Historically, Poland and Germany used solid fuels (mainly coal) for electricity generation before penetration of the renewables to the electricity markets. So, the situation in Poland and Germany at the initial stages of market transformation is similar to Ukrainian;
- The electricity markets of the noticed countries were organized in regional monopolies at the end of 1990's. The new market rules and penetration of renewables turned the direction towards increasing competitiveness and market-oriented pricing relationship. This is also similar to Ukrainian situation with introduction of electricity market regulations and rules.

The table below shows the main items and "lessons learnt" during/from the market transformation and integration of the renewable energy to the grid based on German and Polish experiences. These items could be starting points for review and discussion of the ways to resolve the existing Ukrainian issues on the market transformation and integration of the renewables.

[35] Pitfalls of the electricity balancing market. Available at: https://uare.com.ua/novyny/543-pidvodni-kameni-balansuyuchogo-rinku-elektroenergiji.html

[36] The Law of Ukraine "On Amendments to Some Laws of Ukraine on Ensuring Competitive Conditions for Electricity Production from Alternative Energy Sources". Available at: https://zakon.rada.gov.ua/laws/show/2712-19

Germany	**Poland**
Launching of new electricity market	
2005: The national Energy Act adopted in 2005 started the deep transformation of electricity market and introduced the unbundled transmission system operators (TSOs) and distribution system operators (DSOs) as well as new regulation for network changes and investments.	**1997-2013:** The Energy Law Act of 1997 created the foundations for the operation of the sector on market conditions and introduced the sector regulator. **2004-** TSO established in electricity and gas sector. In **2007** TSO and DSO were separated. **2013-** Amendment to the Energy law act (EU third energy package)
Introduction of the auctioning system	
2016: The Renewable Energy Sources Act 2017 (EEG, 2017) was introduced in Germany in 2016. Starting in 2015, the first (pilot) rounds were already executed for solar PV and in 2017, onshore wind will become subject to tendering as well. **Experience: auctions have been successful in driving down costs. Within less than two years, the prices for solar PV fell by almost 40% from 0.92 to 0.57 EUR/kWh.** In comparison with the administrative procedures in adjusting support levels to cost reductions, auctioning system is faster and more flexible.	**2016:** The relevant RES Act was approved by the Parliament on 20 February 2015 and entered into force on 1 January 2016 **Experience:** Poland has been operating a hybrid support scheme since 2016. New renewable power plants can receive support in an auction-based feed-in premium (FIP) system, while old power plants are part of a green certificate system. It is possible, however, to migrate from the green certificate system to FIP through auctions. **The winners in the 2016 and 2017 auctions were almost exclusively PV plants, and in 2018 only PV.** While PV might be more competitive at this scale than onshore wind turbines, the data reveals that the ceiling price for wind was significantly lower than the average awarded price of the auction in all three years. **This suggests that higher ceiling prices set for onshore wind could have resulted in lower average prices.**
Grid capacity management and investments to the grid capacities	
Investments made: 4 German TSOs (TenneT-TSO Germany, Amprion, 50Hertz, EnBW Grids segment) invested totally approx. EUR 16.6 bln. Into grid capacities since 2014-2018. Another EUR 36.5 bln. are planned to be invested in the next 5-6 years. **Experience:** **The investments into the grid development and management followed by increased transmission tariffs as a result of increased operational costs and a steadily growing regulated asset base.** Germany already has one of the highest unit transmission tariffs in comparison with other European countries.	**Investments made:** the investments into grid development in Poland in the last 5 years reached appox. EUR 10 bln. It is estimated, that by 2030, investment in transmission and distribution networks may amount to approximately 23 EUR bln. **Experience:** Major part of the investments into the grid development was attracted form the foreign investors which could be a good case for Ukraine.
Forecasting of electricity production from renewable energy sources	

Germany	**Poland**
Experience: The grid operators together with research institutes changed the composition of weather predictions to adapt the system to the new needs, and included additional information about the renewables facilities in their calculations (for example, attitudes not 10 m, but 100 m). **Keeping the grid stable in terms of volatile wind and solar energy becomes an ever more complex – and potentially costly – task.**	**Experience:** As a part of European Meteorological Society (EMS) Poland started the research and development on the improvements of weather forecasting systems in 2012. Which resulted in increased accuracy of forecasts by 7-10% according to the rough assessments.

Table 1. Comparison of the Ukrainian situation with the similar initiatives and projects in Germany and Poland[37]

2. PART 2: STRATEGIC AREAS FOR IMPLEMENTATION OF POLICY ACTIVITIES

The results of the performed desk-top analysis lead to the tentative thematic areas with specific existing or possible issues. Such issues include regulatory, policy, financial, investment and other tasks to be resolved in order to support the integration of renewable energy into the grid.

