



# Policy consulting for optimised grid integration of renewable electricity in Ukraine

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## 1. **ABSTRACT**

### 1.1. ENGLISH VERSION

The project “System transformation for an optimised integration of renewable energies in Ukraine” implemented by dena has proven to be highly relevant and timely for the Ukrainian market.

Ukraine is undergoing an active phase of reform on the energy market due to, among others, the launch of electricity market reform in summer 2019. The reform has led to number of policy, technical and economic challenges, with a potentially strong impact on the players in the renewable electricity market.

The change in government in 2019 and their initiation of changing the market rules has put at risk the implementation of a number of renewable energy projects and might have potential retroactive impact on power plants in operation.

Following an overall market analysis, in-depth interviews with market experts, and a lively workshop discussion with a broad range of Ukrainian stakeholders in the energy sector and selected German experts, there is a common understanding on a validated need to jointly develop an overall energy roadmap and a specific action plan. This should define the further rules for the balancing market, should support the establishment of a reliable investment climate and facilitate monitoring the launch of auctions for support quota allocation.

The results of this dialogue and the very positive resonance by Ukrainian stakeholders confirm that the exchange of knowledge should be continued and deepened. Specifically, at the current stage of market set-up and strategic decisions being made by Ukraine there is a strong need in capacity building on technical and economic aspects of grid transformation and the integration of renewable energy facilities. In this sense, the Energy Transition path of Germany provides a valuable knowledge base.

## 1.2. GERMAN VERSION

Das von dena durchgeführte Projekt „Systemtransformation für eine optimierte Integration erneuerbarer Energien in der Ukraine“ hat sich für den ukrainischen Markt als äußerst relevant und aktuell erwiesen.

Die Ukraine befindet sich in einer aktiven Reformphase des Energiemarkts, unter anderem aufgrund der Strommarktreform welche im Sommer 2019 startete. Diese Reform hat zu einer Reihe politischer, technischer und wirtschaftlicher Herausforderungen geführt, mit potenziell starken Auswirkungen auf die Akteure am erneuerbaren Strommarkt.

Der Regierungswechsel im Jahr 2019 und die damit verbundene Einleitung von Änderung der Marktregeln haben die Umsetzung einer Reihe von erneuerbaren Energieprojekten gefährdet und möglicherweise auch rückwirkende Auswirkungen auf in Betrieb befindliche Kraftwerke.

Nach einer Gesamtmarktanalyse, eingehenden Interviews mit Marktexperten und einer aktiven Workshop-Diskussion mit einem breiten Spektrum ukrainischer Akteure im Energiesektor und ausgewählten Experten aus Deutschland wurde die Notwendigkeit erkannt, gemeinsam eine Energie-Roadmap sowie einen spezifischen Maßnahmenplan zu entwickeln. Dadurch sollen Regeln für den Ausgleichsmarkt definiert werden, die Etablierung eines zuverlässigen Investitionsklimas unterstützt werden und das Monitoring der Einführung des Auktionsverfahrens zur Zuteilung von Förderquoten erleichtern.

Die Ergebnisse dieses Dialogs und die sehr positive Resonanz der ukrainischen Interessensgruppen bestätigt, dass der Wissensaustausch fortgesetzt und vertieft werden soll. Insbesondere in der jetzigen Phase des Marktaufbaus und der strategischen Entscheidungen in der Ukraine besteht ein hoher Bedarf an Kapazitätsaufbau zu technischen und wirtschaftlichen Aspekten der Netzumwandlung sowie der Integration erneuerbarer Energieanlagen. In diesem Zusammenhang sind die Erfahrungen aus der Energiewende Deutschlands eine wertvolle Wissensbasis.

### 1.3. UKRAINIAN VERSION

Проект «Системна трансформація для оптимізованої інтеграції відновлюваних джерел енергії в Україні», що реалізується Dena, виявився дуже актуальним та своєчасним для українського ринку.

Україна переживає активну фазу реформ на енергетичному ринку через, серед іншого, започаткування реформи ринку електроенергії влітку 2019 року. Реформа призвела до ряду політичних, технічних та економічних викликів, що можуть мати сильний вплив на гравців ринку відновлюваної електроенергії.

Зміна Уряду у 2019 році та ініційовані ним зміни правил ринку поставили під загрозу реалізацію низки проектів з відновлювальної енергетики, та можуть мати потенційний зворотний вплив на електростанції, що працюють.

