

CASE STUDY

USELF

UKRAINE SUSTAINABLE ENERGY LENDING FACILITY



EXECUTIVE SUMMARY

ESTABLISHING A RENEWABLE ENERGY INDUSTRY IN UKRAINE

The Ukraine Sustainable Energy Lending Facility (USELF) accelerated the development of the renewable energy sector in Ukraine, through an innovative combination of EBRD commercial financing, dedicated technical assistance support, and concessional grant co-financing (climate finance).



USELF was initially approved in 2009 for up to €100 million. The Facility consisted of €50 million in EBRD commercial financing, €20 million in climate finance from the Clean Technology Fund (CTF) and €30 million of sponsor equity. This was supported by technical assistance (TA) of US\$ 8.45 million (€6.62 million equivalent) from the Global Environment Facility (GEF). USELF has combined effective policy dialogue and financing support for the nascent renewable energy sector in Ukraine, supporting the efforts of the Ukrainian government to reduce the country's dependence on imported fossil fuels.

The Facility marked the first implementation of non-recourse finance or project finance in Ukraine for smaller-scale renewable energy projects, further supported in a fully-integrated package by policy dialogue, institutional capacity building, and project preparation. These support activities were essential to the success of USELF and would not have been possible without generous contributions from the CTF and GEF. Through these activities USELF has strengthened the business environment for private sector renewable energy, and fostered the development of related projects.

After a slow start due to the under-developed nature of the country's renewable energy sector, the Facility has now signed seven renewable energy projects. These use biogas, biomass, small hydro, wind, or solar energy to generate heat and power. USELF has almost fully committed its initial allocation, and an extension request will enable full use of the USELF funds within the first half of 2014. With a robust project pipeline remaining, and ongoing weakness in the commercial financing sector for renewable energy, a Phase II replenishment is now sought for launch in early 2014. Using further leverage from this replenishment, USELF should continue strengthening the long-term sustainability of the sector by providing financing for another 24-36 months.

MARKET BACKGROUND

UKRAINE'S ENERGY ENVIRONMENT

Ukraine relies heavily on imported energy. Although import dependence has declined recently, over 35 per cent of primary energy needs and 70 per cent of natural gas needs are still met by imported fuels¹. Globally, Ukraine is also one of the most energy-intensive economies and among the highest greenhouse gas (GHG) emitters. Its domestic power-generating assets are ageing and highly polluting, depending on imported gas and coal for 45 per cent of power production in 2010². This underlines the urgent need to improve energy security and reduce the environmental impact of the country's energy sector. Renewable energy can play a key role in addressing these challenges.

Ukraine has great potential for renewable energy. Yet until now, the country has barely used its resources. Ukraine's technical potential for wind energy is estimated to be 40 TWh/year and small hydro 8.3 TWh/year. Its biomass potential is thought to be 120 TWh/year, and solar energy 50 TWh/year – a total of 218.3 TWh per year, compared with total power production of 188 TWh in 2010. However, in 2012 combined production from all renewable sources was only 0.8 TWh/year. It is expected to have reached 1.3 TWh per year or 0.6 per cent of technical potential by the end of 2013.

This low level of activity is largely attributable to inadequate legislative and regulatory frameworks. Until recently these have been too weak for successful implementation of potential projects and developers have experienced difficulty in securing financing.

The government of Ukraine is working to address these challenges and is now updating its 2006 “Energy Strategy of Ukraine until 2030”. The following are key priorities of the strategy.

- Increasing energy efficiency
- Integrating with European energy networks
- Decreasing reliance on energy imports by expanding domestic production
- Setting a national target to reduce GHG emissions by 20 per cent and 50 per cent below 1990 levels by 2020 and 2050 respectively.

The EBRD has addressed barriers to the development of renewable energy in Ukraine by using technical assistance to help the government prepare legislation supporting renewable energy investments. The foundation for this cooperation was laid when the Bank initiated the Ukraine Renewable Energy Development Framework in 2008, funded by the Dutch government. Extensive stakeholder consultation led to recommendations for the basic legislative framework and the steps required for its implementation. In 2009, the government of Ukraine established primary legislation, setting a green tariff for renewable energy. The National Energy Regulator of Ukraine (NERC) then issued the first green tariff approvals to developers.

IMPLEMENTATION BARRIERS

Ukraine's slow implementation of renewable energy has been due to major market obstacles. These include the following legislative, regulatory, procedural, financial, business and information barriers.

- **A high degree of uncertainty in the legal and regulatory environment.** Among other issues, Ukraine lacks regulatory and procedural transparency regarding land acquisition, planning approval, grid connections, off-take agreements, and local content requirements.
- **Limited availability of commercial funding for renewable energy projects and a poor capacity among domestic financial institutions to assess these projects and their related risks.** As a result of the global economic crisis in 2008, hard currency lending was restricted to a few large corporations with export revenues. Banks suffered from a lack of technical expertise to appraise renewable energy projects as well as an overall reluctance to consider longer-term and limited-recourse financing.
- **Inadequate experience among domestic project developers with regard to renewable energy projects.** This made it difficult to develop strong project proposals and led to a distorted view of the viability of renewable energy investments.

¹ Source: IEA Country Data for 2011

² Source: IEA Country Data, www.iea.org

UKRAINE RENEWABLE ENERGY DIRECT LENDING FACILITY (USELF)

Objectives

In 2009, the EBRD launched a new financing facility, initially called the Ukraine Renewable Energy Direct Lending Facility and later renamed as the Ukraine Sustainable Energy Lending Facility (USELF). The implementation period was initially set for 2009 through 2011. The Bank later extended this time frame to the end of 2013 to enable full disbursement and to take advantage of the promising project pipeline.

