
UREDIF - REGULATORY SUPPORT PROGRAMME

TCS ID: 29084

FINAL REPORT

This assignment was contracted by the **Ukrainian National Commission that Implements the State Regulation in the Energy Sector** utilising European Bank for Reconstruction and Development (EBRD) funding provided by the Global Environment Facility (GEF).



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March 2013

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1. INTRODUCTION

As part of its commitments when entering the Energy Community Treaty, the Government of Ukraine (GoU) is interested in increasing the development of E-RES with the objective of improving energy security and reducing the environmental impact of their highly pollutant generation assets.

To assist in addressing these objectives and helping Ukraine to realise its renewable energy potential the European Bank for Reconstruction and Development launched the Ukraine Renewable Energy Direct Lending Facility (UREDLF or the Facility).

The Facility aims to provide development support and debt finance to renewable energy projects which meet required commercial, technical and environmental standards and comprises an amount of up to €50 million for financing projects together with Technical Assistance funded from a grant of \$8.45 million from the Global Environment Facility.

The Technical Assistance provides a comprehensive framework of support for the Facility covering (i) regulatory issues; (ii) environmental assessments; and (iii) capacity building and project support.

This project aimed to address the first issue: to support GoU in developing or completing all the necessary regulation to allow effective E-RES deployment.

Following the ToR, the general objectives of this project are:

1. Alignment of the Ukrainian legislation in the area of E-RES with the provisions of the EU and the Energy Community Treaty;
2. Ensure that all legislation relating to E-RES in Ukraine is fully consistent; and
3. Based on monitoring of E-RES development (overall and by technology type), analysis and forecasts of the sustainability of the E-RES support framework, provide amendments or additional legislation for a planned and sustainable increase of E-RES production in Ukraine.

To fulfil the specific objectives, the Scope of Work of the Assignment covered the following areas:

- Further development of secondary legislation (i.e. Rules, Regulations, Methodologies and Procedures);
- Development of tools and methods required to accompany and monitor the sustainable implementation of E-RES (registers, databases, network analysis tools, impact calculation models);
- Establishment of implementation capabilities in the various entities that have to be engaged for a successful and accelerated development of E-RES in Ukraine.

2. ACTIVITIES UNDER THE PROJECT

To fulfil the project's objectives the ToR propose seven tasks to be developed by the Consultant. These tasks are:

- Task 1: Full implementation of the existing Green Tariff Law and Methodology
- Task 2: Long-term implementation of Green Tariffs in Ukraine
- Task 3: Connection of RES-E to the network
- Task 4: RES-E operation in the Competitive Electricity Market
- Task 5: Review of the existing mechanism for tendering hydro concessions
- Task 6: Accreditation, Certification, Verification and Audit
- Task 7: Study Tour

To perform these activities the Consultant prepared an assessment of the current situation in Ukraine in the E-RES sector. This initial assessment provided guidelines to adjust the originally-proposed working plan and methodology.

This activity, which continued throughout the duration of the project, implied not only an evaluation of the existence of primary and secondary legislation but also contacting key stakeholders to obtain a clear view on barriers hampering the effective development of renewable power in the country.

After completion of the initial analysis, the Consultants analysed the measures that can be effectively implemented in Ukraine given the existing legal framework. These measures were shared and discussed with NERC and EBRD during Quarterly Meetings with the objective of providing steering control over the project results.

Lastly, the project was complemented with three study tours (Denmark, Italy and Spain) where key stakeholders had the opportunity to obtain first-hand information on state-of-the-art practices for large E-RES operation systems.

3. PITFALLS ON E-RES PROMOTION IN UKRAINE

The main purpose of introducing Article 17-1 in the Electricity Law is to promote the generation of electricity from renewable (or alternative) energy sources. Key features of this article include:

- The promotion scheme covers all “alternative energy sources” except for blast furnace gas and coke and large hydropower plants.¹
- The Green Tariff Coefficient is provided only for the following technologies: Biomass (2.3), Small Hydro (0.8), Solar PV (4.4-4.8) and Wind (1.2-2.1).
- NERC is responsible for developing the procedure to define, review and suspend the green tariff for each generation facility.²
- Includes a progressive Local Share Content Rule of 15%, 30% and 50% on 2013, 2014 and 2015.
- Introduces a degression coefficient on the GT coefficient for new (or significantly upgraded) generation facilities of 10%, 20% and 30% on 2014, 2019 and 2024 respectively.
- Asymmetrical tariff adjustment for covering the risk of UAH devaluation.

As previously mentioned, the promotion mechanism developed within this article introduces a Green Tariff (GT) scheme – which can be assimilated to the common Feed-in Tariff system widely used in the EU– in which tariffs are set at levels that should be attractive enough for investors to participate in this market.

Nonetheless, since the introduction of this additional article in the Electricity Law, the development of RES in Ukraine – except maybe for Solar PV – has barely evolved. Consequently, it is important to ask what the flaws are in the promotion scheme that prevents E-RES development in the Ukraine.

Providing an answer to this question requires an assessment of the impact of the existing legislation from two opposite perspectives: the investor and the Regulator.

3.1. INVESTOR’S PERSPECTIVE

From an investor’s perspective developing E-RES in Ukraine presents the following risks:

- The GT is provided in ex-post basis.
- Does not cover some key technologies for Ukraine, as can be the case, for example, biogas.
- Paradoxically, the system covers electricity generated by biomass, a key input for biogas, which lead to a contentious debate on the topic of why biogas was finally excluded.
- The fact that the GT is provided on an ex-post basis generates great concern for

¹ The Law of Ukraine on Alternative Energy Sources defines alternative energy sources as: “Renewable energy sources, which include solar energy, wind, geothermal, tidal and wave energy, hydropower, biomass, gas from organic wastes, sewerage gas power plants, biogas, and secondary energy resources, including the blast furnace and coke gases, methane gas from degassing of coal mines, transformation of unused power potential of technological processes”.

² This Procedure was developed and approved by NERC decree No. 32 from 22.01.2009

investors due the Local Share Content (LSC) rule. In this sense, the GT is provided if an investor can demonstrate – among other requirements – that it has reached the LSC threshold after the project has been constructed.

If, by any chance the investor fails to reach the minimum level, then he faces the fact that no promotion scheme (i.e. GT) is applicable to the project with the consequent risk of not recovering the investments made.

The probability of reaching this situation hampers the project evaluation as the risks involved in the transaction will easily surpass the expected benefits from the tariff.

In the mid-term future the current market design will be replaced by market based on bilateral contracts and a balancing mechanism, which introduces balancing risks to investors.

Even though the design of the future market has been improved in recent versions of the draft law, introducing a day-ahead market that will allow RES-E producers to sell spot, such a change in the structure generates concerns for investors who find it difficult to determine the risk exposure to the new wholesale market.

This situation can be exacerbated by the fact that the specific mechanism for paying E-RES may depend on cash availability of Energoatom, Ukrhydroenergo and the Transmission Company; this may introduce risks to determining the sustainability level of the scheme and what could happen if there is not enough cash to pay for the electricity generated.

A sustainable RES-E promotion scheme should ensure that investors will receive the GT irrespective of financial problems or different priorities of the sector utilities. Therefore the GoU is the party that should ultimately guarantee that investors will receive the GT.

The existence of both short- and long- term risks seriously jeopardises the possibilities of Ukraine developing effective E-RES deployment. To overcome these issues, the key recommendations made by the Consultant (for further details please review activities on Tasks 1, 2 and 4) are:

- Clarify GT definitions – *under implementation (Law amendment)*
- Provide a GT for biogas – *there was an initial amendment on the Law on Electricity that included a GT for biogas which was vetoed by the President. Currently a new amendment was approved.*
- Remove LSC rules.
- Create sound and automatic funding mechanisms for E-RES in the new wholesale electricity market to ensure cash availability on the settlement process and the long-term sustainability of the Fund. Furthermore, introducing sovereign guarantees on top of automatic mechanisms on the Fund will reduce risk perception by investors.