Після загального аналізу ринку, поглиблених інтерв'ю з експертами ринку та жвавої дискусії під час семінару з широким колом українських зацікавлених сторін в енергетичному секторі та відібраними німецькими експертами, існує спільне розуміння щодо підтвердженої потреби спільної розробки загальної дорожньої карти для енергетичного ринку та конкретного плану дій. Ці документи мають визначити подальші правила балансування ринку, повинні підтримувати створення надійного інвестиційного клімату та сприяти моніторингу запуску аукціонів для розподілу квот підтримки.

Результати цього діалогу та дуже позитивний резонанс українських зацікавлених сторін підтверджують, що обмін знаннями слід продовжувати та поглиблювати. Зокрема, на цьому етапі створення ринків та стратегічних рішень, які приймає Україна, існує значна потреба у розбудові потенціалу з технічних та економічних аспектів трансформації мереж та інтеграції об'єктів відновлюваної енергії. У цьому сенсі шлях енергетичного переходу Німеччини забезпечує цінну базу знань.

## 2. OVERALL PROJECT TIMELINE AND DELIVERABLES

The policy Consultant has been commissioned by dena to support with consultancy services in frames of the project “System transformation for an optimised integration of renewable energies in Ukraine”. Specifically, iC consulenten has been assigned 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.

With this purpose the Consultant performed the following activities:

- **Desktop analysis** of the current energy market policy developments in Ukraine with the focus on renewable energy. The report has been submitted on November 11, 2019 (Reference made to Annex 1, separately attached)
- The Consultant participated in the **Steering Committee** meeting held in Kyiv on November 12, 2019 where the initial results of the analysis and priority areas were presented
- In November and December the Consultant attended two **workshops** organised in Berlin by the grid-focused consultant EGI and held mainly for Ukrenergo, to align the issue relevant for both, the technical and the policy components within the overall project
- The results of this analysis have been further used to prioritise areas of intervention through a series of stakeholder meetings. For this purpose, the Consultant elaborated and confirmed with dena the questionnaire and in December, 2019 and January, 2020 held **10 interviews with stakeholders**. The report “Interview – Summary of Results” has been submitted to dena on January 16, 2020. (Reference made to Annex 2, separately attached)
- The **Policy Workshop** has been organized in Kyiv on March 5, 2020 and has been attended by over 50 market stakeholders, including representatives of the government, Ukrenergo, business and experts’ community. The report “Policy Workshop Summary” has been submitted to dena on March 12, 2020. (Reference made to Annex 3, separately attached)
- The Abstract of this report has been translated into German (Annex 4) and Ukrainian (Annex 5) languages, in accordance with the ToR.
- The Consultant will further attend **the Steering Committee** meeting in Kyiv to be held in April, 2020

This report is focused on summarising recommendations deriving out of all previous stages of the assignment, including the discussions held at the Policy Workshop, aiming to provide specific ideas for potential actions to optimize renewable energy integration into Ukrainian grid with the indication of their potential Opportunities and Threats (SWOT analysis).

It is important to note that Ukraine’s renewable energy market is currently undergoing significant changes due to the recently launched electricity market reform, preparation of auctions, technical grid challenges, etc. Number of topics like balancing market, auctions, new technologies are lacking strong technical and economic analysis, which in turn causes low understanding of possible solutions and partially strong disagreements of reasonable ways forward among the market stakeholders and policy makers.

The Policy Workshop was organized in a brainstorming format, to allow for ideas exchange. All summary results are based on these discussions, but any of further steps or actions have to be individually assessed. **Due to drastically different opinions on the market regarding possible solutions to various challenges, it is not the intention of the Consultant to choose the right one.** Rather, it is in Consultant's opinion, very valuable to contribute to the dialogue, identify information and knowledge gaps, as well as potential areas where additional efforts and support might be beneficial for the optimized integration of renewable energy into the Ukrainian grid.

### 3. SUMMARY OF STRATEGIC SESSIONS DISCUSSIONS IN THE POLICY WORKSHOP

The priority areas selected for the workshop, as a result of stakeholder interviews, have proven to be relevant and important for Ukraine. The most attended was the strategic session related to improved balancing market functionality and increased grid capacities.