This issues and their grouping will be further taken as the basis for the questionnaire and stakeholder discussions with the task to further prioritise them and identify any gaps. Should these thematic areas be re-confirmed they will be further discussed at the workshop, with the purpose to make a plan on how to resolve or deal with the specified issues.

Strategic Area 1. Clear overall country strategy and internal / external communication

In the time of reforms implementation and seeking solutions for existing issues the communication is very important. This is surely relevant for communication on policy and institutional barriers within the country, as part of the process on seeking compromise. At the same time, the signals that each individual governmental authority, as well as country as a whole are sending to international partners and investors is extremely important for a healthy development of the sector. These positions and plans should be well coordinated and not contradicting.

In this regard strategic objectives might include:

- *Harmonization of goals* and tasks for renewables development within the existing economic environment and energy market
- Ensuring *stable framework* and environment for the overall renewable energy development
- Improving the *coordination* within authorities with consecutive alignment of communicated messages

[37] **Sources:** Auctions for the Support of Renewable Energy in Poland Main results and lessons learnt, AURES II - funding from the European Union's Horizon 2020, Germany's grid operators face growing multibillion-euro investment challenge: Energy transition a boon for green bonds; SCOPE Ratings, 2019; The contribution of the Polish energy sector to the implementation of global climate policy, Polish Electricity Association, December 2018; Integrating Variable Renewables in Poland, forum-energii.eu, 2018; European electricity markets panorama: Poland, aleasoft.com, 2019; The Polish power industry in energy transformation process, Lidia Gawlik, Mineral economy, 2017; Renewable energy statistics, IRENA, July 2019; Transforming the energy system, IRENA, September 2019; The response of market and policy design to increasing shares of renewables in California and Germany, Dallas Burtraw, Jim Bushnell, Christian Gambardella, Michael Pahle, April 2019; Part 3: Recommendations on the policy actions and SWOT Analysis

- *Ensuring communication* with international organizations within the areas of their interest by seeking feedback to ideas, draft laws and/or regulations at early stages prior to their approval[38]

Strategic Area 2. Improved balancing market functionality and increased grid capacities

The objectives within this strategic area might include:
- Improvement of forecasting renewable energy generation
- Improvement of the mechanisms for the price setting on the balancing market, including those related to public service obligations and their impact on various market segments
- Optimization of responsibility principles for the producers of electricity from renewable energy sources for imbalances (penalties)
- Implementation of the strategy for grid modernization

Strategic Area 3. Auctions set-up and launch and investor accessibility

In light of transition of the market from the feed-in tariff systems towards auction system several gaps have been identified and need to be managed to ensure smooth transitions. Among them the following objectives are considered:
- Ensuring availability of information about the technical potential of various types of RES in regions of Ukraine as well as grid connection capacities
- Optimization of permitting procedures and technical conditions for grid connection
- The procedure for carrying out auctions on support quota allocation
- The procedure and criteria for selection of electronic market operators for carrying out auctions for support quota allocation
- Principles, criteria and procedures for setting the quotas, their sizes/quantities, as well as the procedure for usage of non-distributed support quotas

Strategic Area 4. Promoting investment opportunities into the grids, renewable energy and innovative technologies

Investment and financial aspects for RE integration are important to perform in accordance with the set targets. The focus should be on ensuring investment protection mechanisms and framework for new innovative technologies' integration, including the following objectives:
- Strengthening of mechanisms for protecting investments into RE
- Establishing technical and framework conditions for investments into:
    - Additional balancing capacities,
    - Accumulations / storage systems,
    - Electricity transportation systems,
    - Digitalization of commercial metering,
    - Demand management technologies, and others
- Identifying investment mechanisms for various of the above mentioned areas (state support, international funding, private investments, etc)

3. PART 3: RECOMMENDATIONS ON THE POLICY ACTIONS AND SWOT ANALYSIS

This chapter will be elaborated prior to finalization of the assignment based on the results of interviews and the organized workshop.

The SWOT Analysis for the indicated findings and initiatives, primarily based on selected thematic areas will be performed.

Final recommendations and conclusions will be briefly summarized.

[38] Here it is specifically meant to involve stakeholders like those relevant to ENTSO-E, EU Delegation, Energy Community Secretariat, Eurelectric, Private developers and investors, EBRD, World Bank group, other donors.