3.2. NERC'S PERSPECTIVE

One of the key roles of NERC regarding E-RES in Ukraine is to ensure that the system operates efficiently thereby minimizing their impact on end-user tariffs, not only for the benefit of end consumers but also to contribute on the economic sustainability of the system.

In this sense, NERC is in charge of performing several activities to improve the development of E-RES but, in many cases, the changes proposed by NERC counselled by

the Consultant require amending the existing law, an activity for which only the Verkhovna Rada has constitutional powers. For instance:

- On the LSC issue, despite all the work developed between the Consultant and NERC experts, NERC has little alternative for introducing flexibility to the mechanism because the system is tightly linked to the Electricity Law and this situation largely decreased the degrees of freedom to develop the methodology. However NERC, as final responsible party to implement the GT, can make public that the current LSC may seriously jeopardise the development of E-RES in the country.
- A similar situation occurred with the biogas green tariff, where the Consultant provided an estimation of the feasible levels for biogas GT which NERC included in their comments to the Draft Law. Nonetheless, this value needs to be approved by the Parliament and further ratified by the President when promulgating the law in the official bulleting.
- Also, the development of a methodology for ensuring E-RES producers pay shallow connection costs when connecting to the grid requires modifying the primary legislation which grants super shallow connection costs which lead to inefficient results. Implementing this change requires the political will from the Ministry and the Parliament to promote a change in the law that allows NERC to introduce secondary legislation on this topic.

Despite this, NERC has been very active in providing feedback to the draft legislation amendments, sharing with the Parliament the results of the analysis performed as part of the project that can contribute to remove barriers and reduce investor's risks.

- NERC promoted the introduction of technical requirements for intermittent RES power generation developed by the Consultant in a workgroup with NERC, Ukrenergo and Oblenergos. These requirements were solicited by Ukrenergo and Oblenergos to clarify under which circumstances wind and solar generation can be connected to the network.
- Nonetheless, NERC does not have enough powers to enforce this technical code and needed approval from the Ministry of Energy and Cabinet of Ministries to effectively implement the regulation. This introduces delays not only in the implementation of the normative but finally in the approval of E-RES projects.

Throughout the development of the project, NERC experts demonstrated their concern over the sustainability of the GT scheme and the potential impact of E-RES development on final consumers. In this regard, the following flaws were identified:

- The GT scheme was developed as a promotion scheme following the overall target specified in the Energy Strategy but with a lack of implementation plans and sub-targets. This situation creates the difficulty of not knowing the politically desirable level for each E-RES technology and, thus, it is impossible to determine whether some specific technology may be over-performing.
- Assistance in this sense was provided on:
 - Estimating the economically-optimal penetration of RE in Ukraine.
 - Forecasting the penetration level E-RES could achieve in Ukraine under the existing GT scheme.
 - Recommending adjustments to GT targets to ensure the sustainability of the scheme. In this sense, the main recommendation was mainly targeted at the

reduction of Solar PV green tariff coefficient.

Ukraine's accession to the Energy Community Treaty (ECT) implies that the country has to adopt EU Directive 2009/28/EC and a 11% RES target on the energy demand for 2020 was agreed. Now this target should be translated into a target for each specific sector (heat, electricity and transport) and, thus, the electricity sector will have an updated target value to benchmark with.

Nonetheless, the Consultant recommends going further than this general target benchmark and determining technology-specific targets for the electricity sector which are in-line with the GT provided for each technology (the Consultant provided targets as part of its activities). This will help identify situations of potential target overshooting, and mitigate the consequent impacts on electricity bills.

- One technology of special concern is Solar PV whereby the existing GT is much higher than those in key EU countries – for instance, Germany. This situation may explain why this is the only E-RES technology rapidly developing in Ukraine:
 - On the one hand, the GT for solar PV is still not affected by the LSC rule (low short-term risks).
 - On the other hand, having such a high tariff ensures the quick recovery of invested capital, for which the medium-term risks of the new wholesale markets are minimized.

As demonstrated by the Consultant the promotion of this technology in Ukraine shall be based on an industrial policy basis and closely monitored as it represents a deviation from the optimal E-RES mix.

Enhancing the E-RES monitoring scheme was another gap that needed to be filled. This scheme is needed to assess the penetration development in each technology and to prevent the development of fraudulent activities. NERC had already implemented a monitoring system for conventional generation and therefore the recommendation was targeted to expand the existing scheme to also include RES. The system is expected to be introduced by NERC in early 2013. In addition, the Consultant recommended making monitoring results publicly-available through NERC's webpage.

Last but not least, the development of the future wholesale market should provide transparency for E-RES producers on the availability of funds to collect the GT that has been rightfully assigned. In this sense, the proposal of creating a Fund within the wholesale market is a welcoming idea, nonetheless, the funding should be guaranteed by explicit and automatic mechanisms that assures enough working capital to support settlement process on monthly basis and cash availability within yearly basis to ensure new producers that the fund can cope with the development of the sector. Depending on the final methodology adopted, the existence of sovereign guarantees on top of sound collection mechanisms may help to reduce collection risks.

Other recommendations on the development of the new wholesale electricity market include:

- On the design of the new wholesale market, the Consultant recommended that E-RES facilities should participate in the balancing market in balancing groups to incentivize market participants on accurate forecasting;
- To avoid forcing the development of bilateral contracts between RES producers and supplier or eligible end consumers but allow them to present generation offers in

the day-ahead market; and

- Do not grant RES dispatch priority, but in case they are not dispatched, compensate them the difference between the GT and their variable cost.

In general, flaws observed in the regulation cannot be solely solved by NERC, which promoted changes recommended by the Consultant to the limits of their powers; and they will require the cooperation – at least – between NERC, the Ministry and the Verkhovna Rada, as they need changes in the primary legislation and taking decisions that exceed the powers attributed to the regulatory body.

4. ACTIVITY DEVELOPMENT, RESULTS AND RECOMMENDATIONS

4.1. TASK 1: FULL IMPLEMENTATION OF THE EXISTING GREEN TARIFF LAW AND METHODOLOGY

4.1.1. ACTIVITY AT-A-GLANCE

The objective of the task was to assess the implementation experience for renewable energy tariffs in Ukraine, identifying gaps and needs for improvement.

In undertaking the assistance activity, the Consultant undertook:

- A complete assessment of renewable energy development in Ukraine in terms of primary and secondary legislation, identifying the main drawbacks and providing specific recommendations. Assistance in the estimation of green tariffs for biogas and an opinion on the potential development of a green tariff for Solid Waste.

4.1.2. MAIN RESULTS AND RECOMMENDATIONS

a) *E-RES versus alternative sources of energy*

Key issues

Various issues and concepts need to be clearly defined, including:

- Definitions related to energy from renewable sources;
- The Green Tariff; and
- Non-renewable energy sources.

Recommendations

- It is recommended that renewable energy sources be separated from other (non-renewable) energy sources following the definition set out in the Law on Alternative Energy Sources. The term "alternative sources" is recommended to be replaced with the term "renewable energy sources" in Article 17-1.
- The Green Tariff should be defined as the "tariff approved by the National Energy Regulatory Commission of Ukraine for electricity produced by power generators using the following energy sources: solar energy, wind, geothermal, tidal and wave energy, hydropower (<10 MW), biomass, landfill gas, sewerage gas and biogas."
- It is also recommended that other non-renewable energy sources which arise from the definition of alternative energy sources in the Law on Alternative Energy Sources can be promoted separately from RES sources. Specifically, they should be promoted through a different article of the Law on Electricity or as a part of a separate law. In particular, such non-renewable energy sources will include blast furnace, coke gases, methane gas from the degassing of coal mines and the transformation of waste power from industrial processes.

b) *Biomass definition*

Key issues

The definition of "biomass" is to be addressed and materials should be categorized as excluded or allowed as sources of biomass fuels.