It is important to note, that the time did not allow to thoroughly discuss all details for each strategic session and sub-topics, and in the end the moderators' and group specifics might have impacted the content output. Therefore, the purpose of the summary of discussions is to summarise the overall results. The recommendations in the following chapter will focus on specific ideas for actions derived from both, the group discussions and Consultant's bilateral communication with stakeholders throughout the assignment duration.

As per feedback from the workshop participants, the "lessons learnt from Germany" preceding group discussions were very well received. There is valuable experience to be shared with Ukrainian stakeholders, which could be elaborated at later stages.

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

Clear country strategy and commitment for sustainable development and diversification of energy mix are important signals to attract investors and foreign direct investments. The existing "green tariff" in Ukraine has facilitated this process causing number of European investors to enter the market and local companies to expand their renewable energy capacities.

Unfortunately, due to mismanagement in political decision making over the years, launch of electricity market and change of the government in 2019, number of structural market issues started to arise putting new and existing investments at risk.

The purpose of this Strategic area was to address and discuss the following policy gaps and market challenges:

- Absence of clear national strategy regarding the role of renewables in Ukraine's energy sector
- Poor communication of the policy makers with the market, between the national authorities, as well as with the international partners and organizations regarding possible strategies for development and integration of renewables in the years to come;



- Talks about potential retroactive changes to the feed-in support system, which started in autumn 2019<sup>1</sup> and have caused uncertainties for number of renewables energy project developments on the market

In addition, it is important to note that the overall understanding of the benefits of the renewable energy in terms of real economic value, potential jobs created, positive impact on the environment is largely misperceived by the general public and some policy makers. Therefore, the lack of clear support towards renewable energy expansion can be influenced by this low awareness.

#### Outcomes from the discussions with market stakeholders

The participants of the workshop within this session agreed on some of the following:

- It is important that the government **aligns/harmonizes all the relevant strategic documents** to assign clear priorities of energy sector developments. The recently announced “Ukrainian green deal” aiming at 70% renewables by 2050 is ambitious. At the same time the statements about strong possible moves towards supporting further development of coal-based generation appeared among some policy makers. The instability and non-clarity about potential changes on the renewable energy market and lack of reaffirming signals about Ukraine’s plans, are not supporting renewables integration. The need to align government strategies remains an important priority for the months to come. Among possible sub-actions the following were mentioned:
  - o Action roadmap for the future renewable energy development and integration (2030, 2040, 2050);
  - o Short-term action plan by 2025 and a forecast scenario for development of renewable energies by 2030<sup>2</sup>.
- On the technical side, the participants outlined the need to establish a **system of prognosis and responsibilities for imbalances**. This area needs to be addressed as early as possible to reduce technical risks for the system operator and avoid delays with Ukraine’s entrance to ENTSO-E.
- One of the issues, which came up outside the group discussion, but was presented at the closing round-table, was the need of **internal coordination of Ukrainian authorities and institutions**. While it is clear that the Ministry for Energy and Environment bears primary responsibility for energy planning, the decisions taken or plans are often poorly communicated to relevant parties. It is important that

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<sup>1</sup> The talks and non-stability caused by political declarations regarding potential retrospective changes to the green-tariff resulted in the official mediation procedure between business and the Ukrainian government, facilitated by the Energy Community Secretariat. The mediation officially commenced in January, 2020. At the time of the Policy Workshop and this report preparation, there has been no compromise reached and the changes within the Ukrainian government (specifically the new minister of Energy and Environment) delays any clarity on how the sector will develop.

<sup>2</sup> Ukrainian Energy Strategy until 2035 according to the opinion of number of market players requires an update in accordance to the new global trends and existing situation in Ukraine. The “Green Deal for Ukraine” (Green energy transition until 2050 – [view](#)) as presented by the Ministry of Energy and Environment covers the longer-term horizon and number of aspects related to development of different types of renewable energies and overall energy market of Ukraine. The discussion during the workshop built on the need that while the long-term targets have been declared, the shorter-term Roadmaps are needed, followed by precise Action Plans with specific steps. Historically, even good strategic documents that exist in Ukraine have been lacking progress in implementation, therefore it is believed by some market players that precise Action Plans with monitoring and accountability of implementation will support achievement of the set targets.

institutions and stakeholders like the Regulator, Ukrenergo (TSO), Verkhovna Rada Committee, which has to further vote for any legal amendments, business community or other relevant ministries like Ministry of Finance or Economy (in relation to those issues impacting finance or investments) are actively involved. The impact of the energy sector, and specifically of renewables on various sectors of economy, tariffs for consumer prices, social issues, investment climate should be assessed in a holistic and thought through way.