ANNEX

ANNEX 1: STRUCTURE OF THE NEW ELECTRICITY MARKET IN UKRAINE

	Bilateral agreements	Organized segment of the Electricity Market			Retail market	Ancillary services
		Day-ahead market	Intraday market	Balancing market		
Description	Bilateral agreements concluded between market participants in an arbitrary form for the purchase and sale of electricity outside the organized market segments	A segment of the electricity market, which sells and buys electricity to be supplied a day ahead of a particular trading day	A segment of the electricity market in which the electricity purchase and sale is carried out continuously after the end of trading at the day-ahead market and during day of the electricity physical supply.	A market organized by the electricity TSOs to provide sufficient electric power and energy needed to balance the volumes of real-time electricity production and imports, electricity consumption and exports, to ensure the settlement of system limits in the unified energy system of Ukraine, as well as the financial settlement of electricity imbalances.	The system of relationships that arise between the electricity consumer and the electricity supplier during the electricity supply process, as well as between other market participants that provide electricity-related services.	The system of relationships associated with the acquisition of ancillary services by TSOs from ancillary service (AS) providers; AS - services that the Transmission System Operator (TSO) purchases from ancillary service providers to ensure the stable and reliable operation of the UES of Ukraine and electricity quality in accordance with established standards;
Operator	Market participants	Market Operator (MO)		Transmission System Operator (TSO)	Electricity Suppliers (ES), TSOs, Distribution System Operators (DSOs)	Transmission System Operator (TSO)
Subjects	Electricity Producers, Electricity Suppliers, TSOs, DSOs, Guaranteed Buyer, Traders, Consumers	MO, Electricity Producers, Electricity Suppliers, Guaranteed Buyer, DSOs, TSOs, Traders		TSO, Electricity Producers, Electricity Suppliers, Guaranteed Buyer, Settlement Administrator, and Consumers, provided that they have acquired market participant status and become the party responsible for the balance	Consumers, ESs, TSOs, DSOs, other market participants providing services related to the electricity supply to consumers.	TSOs and ancillary service providers (electricity producers, electricity suppliers, and consumers)
How regulates the relations between the participants	Market rules	The rules of the day-ahead market and the intraday market		Market rules	The rules of the retail market and contracts between its participants	Market rules

	Bilateral agreements	Organized segment of the Electricity Market			Retail market	Ancillary services
		Day-ahead market	Intraday market	Balancing market		
Peculiarities of functioning	Electricity Suppliers cover most of their electricity needs. The Regulatory Authority has no right to interfere with the pricing and the relationship between the parties to the bilateral agreements. The Guaranteed Buyer has the right to carry out the electricity sale and purchase transactions by concluding bilateral agreements. Suppliers have the right to enter into direct bilateral agreements with producers on terms that are the subject of agreement between the parties, including the fixing of the long term price for electricity, which allows to predict revenues and expenses more accurately. A trader buys electricity solely for the purpose of resale, except for its sale to the consumer.	Functionally, it is an exchange market that determines a single electricity price according to the margin pricing based on the balance of aggregate demand and aggregate supply. According to the trading results, the price and volumes of electricity purchase and sale for each accounting period and other indicators that can be used as a benchmark (indicator) for the conclusion of transactions for the purchase and sale of electricity at the electricity market are announced. SE "Market Operator" is responsible for the announcement of the trading results at the day-ahead market and at the intraday market on its website (https: www.oree.com.ua) The day-ahead market and the intraday market: 1) provide price signals to market participants, incl. the market of bilateral agreements; 2) cover short-term demands; 3) provide an alternative access to the market for those who have not concluded long-term contracts; 4) cover the production of generators that are temporarily out of operation; 5) enable to increase the efficiency of the production schedule; 6) eliminate the risk for counterparties, in particular non-payment risks; 7) allow to reduce the imbalance. In order to ensure a sufficient level of liquidity at the day-ahead market, the Regulatory Authority may set limits on the electricity sale/purchase.		Ensuring real-time balancing of electricity production and imports and electricity consumption and exports. At the balancing market, the TSO: 1) plans the mode of operation of the unified energy system of Ukraine for the next day; 2) buys and sells electricity to balance electricity supply and demand during the day; 3) buys and sells electricity in order to settle electricity imbalances of the parties responsible for the balance. The balancing market is actually a system of settlements made on the basis of electricity consumption, which is aimed at stimulating the most accurate execution of the stated schedules of consumption and production. The market participants: - a balancing group - an association of market participants, established on the basis of the balancing group agreement; - a Guaranteed Buyer balancing group - a balancing group in which a guaranteed buyer is the party responsible for the balance.	Meeting the needs of consumers of electricity and related services.	The ancillary service market sells/provides the following ancillary services to ensure: 1) regulation of frequency and active capacity indicators, maintenance of balance of capacity and energy in the unified energy system of Ukraine, namely: - services of primary, secondary, tertiary regulation with provision of corresponding regulating capacity reserve; - provision of new and/or reconstructed generating capacity reserves; 2) maintaining the parameters of reliability and quality of electricity in the unified energy system of Ukraine, namely: - voltage and reactive power regulation services; - services to ensure the restoration of functioning of the unified energy system of Ukraine after system failures.