Recommendations

It is recommended that the definition of “biomass” be harmonized with the definition of biomass in the Law on Electricity with the provision of EU Directive 2009/28/EC. This can be achieved by replacing the definition of biomass in Article 17-1 of the Law on Electricity with the following definition:

“biomass” means the biodegradable fraction of products, waste and residues from biological origin from agriculture (including vegetal and animal substances), forestry and related industries including fisheries and aquaculture, as well as the biodegradable fraction of industrial and municipal waste.

Alternatively, the definition used in the Law on Alternative Types of Fuel for biomass is also suitable:

“biomass is a renewable biological substance of organic origin, undergoing biological decomposition (waste products of agriculture (of crop and livestock), forestry and technology-related industries, as well as an organic component of industrial and domestic waste)”

In addition to the definition of biomass, a rigorous categorization of either excluded or allowed types of biomass should be developed to prevent the incineration of hazardous materials for which this type of practice is not recommended, or the incineration of materials which are suitable for recycling purposes (such as paper and clothes)

c) Biogas green tariff

Key issues

There was no Green Tariff level for biogas until Nov 2012; therefore, the key activity was to develop a green tariff based on the technology, type and size of projects.

Recommendations

Based on the information collected from local sources, the Green Tariff coefficient for biogas – including landfill gas – could range from 1.90 to 2.98 depending on the specific biogas technology and the allowed rate of return.

Furthermore, it is recommended that different levels of tariff support are provided for different technologies and size bands, at least in the case of landfill gas projects. It is recommended that a maximum of three project size bands (with different levels of tariff support) be provided in order to mitigate the risk that project developers game the system.

d) Solid waste green tariff

Key issues

There is a need to ensure that waste is managed in accordance with sound principals of resource-use efficiency. It is also necessary to ensure that the pricing mechanisms put in place relating to the use of waste for power generation are well-designed in the sense that they promote investment in Waste to Energy projects.

Recommendations

It is suggested that the waste hierarchy be borne in mind in the strategy for promoting waste-to-energy power generation projects. More specifically, it should be ensured that focus is firstly placed on preventing the creation of waste materials, through the promotion of re-use of materials and resources and recycling. Prevention, re-use and

recycling should be pursued as primary objectives; only in the case that none of those three options can be used should the option of developing a waste-to-energy solution be put in motion.

The design of pricing mechanisms for waste and waste to energy mechanisms should carefully take into consideration that power generation is a by-product of waste management systems and thereby pricing mechanisms should provide the proper incentives.

EU experience in the design of support systems for waste-to-energy power generation projects can be considered as an example of good practice to be followed. In particular, the coefficient for Green Tariffs should be designed and set at levels which help investment in waste-in-energy power generation projects, whilst also maintaining Gate Fees as the main driver of waste management programmes. The Green Tariff coefficient should be set close to 1 for Municipal Solid Waste and for Industrial Solid Waste projects.

e) *Local share content*

Key issues

The Law on Electricity includes Local share content (LSC) rules on E-RES development costs. However, these rules create a barrier to effective competition and damage would-be investors' interest in investing in generation projects. LSC rules may also potentially breach EU and WTO legislation.

Recommendations

We are against the use of a LSC requirement and recommend that that requirement be removed.

Nonetheless, removing the LSC rule requires an amendment to the Law and NERC requested the Consultant to assist in the development of a methodology suitable for existing provisions. In this sense, it should be ensured that the uncertainty for investors created by the current inclusion of LSC requirements in the Law on Electricity be removed by providing the LSC calculation after the project has been developed and to provide the possibility of ex-ante approval. It should also be ensured that investors that have failed to achieve the LSC minimum requirement be provided with a way-out alternative.

f) *Green tariff for wind energy*

Key issue

The definition of wind power plant requires clarification, as does the green tariff value for that generation technology.

Recommendations

We recommend that Article 17-1 of the Law on Electricity be amended to provide a clear definition for wind power plant (wind farm) ensuring that the Green Tariff value should be associated with the smallest nominal power capacity of a single wind turbine within the wind farm.

g) *Green tariff degression*

Key issues

The Green Tariff degression strategy, as set out in Article 17-1 of the Law on Electricity, should be adapted from its current format.

Recommendations

It is suggested that the current Green Tariff depression path be replaced with a technology-specific system. Such a system would include specific green tariff reduction coefficients for each E-RES generation technology covered by the Law on Electricity.

It is recommended that until the time that the above-described changes to the Green Tariff reduction coefficients are designed, the current tariff depression mechanism should be suspended.

4.1.3. IMPROVING THE GREEN TARIFF LAW

In the framework of Task 1 and linked with Tasks 2 and 4, the Consultant developed and discussed with NERC recommendations on the existent Green Tariff Law. Most of the recommendations were discussed and agreed with NERC and introduced in the proposals to amend the Law on Electricity (#10183, #8455, #508, #8028, #9588, #1119).

For instance, proposals #10183 and #8028 included several of the recommendations of the Consultant, such as:

- Green Tariff for Biogas and Landfill Gas
- Definition for wind power plant and assigning the green tariff to the smallest nominal power capacity of a single wind turbine within the wind farm

Proposal #8028 was approved by the Parliament but vetoed by the President of Ukraine in October 2011. Proposal #10183 was developed to solve the vetoed amendment and it has been approved by the Parliament in the first reading at the beginning of July 2012.

Besides proposals #10183, #8028, several separate proposals were developed aimed at introducing Green Tariffs for electricity produced from biogas (508) and waste (9588, 1119), which are not currently covered in the Green Tariff Law. Actually, the tariff levels introduced in those proposals lies within the margin determined by the Consultant as applicable. Currently those proposals are under evaluation and are expected to be introduced in the near future.

Proposal #8455 reflects the Consultant's recommendation to separate Renewable Energy Sources from other Non-Renewable (but Alternative ones). The Verkhovna Rada in the first reading in May 2012 has approved this proposal.

On Solar PV, proposal #10183 considers the approach to decrease the green tariff for this technology. Based on the comments submitted by NERC to the Parliament, it can be stated that there is a general agreement of the Energy Regulator of Ukraine to start following worldwide trends related to solar PV tariff revision from January 2013.

Besides that, proposal #10183 introduces the Green Tariff level for small-scale solar PV installations. It goes in-line with the Consultant's recommendations on providing strong incentives in the promotion of small-scale renewable generation.

4.2. TASK 2: LONG-TERM IMPLEMENTATION OF GREEN TARIFFS IN UKRAINE

4.2.1. ACTIVITY AT-A-GLANCE

This task aims to create a sustainable framework for the long-term implementations of green tariffs in Ukraine. The task involves the completion of three sub-activities.

The first component relates to monitoring and reporting. In particular, the implementation of a system of monitoring and reporting for the electricity produced from renewable energy sources.

The second component of the task relates to forecasting and impact assessment, which required the calculation of the expected impact of the existing green tariffs on electricity tariffs with an assessment of the sustainability of the green tariff levels. In addition, the activity includes the analysis of the optimal share of E-RES in the electricity balance and an estimation of the E-RES national target as required by the Energy Community Treaty.

The final component of task 2 is to make an assessment and provide possible adaptations of the green tariff concept: assessment of the link between electricity prices and green tariff level and the cost basis for the coefficients determined for the different technologies

4.2.1. MAIN RESULTS AND RECOMMENDATIONS

a) *Monitoring and reporting*

Key issues

It is considered that the currently-existing monitoring and reporting system, whilst being suitable for conventional power generation, should be complemented to allow data-gathering for E-RES. It is believed that reporting activities are currently based on an inefficient system and that valuable information is currently not optimally provided to policy makers, and not provided to the public.

At the current time, efforts to evaluate the overall RES system in Ukraine are hampered by ineffectiveness of the current reporting arrangements.