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

The launch of electricity market reform in summer 2019 and increased renewable energy generation require that the policy makers address the issues of balancing market functionality and strategy to increase the grid capacities.

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. However, the mechanism for such responsibility for imbalances, clarity of their costs, procedures for their settlement have not been finalized.

This Strategic area aimed to contribute to the following policy and regulatory gaps related to the balancing market:

- The poor forecasting methods for the renewable energy generation do not allow producers to have access to accurate forecasting data while penalizing them for forecasting errors;
- The responsibility for imbalances is lacking clarity on how the costs for imbalances will be calculated and what will be the real financial impacts on the producers;
- The Guaranteed Buyer is acting as a centralized authority responsible for buying all the electricity produced and paying to the renewable energy producers. In addition, the Public Service Obligations have been created, which oblige nuclear and hydro power generators to sell “cheaper” electricity to the end consumers, while this process is managed by the Guaranteed Buyer. This has also influence on price setting on the balancing market for market participants;
- While balancing market assumes compensation to the renewable energy produces for curtailment, the mechanism and conditions of such compensation have not been finalized.

### **Outcomes from the discussions with market stakeholders**

This Strategic area proved to be one of the most relevant and hot topics. With the planned launch of auctions and technical grid challenges it is crucial for investors to understand the balancing market and possible responsibilities for imbalances.

### ***Improved renewable energy generation forecasting is important and requires the combination of below elements:***

- It is crucial to enhance **incentives for forecasting accuracy**. There are number of opinions on the market regarding who and how should address this problem. It is possible that the state institutions (i.e. Ukrenergo) invest into improved forecasting and weather stations and provide investors with reliable information. Another opinion is that business is most equipped to make individual arrangements with service providers.

- The **price of balancing** should make investments into forecasting attractive: the price of balancing should be higher than the costs of implementing manoeuvrability and balancing technologies.
- Increasing **responsibility for the imbalance** of RES: while it is clear for market players, including business, that the responsibility for imbalances is needed, what remains to be answered are especially the mechanisms and procedures for introducing such responsibilities. It is also discussed on the market that the overall conditions for the balancing services market have to be established, so that businesses are interested to come and develop services.
- Also, the introduction of **responsibility for forecasting error**, not just imbalance was discussed as an option.

***The price setting mechanisms in the balancing market has to be improved:***

- It is important to see how the NEURC Resolution No 516 on Pricing Rules in the Balancing Market adopted on February 28, 2020 will work in practice. After there is a possibility to test how effectively it works, the need for **any amendments** can be assessed.

***Compensation mechanism for producers of electricity that is curtailed at the request of the system operator has to be established:***

- The regulatory framework only mentions that RES producers will be compensated in case of curtailments, but the conditions or mechanisms are not specified.
- German experience, for instance, clearly stated rules of shutdowns, the cost of switching-off is compensated and typically refunded by the grid users. Another option is to enter into an agreement with investors on possible shutdowns.

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

The auctions launch has been delayed by the negotiations / mediation procedure taking place between business and the government of Ukraine. While the set-up of quotas for support allocation, specifically the size of quotas for various RE types, depends on possible restructuring of the pre-PPAs currently issued to the developers (namely their cut-off date), both questions have to be solved as soon as possible. It is foreseen, that the Auctions will be carried out twice per year, in April and October each year. For 2020, the April launch of auctions is no longer feasible, but could be possible to make the test Auction in June.

The overall instability about investments into renewables and low trust of investors to the government of Ukraine are allowing for speculations whether the results of the auctions can indeed reduce the costs of renewables in Ukraine and thereby reduce the burden on the Guaranteed Buyer, which is heading towards default risks.

This Strategic Session was aiming to address some of the following policy gaps and market challenges currently influencing renewables integration into the grid:

- Lack of clarity about the auctions launch on the Ukrainian market, specifically, in regards to timelines and size of quotas for various types of renewable energy;
- Concerns among market participants related to the existing auctions design, criteria for quota allocation, usage of non-distributed quotas, etc. and need to address these issues to successfully launch the auctions;

- Need to optimize and improve the permitting procedures and technical conditions for grid connection with the purpose to attract more renewable energy participants to the market under the auctions model.