	Bilateral agreements	Organized segment of the Electricity Market			Retail market	Ancillary services
		Day-ahead market	Intraday market	Balancing market		
Main types of agreements	Bilateral Agreement - electricity purchase and sale agreement concluded between two market participants outside the organized market segments, except for consumer electricity "supply" contracts. Shall be concluded for a long-term period with an equal supply schedule in arbitrary form. Shall predict as accurate as possible how much electricity consumers need.	Electricity purchase and sale agreement at the day-ahead market is concluded in electronic form between the market operator and the participant of the day-ahead trade for the electricity purchase and sale according to the day-ahead trading results. Pursuant to the day-ahead market agreement, the day-ahead market trader and market operator simultaneously accept rights and obligations for the electricity purchase and sale according to results of the respective day-ahead trading.	Electricity purchase and sale agreement at the intraday market is concluded in electronic form between the market operator and the participant of the intraday trade for the electricity purchase and sale according to the intraday trading results. Pursuant to the intraday market agreement, the intraday market participants simultaneously accept rights and obligations for the electricity purchase and sale according to results of the respective intraday trading.	A balancing group agreement is an agreement which determines a market participant that is a member of such an association responsible for the electricity balance of all other market participants that are part of such an association. Balance responsibility is established - the obligation of market participants to report and adhere electricity hourly schedules in accordance with the volume of purchased and sold electricity and to be financially responsible for the settlement of imbalances.	Consumer electricity supply contract	Ancillary service contracts concluded on the basis of standard ancillary service contracts.
Electricity pricing methodology	Free (market). Market rules	Free (market). The price for electricity is determined by the Market Operator in accordance with the Market Rules.		The price and cost of imbalances are determined by the Market Rules. Payment for electricity transmission services and dispatching (operational and engineering) management services shall be made at tariffs determined by the Regulatory Authority.	Free/ State-regulated in the cases provided for by Articles 63 and 64 of the Law "On the Electricity Market of Ukraine"	State-regulated in the cases provided for by Article 69 of the Law "On the Electricity Market of Ukraine"

ANNEX 2: KEY PARTICIPANTS OF THE NEW ELECTRICITY MARKET IN UKRAINE

	Market participants								
	Electricity Producer	Transmission System Operator (TSO)	Market Operator (MO)	Guaranteed Buyer (GB)	Trader	Distribution System Operator (DSO)	Electricity Supplier	Consumer	
								Industrial consumer (IC)	Residential Consumer (RC)
Description	A legal entity that produces electricity (nuclear, hydro, thermal power plants, thermal power plants, CHPP, renewable energy power plant)	A legal entity responsible for operation, dispatching, maintenance, development of electricity transmission system and interstate electricity transmission lines, as well as for ensuring the long-term capacity of the electricity transmission system to meet reasonable demand for electricity transmission;	A legal entity that ensures the functioning of the day-ahead market and the intraday market and organisers purchase and sale of electricity at these markets;	A legal entity that is obliged to buy electricity from producers that have a "green" tariff, as well as from producers at auction price and perform other functions specified by law;	A legal entity that purchases electricity solely for the purpose of resale, other than sale under the consumer electricity supply contract;	A legal entity responsible for the operation, maintenance and development of the distribution system and for ensuring the long-term capacity of the distribution system to meet reasonable demand for the electricity distribution, taking into account **environmental and energy efficiency requirements**;	A legal entity that sells electricity under the electricity supply contract to the consumer;	An individual entrepreneur or a legal entity that buys electricity to be used for business needs. A Small IC is a consumer who is not a residential consumer and buys electricity for his own consumption, whose electrical units are connected to electricity networks with a contractual capacity of up to 50 kW;	Individual RC: - an individual; - uses electricity for own needs; - does not include professional and/or economic activities. Collective RC: - a legal entity created by the union of RCs; - pays for electricity according to the readings of the general electricity meter; - consumes electricity for own needs;