Recommendations

Considering the existing methodology for gathering and processing information on the power sector (from conventional sources), the Consultant improved the methodology, proposed some adjustments to the existent monitoring scheme, introduced new templates both for monitoring and reporting activities and proposed a minimum set of templates that NERC would use for the information disclosure.

The key recommendations that flowed from this component include:

- The reporting system should be improved by implementing a more systematic approach to reporting activities and making information publicly-available through the internet.
- The new reporting system should include the requirement to provide, at least, the following information:
 - Installed capacity;
 - Electricity generation;
 - Average load factor;
 - Share of E-RES over gross electricity demand (or any other target defined by the government);
 - Cost of the promotion system; and
 - Incremental cost of the promotion system (over the wholesale price of electricity).
- The scheme should provide a transparent mechanism for close follow-up of the RES development by any stakeholder and promotes sustainable implementation of the green tariff scheme in Ukraine.

Results

The methodology for monitoring and reporting was presented to NERC. After a set of discussions, specific excel forms for requesting/publishing data on RE-development in the country were agreed with the Client.

NERC considers that it is important to introduce the Consultant's recommendations in the monitoring and reporting scheme currently used in Ukraine and to transform it from a system that only gathered information from conventional sources to another which comprehends all generation technologies.

b) Forecasting and impact assessment

Key issues

It is important that the likely impacts of the development of the E-RES sector in Ukraine be forecast and assessed, in order to identify any specific issues that ought to be addressed or mitigated, as well as the positive impacts that are to be expected.

Such impacts are specifically related to: levels of generation expected under the Green Tariff; costs of the Green Tariff scheme; any disproportionately large impacts on system costs flowing from particular technologies; and the anticipated impact of E-RES on electricity costs generally.

Recommendations

The Consultant proposed to use a "supply-curve" approach for the purpose of forecasting and impact assessment. Working closely with the USELF and local investors, the consultant obtained reliable input data to feed the model. The results from the model were used by NERC as a background support in its preparations of amendments to the Electricity Law and to contribute to the shaping of the Energy Strategy.

A number of important points followed from the activities of this component, specifically:

- The E-RES generation level under current green tariff scheme could be between 21.000 GWh and 29.000 GWh per year, with an installed capacity in the range of 7.000 MW to 12.000 MW. Therefore, in line to achieve the national E-RES target and potentially to overshoot it;
- E-RES development largely driven by solar PV and wind power;
- The total cost of the green tariff scheme would be between 3.7 and 6.6 billion euro per year;
- Solar PV represents 45% to 65% of the total cost even though it generates between 20% and 30% of the E-RES power; and
- The expected impact of E-RES in the electricity cost presents a range between 0.82 and 1.73 c€/kWh.

During the development of the activity, NERC experts expressed their concern relating to the impact of PV green tariffs over the final cost of electricity. This concern is shared by the Consultant.

Recent EU experience shows that target overshooting in Solar PV had a significant impact on consumers' bills. Moreover, in Spain, Germany and Italy, where tariffs have been reduced by half (to the average of 200 €/MWh), projects were still being developed.

c) Assessment and possible adaptations of the green tariff concept

When requested the need to achieve the E-RES national target in a cost-efficient way (optimal E-RES mix), modelling results demonstrated that all E-RES technologies, with the exception of Solar PV should have a share in the optimal mix.

Moreover, the study showed that most of the green tariffs (with Solar PV being the exception) for RES generation in Ukraine are at an adequate level, that is, close to the optimal one.

The exclusion of Solar PV from the optimal E-RES mix shows that promoting this technology implies a deviation from the optimal outcome and, therefore, its green tariff represents an overall increase in the energy bill for society. In this sense, the promotion of Solar PV can only be explained in terms of a domestic policy basis for promoting that sector in Ukraine.

On the basis of this analysis, the Consultant recommends resetting the Solar PV green tariff to a level between 2.16 c€/kWh and 3.74 c€/kWh, which reflects the average generation costs in Ukraine.

4.3. TASK 3 – CONNECTION OF E-RES TO THE NETWORK

4.3.1. ACTIVITY AT-A-GLANCE

According to the ToR, this task is about “making connection to the network a transparent, non-discriminatory, reliable and swift process, and at a fair price”.

This task contains two components:

1. Connection Rules, Procedures, Guidelines and Template Contracts
2. Mechanism for compensation of connection costs

For successful implementation of the overall task, a working group was established including representatives from:

- NERC (various departments)
- Transmission System Operator SE “NPC “Ukrenergo” (various power systems and departments)
- State Agency of Energy Efficiency and Energy Saving of Ukraine
- Distribution System Operators (NSJC “EKU”, “VS Energy International Ukraine” LLC)

During the first work group meetings it was agreed to focus the Consultant’s assistance on the following components:

- Component 1 “*Connection Rules, Procedures, Guidelines and Template Contracts*”: NERC has developed Connection Rules, Procedures and Template Contracts by itself prior to this project commencing. These documents were under approval by the government. But the TSO and DSOs require unified technical requirements for RES facilities during the development of technical conditions. The Consultant was requested to develop such technical requirements using EU best practice.
- Component 2 “*Mechanism for compensation of connection costs*”: The Consultant has been requested to develop recommendations to implement

appropriate mechanisms for compensation of connection costs based on EU best practices but using Ukrainian specifics of energy sector.

4.3.2. MAIN RESULTS AND RECOMMENDATIONS

a) **Component 1 - Connection Rules, Procedures, Guidelines and Template Contracts**

Key issues

Existing technical requirements for RES generation projects have the following disadvantages:

- Outdated, taking into account modern technologies and planned high penetration
- Absence of specific requirements for Solar PV, as well as for other types of RES
- Various requirements are placed in different documents – nothing is consolidated

Recommendations

The document "*Requirements for wind and solar photovoltaic power plants with a power output greater than 150 kW regarding connection to external power networks*" provides a technical base for effective development of the renewable energy sector in Ukraine. Upon approval of this document the TSO and regional DSOs will have the opportunity to use the RES-E facilities as active, managed energy sources.

The proposed regulation defines the basic requirements for wind and solar photovoltaic power plants (i.e. power plants that use a static electronic energy converter) with a power output greater than 150 kW to connect to general purpose power networks. Connection to power networks of other types of renewable energy sources that use synchronous generators and are connected directly to power networks (such as solar thermal power plants, small HPP, biogas installations, etc.) are governed by existing regulations in Ukraine.

The developed document has the main components:

- Terminology and definitions
- Objective, field of application and regulatory provisions
- Acceptable frequency and voltage deviations
- Electricity quality
- Control and monitoring
- Protection
- Data communication and exchange of signals
- Verification and documentation
- Requirements for connection schemes

Regulation should be used by developers during the Feasibility Stage for equipment selection and planning and grid owners (TSO, DSOs) during composition of Technical Requirements for connection of RES objects.

The developed draft document has been approved by beneficiary and TSO and transferred for approval to the Ministry of Energy and Coal Industry.

Results

The specific regulation on technical requirements to connect wind and solar power plants to the grid has been developed in the framework of a constant consultation process with power sector stakeholders, such as Ukrenergo (including regional branches), DSOs, NERC, NAER. The document was developed to include all the peculiarities of Ukrainian standards and requirements.

However, as far as there were no requirements on NERC to develop such regulation, in December 2011 a letter to the CMU was sent from NERC with the proposal to do so and to develop such a regulation.

CMU officially responded that it is important to identify the real need for this document and sent letters to involved institutions. SAEEEC (formerly NAER) and Ukrenergo submitted their answers to CMU arguing for the necessity to develop such regulation and the only pending organisation is the Ministry of Energy and Coal Industry.