#### Outcomes from the discussions with market stakeholders

The discussion about priority actions for the Auctions launch and increased investors accessibility resulted in the following needed actions:

- Setting the annual support quotas per renewable energy type, which in turn requires:
  - o Clear understanding of the target of installed renewable capacity
  - o Finalization of mediation procedure between the Ministry of Energy of Ukraine and renewable energy market players with most critical issues regarding the cut-off date for the pre-PPAs<sup>3</sup>
- Support to establishing competitive rules, including:
  - o Shortening of validity period of technical conditions for grid connection, which would allow reduction of the “secondary market” for developed projects<sup>4</sup>
  - o Enforcement of usage of bank guarantees in case the projects are not implemented. The wind projects might require separate approach due to specifics of project development cycle
  - o Implementation of auctions with land plots (currently being prepared by the Ministry of Energy and Environment)<sup>5</sup>

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<sup>3</sup> All investors/developers that entered the market received grid connection agreements and preliminary Power Purchase Agreements (pre-PPAs), among other documents. The pre-PPAs normally define the conditions of the renewable energy purchasing (price, terms etc.). The other important moment is that the pre-PPA’s typically concluded before the certain power plant commissioning and contains the clear statement that the electricity price, indicated in the pre-PPA is valid in case the project owner will put the plant into operation during a certain period (up to 3 years). The cut-off date of the pre-PPAs is related to the government’s wish to reduce the time of pre-PPA validity and by that reduce the number of projects that will be qualified for “green tariff”. For many investors the earlier pre-PPAs cut-off date (cancellation of its validity) means they will not be able to finalize their projects in time to be qualified for the “green tariff”/expected tariff and would need to switch to auctions model or stop their investments with potential financial losses. The duration of the existing pre-PPAs is one of the key issues of disagreement between the investors and the Ukrainian government during current negotiations.

<sup>4</sup> Technical conditions for grid connection are given to developer at early stages of project cycle. These conditions are also indicating the time until when the plant has to really be connected and go into operation. It has been common on the market until recently, that local companies receive the technical condition, arrange for the set of documents for new developments and sell such developments to foreign investors on “secondary market”. Currently, there are technical conditions for grid connection on the market in the amount of 7.4 GW, and according to Ukrenergo, the existing grid can take not more than 3 GW of renewable energy. Apparently, the workshop participants believed that changes to technical conditions for grid connection would improve the “quality” of developers, reduce manipulation by selling “reserved grid capacities”.

<sup>5</sup>According to the Order on holding of auctions for support quota allocation (stipulated by the Cabinet of Ministers of Ukraine Decree #1175 dtd. 27.12.2019), the auctions could be organized in a form of “auctions with a land plot”: the land plots with certain technical parameters and specifications for connection to the existing electrical grid could be recommended by Ukrenergo and Ministry of Economy of Ukraine. Subject of endorsement by the Cabinet of Ministers. Land plot allocation and related paper work is quite time consuming for investors for larger projects. Potentially, auctions with land-plots would generate more interest from investors.

- Introduction of ex-post coefficients for stimulations for projects with reduced economic efficiency due to geographic or other factors, (which would be comparable to the German system of the reference yield model / Referenzertragsmodell)
- Improvement of the design of auctions, which might include the following:
  - Cancellation or reassessment of the rule regarding concentration of no more than 25% of annual quota with one beneficiary, due to difficulty of implementing such requirement
  - Evaluate the possibility of separating and/or combining the bids to allow a joint participation of several small and medium producers for larger capacities/quotas. Another option to enhance smaller market actors could be to allow bidding consortia to participate in the auction process.

The participants also raised an issue, during discussion with the German Regulator, that while it is clear that auction launch will take time prior it is fully operational and brings value in terms of potentially reduced prices and increased number of renewable energy market players, it is worth considering alternative supporting mechanisms. For instance, the feed-in-premium could be considered instead of feed-in-tariff, or similar solution that would be attractive to potential investors.

Overall, while the market is awaiting the test auctions it will be important to allow for the test period, evaluation and introduction of improvements to auction design (if needed) based on stakeholder consultations.