	Market participants								
	Electricity Producer	Transmission System Operator (TSO)	Market Operator (MO)	Guaranteed Buyer (GB)	Trader	Distribution System Operator (DSO)	Electricity Supplier	Consumer	
								Industrial consumer (IC)	Residential Consumer (RC)
Functions	Electricity production	Ensuring the functioning of the electricity transmission system. Administrates settlements, provides organization of the electricity market operation. Administrates commercial accounting at the electricity market.	Ensuring the functioning of the day-ahead and intraday markets	To implement state guarantees for the purchase of all electricity produced by renewable energy power facilities. To organize auctions for the allocation of support quotas in accordance with the Law "On Alternative Energy Sources"	Purchase and sale of electricity under bilateral agreements and in organized segments of the electricity market, except for its sale under the consumer electricity supply contract.	Ensuring the functioning of the electricity distribution system.	Electricity supply to the consumer. Universal Service Supplier(USP) Supplier of Last Resort (determined by the Cabinet of Ministers of Ukraine).		- does not include professional and/or economic activities.

	Market participants								
	Electricity Producer	Transmission System Operator (TSO)	Market Operator (MO)	Guaranteed Buyer (GB)	Trader	Distribution System Operator (DSO)	Electricity Supplier	Consumer	
								Industrial consumer (IC)	Residential Consumer (RC)
Activities (rights)	To sell electricity under bilateral agreements, except for the volumes subject to mandatory sale at the day-ahead market according to the provisions of this Law	To buy and sell electricity for: - balancing of electricity supply and demand within the current day; - regulating imbalances of electricity of the parties responsible for the balance.	To organize purchase and sale of electricity the day-ahead and intraday markets	To buy electricity from renewable energy producers ("green tariff"/auctions), as well as from the CHPPs if such entities are part of the balancing group of the GB. To provide TSOs with services to increase the share of electricity production from alternative sources.	To buy and sell electricity at the electricity market, export and import electricity at free prices	To buy electricity under bilateral agreements in order to compensate for the electricity consumption by engineering electric networks during its distribution, except for the volumes subject to the mandatory purchase at the day-ahead market according to the provisions of this Law.	To buy and sell electricity under bilateral agreements and/or at the day-ahead market, intraday market and at the balancing market, as well as through imports. To choose freely a contractor under a bilateral agreement	To buy electricity for own needs: - under bilateral agreements and in organized market segments, subject to the conclusion of an agreement on imbalance regulation and an electricity transmission services agreement with the transmission system operator, and in case of connection to the distribution system, an electricity distribution services agreement with the operator distribution systems; - at the retail market from electricity suppliers or producers which produce electricity at distributed power generation facilities, according to the rules of the retail market. To change the electricity supplier.	

ANNEX 3: THE LIST OF THE KEY MARKET STAKEHOLDERS

RES Stakeholders and activity	Policy national level	Law framework development	Policy implementation	Invest programs management	Regulation energy market	Management energy market	Energy and Demand side Management	Energy production	Energy distribution or supply	Services to Energy market	Funding of projects or investment support	Awareness and communication
Stakeholders of National Policy level												
President of Ukraine	★											
Verkhovna Rada of Ukraine	★	★			★							
Cabinet Ministry of Ukraine	★	★			★							
Ministry of Energy and Environmental Protection	★	★	★	★	★							★
Ministry of economy development	★	★										
Ministry of finance	★	★										
State Agency for energy efficiency & energy saving		★	★		★							★
Energy and Utilities the National Regulatory comission					★							
Stakeholders of National Operational level												
"Ukrenergo" JSC - TSO			★	★	★	★	★		★			
"Guaranteed Buyer" SE			★		★	★				★		
"Market Operator" SE			★		★	★				★		
Distribution System Operators				★			★		★			
Traders									★			
Universal Service Suppliers									★			
Supplier of Last Resort									★			
Competitive Suppliers									★			
Stakeholders of Production level, Industry Associations, Civil Society , Think Tanks												
Ukrainian Renewable Energy Association		★						★				★
Ukrainian Wind Energy Association		★						★				★
Bioenergy Association of Ukraine		★						★				★
Energy Association of Ukrainian Hydrogen Council		★						★				★
Better Regulation Delivery Office (BRDO)	★	★								★		★
Dixi Group										★		★
European-Ukrainian Energy									★	★		★
Association of DSO of Ukraine									★	★		★
International Institutions and organizations												
EBRD		★									★	
World Bank group / IFC		★									★	
USAID		★			★							★
Energy Community Secretariat		★			★		★					★
EU Delegation		★										
Eurelectirc							★		★		★	★