Recently, NERC prepared a letter to the Ministry proposing to use the developed document for the Ukrainian case. The Ministry officially replied that they have no comments to the document. However, the document has not been approved yet.

b) Component 2 – Mechanism for compensation of connection costs

Key issues

- RES-E developers have no “location signals”: they are not stimulated to take into account the cost of connection during site location (there are some situations when RES-E developments are planned very far from existing networks and achieving their grid connection would cost a prohibitively-high level of investment).
- The Law on Electricity defines that the interconnection scheme should be constructed by the grid owner, but the grid-owning companies have no funds available for undertaking this task; unless a mechanism for compensation can be found, grid owners will continue to resist RES-E connection.
- Secondary legislation (still in force) limits free connection to plants with up to 10 MW of generation capacity; the Law on Electricity does not.
- There is no mechanism of prioritization of E-RES projects to be connected (since 2009 more than 15,000 MW of E-RES capacity applied for connection – this combined level of generation capacity looking to be connected is significantly higher than the level which could reasonably be interconnected).
- There is no secondary legislation regarding cost allocation for connection.
- Legislation does not distinguish between “shallow connection” - the direct connection costs from the plant to the nearest substation of the DSO which should be borne by the plant owner (case in other countries) and the “deep connection” costs of grid reinforcement of the grid system of the DSO.
- There are no defined procedures for assuring coordinated timing of the conclusion of the construction of the RE-plant and the construction of the grid connection (because of the procedure with NERC approval of investment programmes and expansion plans).

- There are no regulations for how DSOs are to take RE into account in their expansion plans.
- There is no single Grid Code and Distribution code; existing technical requirements are out-of-date, not regulating technical aspects (e.g. with voltage control by embedded generation etc).

The “no connection charge” policy in the Ukraine is not in accordance with the principle of the ‘beneficiary pays’. Although the policy is applied both to demand customers and to generators, it leads to a cross subsidy from demand customers to E-RES, and from E-RES that optimizes the location to those who do not. Because the oblenergos do not charge E-RES a distribution-use-of-system charge (DUoS), the cost of the connections must be recovered from the general consumer tariff revenue.

Recommendations

It is recommended to introduce a *shallow connection cost charge* under which E-RES is charged:

- the total cost of the investments in connecting the plant to the distribution grid,
- incremental grid upgrading costs caused by the wish of a developer to get a solution, which is more costly than the least-cost technically satisfactory solution,
- all soft costs for developing the technical reports and all administrative costs for processing the request.

A *deep connection cost charge* for the proportional share of reinforcement costs (assuming other generators are connected later) gives the best location signal and the most effective rationing of RE-projects. In the present situation in Ukraine of having a severely restricted availability of power sector revenue to finance oblenergo investments in grid upgrading and expansion, it would also facilitate the implementation of E-RES projects. Full developer finance for connections would enable an oblenergo to react to ad-hoc requests for connections without the need for having the investment approved a priori in the annual investment plan.

The switch from an ultra-shallow to a deep connection charge is, at present, not politically feasible, although it would be the preferred solution. So the proposal is to introduce a one hundred percent shallow connection charge as a compromise solution.

As a complement to the upfront shallow connection cost charge, it is recommended to introduce a generator Distribution-Use-of-System Charge (DUoS) covering, as a start, the estimated annual oblenergo costs for maintaining the shallow connection assets and the cost of administering the relationship with the E-RES during the year. One can call it a “*shallow DUoS charge*”. The charge should be modest.

The planned recommendations, presented below, seek to promote *economic efficiency in resource allocation* and uphold the regulatory principle that only *reasonable costs* of investments can be included in the regulated tariff revenue, which the oblenergos can raise from consumers. The Consultant proposes two approaches:

1. Adopt a *hard quantitative definition of reasonable cost of connection for the oblenergos to use* when assessing a request for a connection. The quantitative criterion can be expressed in terms of (i) Hryvna per MW E-RES capacity to be connected; or (ii) Hryvna per annual MWh generated electricity (forecast for average year of operation).

2. Fix a *hard quantitative limit on the annual budget, which is allocated to finance E-RES grid connections*. NERC would review the requests for connections in the investment programs submitted by the Oblenergos and approve connections according to the lowest required financial support per MW of connected E-RES capacity or per annual MWh of E-RES generated power until the budget is exhausted.

The coordination of oblenergo expansion plans and E-RES development plans is also proposed.

4.4. TASK 4 – E-RES OPERATION IN THE COMPETITIVE ELECTRICITY MARKET

4.4.1. ACTIVITY AT-A-GLANCE

There are two key components to this task, namely the following: (1) preparing the conditions and essential requirements to facilitate the sale of E-RES energy in the Ukrainian wholesale electricity market, and (2) developing an adequate system related to the system's imbalance costs and ancillary services.

In order to develop the first component of the task, related to the sale of electricity, the consultant:

- Reviewed the implication of the future development of the BCBM on RES-E generation.
- Analysed international experience to identify potential solutions.
- Proposed a framework suitable and sustainable for Ukraine including funding, settlement, analysis of perceived risk by developers, administrative procedures, etc.

In developing the task related to imbalance costs and ancillary services, the consultant:

- Performed an estimation of potential imbalance cost of intermittent RES. This activity was developed by simulation of the short-term dispatching of RES.
- Analysed international experience on managing imbalance cost of RES, assessed pros and cons for the Ukrainian case and make a recommendation for balancing regulation focused in RES generation.
- Analysed international experience regarding provision and pricing of ancillary services in market with a high penetration of non-firm generation, analysed pros and cons for the Ukrainian case and finally made recommendations for ancillary service regulation that fulfils the objectives of efficiency but does not undermine the penetration of non-firm energy.

4.4.2. MAIN RESULTS AND RECOMMENDATIONS

a) Sales of electricity

Key issues

There is a need to prepare the ground for the participation of E-RES in the planned wholesale market of electricity. During the period in which the project was carried out, the Consultant received from NERC two alternatives for the future Wholesale Energy Market (WEM): one, based on Bilateral Contracts and the Balancing Market (BCBM) developed by

KEMA as part of a previous project financed by EBRD³; and, later on, a draft version of the Law for the new wholesale electricity market (WEM), based on a “pool” for the day-ahead market. The draft Law (DL) is much in line with the recommendations of our reports, so our final suggestions are oriented to this draft rather than the original BCBM design.

In the transition process proposed for the transfer from the existing WEM rules to those of the new wholesale market (either the BCBM or the DL), the Single Buyer will remain, and hence it appears that all existing arrangements and options could stay in place; therefore this would not affect E-RES sales. However, in both market designs the Single Buyer with its effective off-take obligation for all licensed generators will disappear. Therefore, the RES producers will have to sell directly to a supplier or customer, or other entity.

Additionally, nowadays, the costs for the supported tariffs are recovered from all non-household customers of Ukraine via the average wholesale power price. The system works well in practice, and even in times of less than 100% collection rate in the WEM, the RES generators are reasonably assured that they will receive a monthly cash volume equal to the green tariff times kWh delivered. This is a critical issue as credit risk hedging is one of the most important elements of RES policy to be successful in emerging countries. All accreditation and metered volume verification issues are effectively dealt with by Energomarket.

The sale of RES energy directly to consumers or suppliers, as proposed in the BCBM, imposes a huge challenge. In the BCBM design there are some key aspects of importance that should be addressed, including the funding source, fund settlements, undeveloped administrative issues and credit risks.

Recommendations

The analysis of the BCBM proposal had several drawbacks in relation with RES mostly related to the intermittency issues of some key E-RES sources (like wind or solar), so our recommendations on the sale of energy generated by RES are that:

- In order to allow the dispatch of intermittent generation, conventional plants should present mandatory flexibility offers, it is to bid a price at which they accept a reduction of its notified generation at least in 15%.
- Implement intra-day markets to facilitate of the adjustment of the day-ahead schedule to improved RES forecasts. These markets would also allow conventional generations and demand to adjust their physical positions.
- If the final shape of the market follows the initial design (as proposed in BCBM project developed by KEMA), then:
 - For non-intermittent RES technologies, it was recommended that they participate in the dispatch as any other conventional power plant, presenting bids (at their variable cost that for most of RES technologies is close to zero) and without dispatch priority.
 - On the other hand, for intermittent RES, dispatch priority shall be granted by presenting daily schedules. The conventional bilateral contracts are adjusted to accommodate the intermittent RES using the flexible bids.