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

The Ukrainian President along with the Government declared ambitious targets on attracting foreign direct investments (FDIs). At the same time, the discussions about potential retrospective changes to the market rules caused a great instability and mistrust within the market. Promotion of investment opportunities and increased integration of innovative technologies require clear strategy and stable framework as earlier described in Strategic Area 1.

The reason for this Strategic Area to appear, came in understanding that given the country risks of Ukraine, it is not so natural that investors come and invest. Certain support mechanisms, or motivation conditions are needed. During the interview stage the opinions of stakeholders varied between those respondents that are convinced that the government should be actively involved and financially support the renewables integration, by, among other investing into specific solutions (i.e. storage, balancing capacities or demand management technologies). Others insisted that as long as the overall market framework is established, functioning and clear, the business will come and offer these solutions to the market itself.

This Strategic Session was aiming to address some of the following policy gaps and market challenges currently influencing renewables integration into the grid:

- Low trust of renewable energy investors due to discussions about potential retroactive changes to the market rules, with further influence on many other related markets requiring investments;

- Strong need in new technologies and investments that would increase technical capacity of the grid to in-take more renewable energy and balance the grid;
- Absence of mechanisms and of a strategy on how to attract investments into the new areas of the market and create framework for market development (i.e. demand driven technologies, storage batteries, etc.)

It was also important to receive feedback from the workshop participants regarding their vision on the potential role of the state in supporting investments. How much national, regional or local governments can / should be involved.

#### Outcomes from the discussions with market stakeholders

- No retrospective changes to the current green tariff rules and regulations (specifically pre-PPAs duration) should be done without coordination and agreement with the investors
- State policy should have certain “no change” periods to ensure stability and protection of investors<sup>6</sup>
- The prices on the market have to be cost-reflective (also relevant for state support mechanisms)<sup>7</sup>
- Under the specific technical and framework conditions for investments into various areas, some of the following ideas have appeared:
  - o Additional balancing capacities: price caps increase; competitive market set up.
  - o Accumulations / storage systems: all competitive market segments have to be in operation; the State should organize the contests; Naftogaz<sup>8</sup> could be obliged / encouraged to invest into storage systems.
  - o Demand management technologies: ancillary services; clear rules for small capacities aggregation.
- For the possible investment mechanisms into the various technologies the following ideas have been mentioned:

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<sup>6</sup> While the previous point addresses the existing discussion regarding potential retrospective changes to the green-tariffs it might have potential impact on the investment climate in general. Therefore, the “no change” period as discussed by workshop participants is meant to remind the natural rule: once the new mechanisms to attract investments into innovations have been established, they should be fixed for the initially declared period of time and type of support.

<sup>7</sup> It has been since long discussed whether the green tariff (GT) is fair or too generous for the country in the economic condition as Ukraine. It is a difficult and subjective discussion what is the fair remuneration for the renewables, what is the fair rate of returns, net present value and profitability of the projects. In this sense, any new investment markets or innovative technologies to be supported by specific policies have to aim to create price that truly reflect costs and fair remuneration to investors. What is “fair” remains to be discussed.

<sup>8</sup> Naftogaz of Ukraine is a vertically integrated oil and gas company engaged in full cycle of operations in gas and oil field exploration and development, production and exploratory drilling, gas and oil transport and storage, supply of natural gas and LPG to consumers. Given that it is the largest company in the energy sector and one of the largest tax payers and financially very strong, some market participants believe Naftogaz could diversify its investments and enter other energy sub-market, like balancing services. Naftogaz already started investing into renewable energy, i.e. into solar plants. The CEO of Naftogaz, Andriy Kobolev, in February 2020, declared that the company will consider investing into the gas-based electricity generation to potentially provide balancing services, but first they need to see how the dialogue with other renewable energy market players will end (ref: <https://mind.ua/news/20208125-naftogaz-mozhe-zajnyatis-gazovoyu-generaciyu-kobolev>).

- Potential grant support / co-financing of the state of i.e. 10% of the pre-investment costs (i.e. feasibility study, development of projects).
- Pilot projects could be supported by the state to test the models and convince investors that the projects are financially and economically feasible.