³ KEMA (2010). EBRD Project ID 25329 - Ukraine Renewable Energy Development Framework - Phase II. WP 2: Issues with connection and sale of renewable energy generation sources in Ukraine.

- The settlement will be performed by paying RES the market price for electricity. The difference between market price and the green tariff is paid by the government.

As the draft Law proposal addressed most of the identified drawbacks of the BCBM, our final recommendations are oriented to adjust the DL:

- In the day-ahead market RES generators should bid their actual variable costs. Such costs are zero for intermittent RES and some other E-RES technologies. It would be economically-inefficient to force the dispatch of RES plant with significant variable costs.
- RES should form balancing groups. The market operator settles the differences between the accepted total volume bids of the entire balancing group and actual generation at the cleared balancing price. The key difference between our recommendations and those of the ND is that we recommend that:
 - Both positive and negative deviations should be settled at the relevant balancing price. This approach maintains incentives to prepare state of the art wind (or solar, hydro) forecasts.
 - The settlement is on the total deviation of the group, not the individual deviation of each member of the group. The group deviation should be allocated to its members proportionally to their individual deviations.
- The simulations performed showed that the costs of deviations of wind plants, averaged over a long period of time are very low in relation to total revenues. Therefore the obligation to pay deviations will have a very low impact on the return of RES investors, but will maintain an incentive to make state-of-the-art generation forecasts, which results in lower system balancing costs.
- In order to ensure that all the RES producers are paid, the “Fund of Imbalance Cost Settlement” should be designed with automatic mechanisms for ensuring cash availability in daily operations and include enough guarantees to allow E-RES producers to maintain the collection process in the case of default of some of the companies providing cash to the Fund.

b) Imbalance costs and ancillary services

Key issues

The activities related to imbalance costs and ancillary services are driven by the situation that under the current arrangements, the costs for balancing the system are shared among all market participants, there are no penalties or other charges specifically related to whether or not the producer kept the nominated schedule, as the pool makes up the balance. However, in the balancing market rules, as proposed in the BCBM, all generators and suppliers will be responsible for their imbalances – directly to the Settlement Administrator if they themselves have the status of Balancing Responsible Parties, or indirectly in the Balance Group if they have joined one; this may create extra costs for RES-E producers.

In the case of RES, three alternatives are available:

- RES generators are fully responsible for their imbalance costs, but they can join Balancing Groups to mitigate some effects
- Allow some conditions to balancing rules to ease the balance of RES producers

- RES generators are not responsible for their imbalances. This, at the end of the day implies a subsidy and does not foster RES-E producers to manage their potential imbalances.

Also, in the future WEM, it is envisaged that the SO will procure ancillary services. The offering of some of them will be compulsory for conventional generating units as is the common practice in the world. Unless clarified, for RES generators this may mean the imposition of additional obligations to provide certain technical capabilities, which might cause increased cost obligations for the seller regarding the provision of ancillary services that should be clearly established in the terms of the contract.

It is clear that ancillary services should be procured and priced in order to improve the efficiency of the generation market; the challenge is to define a price system that does not undermine price efficiency signals but allows RES producers to take some benefit, or at least not to be affected by the mechanism.

Recommendations

The recommendations on imbalance costs and dispatch priority were included in the previous section of this task.

In relation to ancillary services, our advice and recommendations are as follows:

- Although presently RES generation units (with the exception of solar PV, but including wind), have the capability to provide frequency control, it makes no sense to oblige these units to participate in this service. It is not economically convenient, as it may result in the wastage of energy whose primary resource (wind, sun and water) has zero cost.
- However, the rules may require that these units be equipped with controllers to provide frequency regulation during emergencies. For high levels of penetration of wind, the new units can be obliged to provide synthetic inertia.
- In the case of reactive generation, the RES plants should contribute to the maintenance of the targeted voltage level in the points where they are connected, through either using the capability of the generation units or with static compensation provided by each plant.
- When the SO assessment detects an expected amount of wind energy that may produce security violations, it will be necessary to take appropriate actions to return the system to secure conditions. Frequently, this will involve taking action to limit the amount of wind generation to be delivered to the system. Therefore the system operator should have the ability to curtail wind generation when system security is threatened.
- Solar PV and wind generation forecasts both introduce significant errors in the operation planning process. Therefore, it is necessary to maintain incentives for these plants to provide state-of-the-art forecasts. Ensuring the continued obligation to pay imbalances is our proposed way of achieving this target.
- In parallel, the system operator should produce its own forecasts, oriented towards the group and consolidate the individual projections provided by RES plants.
- The SO should take into consideration the expected forecast errors to define the reserves required to prevent large errors in intermittent RES production.

4.5. TASK 5 – REVIEW OF EXISTING MECHANISM FOR HYDRO CONCESSIONS

4.5.1. ACTIVITY AT-A-GLANCE

This task deals with “the mechanism for tendering and awarding concessions for hydro facilities in Ukraine”.

The EBRD seeks to encourage private sector involvement in the provision of public infrastructure and services through a variety of means. One such means is the involvement of private sector parties in infrastructure projects through concession arrangements, whereby a public authority entrusts a private sector party with the long term implementation of a project.

A key objective of the task is to investigate the level of compliance of the existing system in Ukraine with the EBRD’s core criteria with regards to concession policy and develop recommendations regarding improvements in such compliance.

4.5.2. MAIN RESULTS AND RECOMMENDATIONS

Key issues

After evaluating the current system being implemented in Ukraine for developing small hydro, the Consultant identified the following issues:

- *Technical optimization*: in the absence of competition involved, the authorities are presented with a single design for the plant.
- *Costs of transaction*: complicated procedure for land allocation; many signatures for technical/environmental approval enable staff to extract payments from developers; additionally, there are cumbersome dual quality controls.
- *Compatibility with principles for rational planning*: regime is out of synch with the trend towards a better planned development of local land use. According to the Town Planning decree, every Village Authority must develop plans for the use of local water resources. The planning process will define prospective sites for the development of SHP-projects.
- *Compatibility with Legal principles for allocation of rights to public assets*: out of synch with the legal premise in the *Law on Concessions* that sales and leases of public property are to be awarded through a competitive process.

Recommendations

The Permit regime practiced in the Ukraine does, as much as is possible, comply with the EBRD Concession Policy. The single criterion that is not met is the requirement for an open tendering process for these projects and thus competition. As these developments have been developer-driven to date within Ukraine, these projects are not openly tendered - however, the remainder of the process does generally comply with the Core Criteria as stipulated by the EBRD, albeit not a concession regime.

A concession regime for SHPs can be introduced de jure or de facto.

The de jure, i.e. formal, introduction through the adoption of a Hydropower Concession Act provides maximum legal clarity and can be introduced with reference to the Concession Law, Land Law and Water Management Law. The Act would introduce the regulatory instrument of 25 year concessions for SHPs that combine the right to the land lease and water usage right in one package and subject to a concession fee.

The subsequent conclusion of the land lease and water usage rights would be in accordance with the land use and water use laws. In addition to this law, adjustments in the form of a single new article must be made to the Water Management Law, the Land Use Law and the "On Town Building Activity Regulation".

Alternatively, the concession regime can be introduced de facto by regulations ordering the Ministry of Energy and Coal Industry to organize tenders for greenfield SHP-projects and for SHP-plants with the award of lease rights and water usage rights being given to the winner for the same lengths of time; e.g. 25 years.

The option could be introduced through the rules and conditions being defined in the tender documents. Draft documents for the land lease and for the water usage permit will be included in the tender documents. This secondary legislation would be referenced to the same three laws as the specific Act and to the Public-Private-Partnership Law.