#### **4. RECOMMENDATIONS ON THE POSSIBLE ACTIONS AND SWOT ANALYSIS**

The recommendations are elaborated in the form of ideas for possible follow-up activities for dena. These ideas derive from the policy workshop discussions and/or the consultants' market understanding based on communication with stakeholders (marked respectively).

To make ideas specific and tangible, the consultant also specified type of support / interventions, possible beneficiary on the side of Ukraine, relevant time frame.

It is important to note that the Ukrainian renewable energy market is very dynamic at the moment, and changes are permanently occurring. In addition, there are several International Financial Organizations and donor projects that have supporting components relevant to renewable energy. At the time of preparation of this report, the consultant is not aware of any of these initiatives being implemented or supported by other organizations, but this will require separate assessment and stakeholder consultations prior to launch of any of these initiatives individually.

Potential Action / Activity / Project	Potential Beneficiary	Type of activity	Timeline	Opportunity (Positive Impact)	Threat (Possible negative consequence)	Source
<b>Strategic Area 1. Clear overall country strategy and internal / external communication</b>						
Aligning national targets / policies and strategic documents to prioritize renewable energy development throughout various sectors of economy	Ministry of Energy and Environmental	Analytical consultancy works; coordination support; stakeholder engagement	asap	The government strategy is clear, aligned, attractive for investors in the mid-term and long term future. Goals are specific and tangible	Contradiction of several strategic documents, national action plans, or possible laws, with conflicting priorities / interests	Workshop
Study on employment / jobs potential of renewable energy in Ukraine, incl. impact on the economy	Ministry of Energy and Environmental	Study and result dissemination among stakeholders and the public	n/a	Strong support to fight the myth that renewable energy does not add value to the economy	Continuous loss to other business segments which would be given the priority support by the government as those creating more employment opportunities	Consultant own communication with stakeholders
General public awareness raising campaign on benefits of renewable energy development	Ministry of Energy and Environmental / Cabinet of Ministers	Stakeholder engagement, public campaign, analytical materials	1 – 3 years of active promotion	Strong public support and understanding of benefits of renewable energy. Less resilience to unpopular governmental decisions (i.e. increased of consumer prices)	Any support or development of renewable energy market would be seen as unfair support to Ukrainian oligarchs or "greedy foreign investors"	
Establish continuous exchange on Germany's experience of "Energy transition" in workshops and bilateral meetings	Ministry of Energy and Environmental / Ukrenergo / Regulator / other stakeholders	Workshop	1 year	Understanding the problems of the "energy transition" in Ukraine and the best ways to solve them.	Slowdown in measures to ensure "energy transition". Lack of knowledge about positive experiences and hence wrong decisions in strategic planning	Workshop



Potential Action / Activity / Project	Potential Beneficiary	Type of activity	Timeline	Opportunity (Positive Impact)	Threat (Possible negative consequence)	Source
<b>Strategic Area 2. Improved balancing market functionality and increased grid capacities</b>						
Study regarding optimal models and tools for improved generation forecasting and electrical energy consumption	Ministry of Energy and Environmental / Cabinet of Ministers	Study / Consultancy support	1 year	Improved forecasting accuracy. Improved integration of RES into the grid. Supporting the reliability of the power system. Cost optimization of producers, suppliers, and consumers of electricity.	Threats to the energy operation. Increased financial costs for market participants. Decline in the quality of energy supply services.	International experience and the best practices analysis. Consultant own communication with stakeholders
Provision of support to the Ministry in identifying most optimal directions of development of balancing capacities and their financing, including establishment of balancing responsibilities for market players	Ministry of Energy and Environmental / Cabinet of Ministers	Consultancy support, stakeholder dialogue, coordination support	1 year	Improved reliability of the power system. Cost optimization of producers, suppliers, and consumers of electricity.	Threats to the energy system operation. Increased financial costs for market participants. Decline in the quality of energy supply services.	International experience and the best practices analysis. Consultant own communication with stakeholders
Policy consulting support to the Ministry in developing / improving legislation for development of balancing capacities market, including primary and / or secondary legislation	Ministry of Energy and Environmental / Cabinet of Ministers	Policy consulting support; legal support	1 year	Improved reliability of the power system. Cost optimization of producers, suppliers, and consumers of electricity.	Poor and contradicting legislation causing disturbance to market development and functionality.	Consultant opinion
Promotion of Germany's experience of conducting temporary curtailment of power generation facilities: legal, technical and financial aspects.	Ministry of Energy and Environmental / Cabinet of Ministers / other stakeholders	Workshop; analytical documents/articles	1 year	Capacity buildings of local decision makers and market participants	Lack of knowledge; decision making based on poor technical or economic analysis	Consultant's discussions with workshop participants
<b>Strategic Area 3. Auctions set-up and launch and investor accessibility</b>						

Potential Action / Activity / Project	Potential Beneficiary	Type of activity	Timeline	Opportunity (Positive Impact)	Threat (Possible negative consequence)	Source
Sharing Germany's experience in organizing and conducting auctions for the production of electricity from renewable sources	Ministry of Energy and Environmental / Cabinet of Ministers / other stakeholders	Workshop; analytical documents	1 year	Capacity buildings of local decision makers and market participants	Lack of knowledge; decision making based on poor technical or economic analysis	Consultant's discussions with workshop participants
Consulting and German – Ukrainian peer-to peer support to launch auctions in Ukraine, including lessons learnt analysis and potential improvements after test period	Ministry of Energy and Environmental / Cabinet of Ministers / other stakeholders	Consulting support; stakeholder coordination and engagement; analytical work	1 year	Improving the regulation of relations between market stakeholders.	Exacerbation of interest conflicts between stakeholders	Consultant own communication with stakeholders
Policy dialogue on possible additional mechanisms or tools to support renewable energy integration into the grid	Ministry of Energy and Environmental / Verkhovna Rada Committee / Regulator	Policy dialogue, stakeholder engagement; analysis and case studies (i.e. feed-in-premium vs. feed-in-tariff)	1 year	Additional policy tools to support renewable energy integration into the grid	Support to the methods / tools that are not most beneficial to Ukrainian market and the grid	Consultant's discussions with workshop participants
<b>Strategic Area 4. Promoting investment opportunities into the grids, renewable energy and innovative technologies</b>						
Support with development of national and / or regional incentive programmes and/or financial mechanisms to facilitate investment	Ministry of Energy and Environmental / Cabinet of Ministers / other stakeholders	Conceptual study / analysis / design of potential financial mechanism	1-3 years	Improving the investment climate. Stimulating of RES development and investment facilitation	Slowdown of "energy transition"; lack of interest from investors to enter unsecure, undeveloped or unsupported market segments	Consultant's recommendation
Development and implementation of a pilot project to support investors	Ministry of Energy and Environmental / Cabinet of Ministers / other stakeholders	Pilot project with new technologies	3-4 years	Establishing framework for new innovative (for Ukraine) investments; supporting development of new market segments; creating case studies for potential scale up; promotion of German	Lack of interest from investors to enter unsecure, undeveloped or unsupported market segments	Consultant's recommendation

Potential Action / Activity / Project	Potential Beneficiary	Type of activity	Timeline	Opportunity (Positive Impact)	Threat (Possible negative consequence)	Source
				technology and know-how		
Knowledge transfer between EU and Ukraine regarding effective innovation policies to facilitate integration of renewable energy in Ukraine	Ukrainian Ministry of Energy and Environment / Ministry for Digitalization	Knowledge transfer in form of workshops; twinning project; analytical documents; policy consulting	2-3 years	Strengthened capacity of Ukraine to develop policies for thought-through innovation support	No policy supporting innovations. Poorly designed policy that is not functioning in practice or causes money misuse with no result.	Consultant's recommendation
Joint international renewable energy research program (R&D) with Ukrainian University or academic research institutions	Ministry of Energy and Environmental / Ministry of Education / Cabinet of Ministers	R&D project for innovation promotion (potentially via Horizon 2020 or similar programme)	1-5 years	Improving the competence of Ukrainian specialists. Research stimulation for innovation promotion.	Technical and technological backlog	Consultant's recommendation

## **ANNEXES**

### **ANNEX 1: POLICY ANALYSIS**

Report Policy analysis is submitted as a separate document dated November 11, 2019

### **ANNEX 2: INTERVIEW WITH MARKET STAKEHOLDERS – SUMMARY OF RESULTS**

Report “Interviews – Summary of Results” is submitted as a separate document, dated January 16, 2020

### **ANNEX 3: POLICY WORKSHOP SUMMARY REPORT**

Report “Policy Workshop Summary Report” is submitted as a separate document, dated March 24, 2020