In both cases the issue of a CMU decree is required to impose collaborative action on the public institutions that are involved in the regulatory framework for new SHP-projects. The decree would instruct the Ministry of Energy (or the National Water Resource Authority) to act as the responsible coordinating authority for the preparation and implementation of SHP-tenders on a river basis.

The existing system in Ukraine is not significantly deviated from the EBRD concession policy (even though it is a permitting rather than a concession regime that is in place), the procedures for obtaining land use and water usage rights are clear. The prices for all economic terms – water usage fee, lease payment, feed-in tariff etc. are fixed by Government regulation (water usage fee and feed-in-tariff) or calculated in an objective, simple and transparent manner by pricing formulas fixed in Government regulations that are non-negotiable and verified by third party (land and SHPOO leases). In this context, the absence of tendering processes do not compromise the achievement of the aims described in the EBRD concession policy.

4.6. TASK 6 – ACCREDITATION, CERTIFICATION, VERIFICATION AND AUDIT

4.6.1. ACTIVITY AT-A-GLANCE

This task is concerned with the accreditation, certification, verification and auditing processes related to E-RES facilities and energy generation. More specifically, the activities undertaken in this task can be grouped as having the following goals:

- Accreditation of E-RES facilities
- Certification of renewable energy production – issuance of Guarantees of Origin
- Organisational and personnel capabilities

In undertaking the above-mentioned tasks, the consultant's activities included the delivery of presentations, the preparation, presentation and discussion of position papers and/or early drafts of deliverables in close collaboration with NERC and EnergoRynok staff and preparation and discussion of draft and final reports on sub-tasks.

4.6.2. MAIN RESULTS AND RECOMMENDATIONS

a) Accreditation of E-RES facilities

Key issues

This component of the task set out the address the key issues related to the following points:

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- The context of the initial accreditation and approval;
 - The responsible authority related to accreditation and approval;
 - The different types of approval which may be awarded;
 - The process of obtaining an approval; and
 - The ongoing monitoring of RES facilities.

Recommendations

Based on our analyses, we have developed the following series of recommendations to address the key issues stated above:

Initial accreditation / approval of E-RES facilities is recommended to be integrated within the overall system for GO and the corresponding regulation. On the basis of the above, the whole legal basis of the evaluation and auditing, including the duties and accountability of the facilities in relation to evaluation and auditing is to be integrated in the GO regulation.

As the initial approval is recommended to be part of the GO system which is managed by the Issuing Body, then subsequent approval and auditing activities should be under the responsibility of the Issuing Body as well. The necessary provisions so that the Issuing Body has the flexibility to authorise external agents to carry out certain functions of the approval/auditing process, if needed, is also recommended to be part of the GO regulation,

The following types of approval processes, distinguished mainly on the basis of the extent of the effort required by the Issuing Body, are recommended:

- Simplified approval process: It can be applied for facilities using wind, solar, PV and hydro (excluding pumping hydro). Physical inspection of the facility is recommended to be optional, at the discretion of the Issuing Body.
- Detailed approval process: It is recommended to be applied in principle for facilities burning biomass/biogas/waste. Physical inspection and auditing is recommended to be mandatory in the cases of detailed approval process.

It is recommended that the approval process is carried out as the first step for the process of registration of a generation facility to the Electronic Registry for the GOs.

Two basic types of monitoring activities are recommended:

- Desktop monitoring. It includes mainly desktop work for the statistical assessment of the data received from the RES-facilities and observing for cases of systematic discrepancies on selected performance indicators. It is recommended for the facilities which have been approved through a simplified process.
- Auditing of the RES-facilities: It includes the, on short-notice, physical inspections and auditing of a RES facility in order to verify that the initial approval conditions have not been altered, as well as for occasional verifying of the contents of the declarations that the issuing of GOs has been based on. It is recommended to be mandatory for the facilities which had gone through the detailed approval process and optional for the rest.

b) Certification of renewable energy production – issuance of Guarantees of Origin**Key issues**

It is necessary to prepare the ground for the implementation of a modern system of Guarantees of Origin for RES (RES-GOs) in the Ukraine.

There is a requirement for the RES-GO system in the Ukraine to comply with the relevant provisions of Directive 2009/28/EC.

There is also a need to ensure that the Issuing Body - the body which is designated by the state as being responsible for the supervision of the issuance, transfer and cancellation of GOs – is clearly established and able to undertake its role.

Recommendations

Following a revised position of NERC regarding GOs and its communicated intention to designate EnergoRynok as the Issuing Body for the issuing and management of the GOs, the Consultant reviewed together with NERC and EnergoRynok the GO regulation. The revised regulation was submitted by the Consultant and accepted by NERC in July 2012. It provides for a voluntary GO system.

For the certification of RES electricity generated and the issuing of the corresponding GOs, the regulation recommended by the Consultant takes into account the relevant provisions of Directive 2009/28/EC. Provisions of the regulation include among others, that:

With regard to Guarantees of Origin:

- RES-GOs are issued for electricity produced by a generation facility using energy from RES (i.e. wind, solar, aerothermal, geothermal, hydrothermal and ocean energy, hydropower, biomass, landfill gas, sewage treatment plant gas, biogases and biofuels). In the case of the concurrent use of non-RES and RES fuels, then the GOs are issued only for the part of the electricity that was produced from RES fuels.
- The GOs are used for proving to a final customer that a given share of energy was produced from renewable sources. After their use the GOs should be cancelled.
- RES GOs have a standard size of 1 MWh each.
- The GOs are valid for 12 months after the end of their Reference Period (i.e. the time period that the guaranteed electricity was generated in). After this period the GOs expire.
- GOs are issued only in electronic form and are available through the Electronic Registry.
- GOs can be transferred from one holder to another.
- GO are issued after an application from a RES generator. The GO system is voluntary.

With regard to the electronic registry:

- An Electronic Registry should be used for the issuing, transferring, cancellation and general management of the GOs.
- Generators need to register with the Registry before they can apply for issuing of GOs.

- Registration to the Registry is voluntary.
- All transactions on GOs (i.e. issuing, transferring, etc.) should be carried out through the Registry.

With regard to the Issuing Body (IB):

- The IB is the body designated for the management of the GO system.
- The IB is responsible for the operation of the Electronic Registry.
- The IB should check the data of the generators prior to their registry in order to conclude that the generator is producing electricity from RES and that adequate conditions for measuring the RES electricity generated are in place.
- The IB should check the data provided by the generators for the issuing of GOs.
- The IB should from time to time check/audit that the generation conditions and characteristics of registered generators have not been altered.

Results

In December 2011, in a meeting with NERC, SAEEEC (formerly NAER), EBRD and the Consultant it was decided to nominate the Energorynok as the Issuing Body for the Guarantees of Origin. Since then, Energorynok has been involved in the consultation process and provided their input in developing the Guarantees of Origin (GO) regulation that now is at the final agreement stage within stakeholders.

In order to make that happen, CMU has to adopt its decision on the activity of Energorynok. Also, and in a separate decision, NERC must approve the budget for this additional activity of Energorynok.

NERC prepared proposal #10183 reflecting the concept of the GOs and based on the GO regulation prepared by the Consultant, NERC developed the methodology on issuance, use and cancellation of the GOs that will be implemented after the approval of the Amendment to the Electricity Law #10183.

It should be mentioned that expected changes in the organisational structure of Energorynok, as well as the requirements to the personnel to be involved in managing the Guarantees of Origin Scheme have already been discussed and agreed between NERC and Energorynok following the proposals made by the Consultant. NERC will apply the results of this task for the budget estimation when the decision to create such a department in Energorynok is taken.

As far as an Electronic Registry is a key ingredient for the GO Scheme to be compatible with Directive 2009/28/EC, the technical specifications were developed by the Consultant and agreed with NERC and Energorynok in July 2012. As soon as the proposal #10183 is approved, NERC will issue the methodology on the GO and will include costs for development of the Electronic Registry as a tariff component for Energorynok.

c) Organisational and personnel capabilities

Key issues

The main issues to be addressed in relation to organisational and personnel capabilities in the context of E-RES and a GO system can be considered as having an Electronic Registry of GOs operational, as well as putting in place procedures for the approval of the participation of E-RES generators (and possibly other actors too, such as electricity

suppliers) within the registry. The Issuing Body must also supervise the issuing, transfer, and cancellation of GOs.

It may also be required that the Issuing Body establishes collaboration with other stakeholders in the Ukraine who provide data needed for the GO system. In particular, the Issuing Body may need to establish collaborations with the System and Distribution System Operators in order to obtain metering data.

Recommendations

From an organisational point of view three main roles are recommended for the core staff of the Issuing Body, namely:

- The GO Supervisor (or IB Head) role that will have the overall responsibility for the management and operation of the Issuing Body.
- The GO Technical Expert role that will be mainly responsible for the day to day work regarding assessment of RES facilities applications to register in the Electronic Registry, the applications for the issuing of the GOs and the desktop monitoring work.
- The GO Auditing role that will be taking over the activities for the auditing of the renewable facilities. A further discrimination is considered for the Auditor of biomass based generation facilities and for the Auditor of the rest of renewable facilities.

The aforementioned roles are separated either due their administrative responsibilities (e.g. the Supervisor role) and/or because of the different qualifications required (e.g. auditing role). However, if a member of the IB staff is qualified as an Auditor, he can also assume the role of the GO technical expert. Such combinations can be exploited in order to maximise the utilisation of the IB staff time and thus reduce needs for additional staff and increased personnel costs.

The staffing requirements of the Issuing Body will depend to a significant degree on certain factors with the most important being the number (and to a smaller extent the technology e.g. whether generation is biomass-based or not) of the generation facilities, the time required for the approval of the application from the registrants to the Electronic Registry (although this time is expected to be reduced as experience is building up in the Issuing Body after the first period of operation), and the frequency of the audits of the registered generation facilities.

A methodology has been suggested for approximating staff requirements depending on the assumptions for the development of the aforementioned parameters.

Finally, a capacity building, training programme comprising six components is recommended for the Issuing Body staff.

5. PENDING ISSUES AND POLICY RECOMMENDATIONS

As has been presented in the previous sections, the activities developed by the Consultant were made in close cooperation with NERC experts and other stakeholders. This allowed the team to provide NERC with products tailored for Ukrainian needs that reflected best international experience in each field.

Nonetheless, as already envisaged during the inception phase, many of the activities required changes in primary legislation which need the approval of the Verkhovna Rada and the President. Under this scenario, NERC will become an important stakeholder in the decision process but not the only one, which means that the approval process may take longer than desired and that the outcome of the political debate may not necessarily reflect the ideas developed within NERC.

In this final section of the report, the Consultant would like to remark upon the issues or recommendations provided as part of this advisory process that are pending to be implemented and to present some policy recommendations hoping that they will provide guidance in the ongoing process of delivering effective E-RES development in Ukraine.

Local Share Content

- As has been previously mentioned, LSC rules harm both consumers and investors (local and international) and may represent a breach in international law. Therefore, our first recommendation is to remove the barrier that blocks the development of E-RES in the country.
- The Consultant also wishes to remark on the fact that LSC rule, as developed in the Law on Electricity, will prevent the development of E-RES simply because it introduces too much risk for investors (both local and international), hindering project bankability. This result is completely against the spirit of the rule – to seek local industrial promotion – simply because there will be no E-RES market.
- The Consultant does not neglect that the promotion of local industry is desirable from a policy perspective as it helps in the creation of employment, local R&D and national development. However, there are other alternatives – for instance, tax incentives on local industries, investment subsidies, etc. – to directly promote the industrial development instead of using direct trade barriers.

Green Tariffs

- Different studies developed by the Consultant determined that the level of the green tariff is adequate for most of the technologies. However, the green tariff for Solar PV shall be closely examined.
- Economic studies showed that the current green tariff for Solar PV almost doubles the average generation cost, which not only implies that investors are allowed to receive substantial windfall profits but also that the existing value may jeopardise the sustainability of the green tariff model as has been the case in some EU Member States, where the target overshooting on solar PV penetration significantly increased the energy bill for society.
- In this sense, the Consultant has recommended to NERC to promote a reduction in the green tariff for this technology in order to align the tariff with generation costs. This recommendation has been translated into the draft amendment to the Law on Electricity and is pending approval.

- Further to the existence of green tariffs for biomass and biogas, the regulation should be completed to highlight which type of biomass should be banned as input source as they may have a negative environmental impact or have an alternative use if recycled (for instance, hazardous materials, paper and cloths).

Tariff Degression

- The mechanism proposed in the Law on Electricity for tariff digression strongly penalizes mature E-RES technologies as the reduction in the tariff highly exceeds the expected technology learning curve.
- While it agrees on the implementation of tariff digression, the Consultant recommends adjusting the tariff on a technology basis.
- This issue has been acknowledged by NERC experts but it is still pending to be resolved. The Consultant understands that there were more urgent matters to amend in the law before moving to the tariff digression issue but this aspect will become very relevant in the short-term.

E-RES National Target

- Further to the agreement of a RE target for Ukraine – 11% of final energy demand in 2020 – the following step is to define E-RES targets which are in-line with the overall RE target.
- The E-RES targets will have to be developed by the Ministry of Energy and Coal Industry but, in this sense, NERC has been provided with instruments to help the Ministry in their elaboration.
- The targets should be technology-specific and linked to the green tariff categories in order for the government to track the evolution of each category and be able to react in case one target is under or over-achieved.
- To monitor E-RES development it is necessary that NERC implements the improved templates for collecting information and improves the reporting process through the webpage to make publicly-available information on the development of the power sector in Ukraine.

E-RES Connection to the Grid

- Further to the implementation of technical requirements, which are still pending approval, the development of a shallow connection cost approach in the replacement of the existing free-of-charge methodology must be approached in the short term.
- As demonstrated, current procedure does not provide the right incentives to potential investors while continuing to promote obscure practices to recoup some connection costs.
- Shallow connection costs will introduce locational incentives on investors, simplify and make the process for Ukrenergo and the Oblenergos more transparent, reducing their financial constraints as they will not have to bear the cost for the connection line from their budget.

E-RES Operation in the Future Market

- The future wholesale electricity market is still under development. However, one of the main topics affecting E-RES development is the creation of a Fund that will

collect money to finance the green tariff. In this sense, the Consultant recommends that the Fund is designed with automatic mechanisms for ensuring cash availability in daily operations and include enough guarantees to allow E-RES producers to maintain the collection process in the case of default of some of the companies providing cash to the Fund.

- In addition, the Consultant recommends the development of balancing groups in which RES producers are able to reduce their individual volatility (for intermittent E-RES) in which the group is responsible for the balancing costs.
- Further to this, the Consultant also recommends not introducing priority dispatch but allowing E-RES producers to offer their marginal costs in the day-ahead market as this will increase market efficiency.
- The participation of E-RES producers in the ancillary services market should be made on a voluntary basis for all technologies.

Guarantees of Origin

- The development of a GO system is an activity still needing to be developed. In accordance with amendment #10183 to the Law on Electricity, any producer generating electricity from alternative energy sources can request the organisation authorised by the CMU to issue a Guarantee of Origin for confirming the origin of electricity generated. The regulation for the issuing, use, etc. of the Guarantees of Origin has to be also approved by CMU.
- The authorisation of the Issuing Body by CMU is currently pending. Following that, CMU should approve the regulation for guarantees of origin and the Issuing Body should then organise the development of the Electronic Registry for the Guarantees of Origin and set the GO system in operation.
- Nonetheless, the development of this activity shall be promoted, as it will become a cornerstone unit for monitoring the evolution of E-RES in the Ukraine.