In the context of Ukraine's critical need for increased renewable energy production, USELF was designed to:

- provide financing and technical assistance for renewable energy projects to demonstrate the benefits of such investments
- encourage and support policy dialogue and institutional capacity building that foster a favourable environment for the development of renewable energy
- build capacity among project developers and encourage a vibrant private sector for renewable energy investment.

Through USELF, the EBRD aimed to provide non-recourse debt financing directly to domestic enterprises to fund small and medium-sized renewable energy projects, including solar, wind, small hydro, biomass and biogas.

The EBRD's business model for renewable energy investments in Ukraine

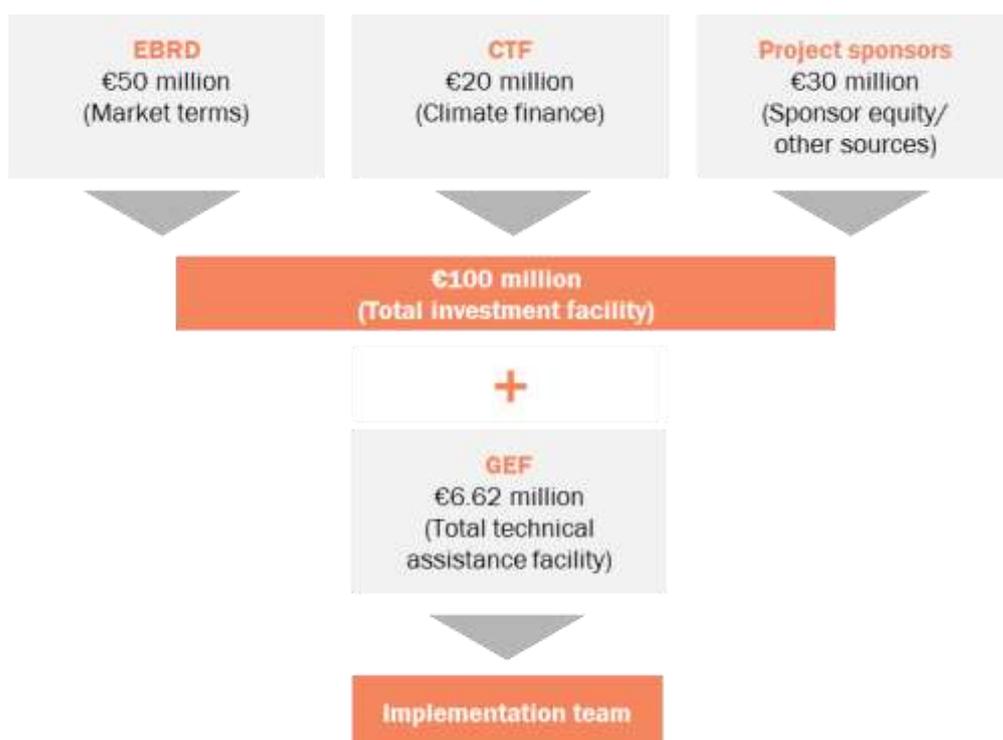
To ensure effective implementation of the Facility, the EBRD applied its proven model for sustainable energy businesses, which combines investment with technical assistance and policy dialogue.

Financial structure

USELF was originally launched with an EBRD commitment of €50 million and further leveraged by €20 million in concessional climate finance from the CTF (see Box 1 below). A grant of US\$ 8.45 million (€6.62 million equivalent)³ was provided by the Global Environment Facility (GEF) for technical assistance to support work on:

1. addressing regulatory issues
2. conducting environmental assessments
3. delivering capacity building and project support.

FIGURE 1: FINANCIAL STRUCTURE OF USELF



³ Exchange rate used: €1 = \$1.28, 11 May 2010.

BOX 1 THE ROLE OF CTF FUNDING

Funding from the Clean Technology Fund (CTF) played a key role in establishing USELF and enabling it to succeed. In the absence of a track record for the renewable energy industry in Ukraine – for project developers in particular – commercial co-finance was unobtainable. This required developers to provide much higher equity for their projects than would normally be the case (50 per cent versus 30 per cent in a mature market). The availability of CTF finance of 20 per cent was crucial in bridging the capital gap, which would otherwise have prevented the realisation of such projects.

The Facility has also made use of the pricing and tenor concessionality of the CTF finance, by providing (i) a lower-cost blended loan package, thereby reducing developer financing costs, and (ii) providing longer tenor and grace periods for the CTF funding, which better aligned the financing tenor with the payback periods of the projects.

The flexibility of CTF support was critical in bringing projects to completion and building the renewable energy sector in Ukraine.

Technical assistance structure

USELF has been supported by a comprehensive €6.62 million technical assistance programme funded by the Global Environment Facility (GEF). A consultancy team based in Ukraine (Project Support Unit) has implemented the programme, working directly with the government, project developers, and the EBRD.

BOX 2 TECHNICAL ASSISTANCE TO DEVELOP EFFECTIVE RENEWABLE ENERGY POLICIES

The implementation of USELF's technical assistance programme significantly expanded the renewable energy policy dialogue that had been initiated in 2008, and supported further commercial, market, and project development.

Institutional support

- Policy dialogue focused on legislation, regulation, and procedures. It assisted the government, specifically the NERC to create an appropriate legislative and regulatory environment, including (i) monitoring and support to evolve RES-E (electricity generated from renewable energy sources) support frameworks, including ensuring consistency between legislative and regulatory frameworks; and (ii) aligning domestic Ukrainian legislation on RES-E with the provisions of the EU and the Energy Community Treaty.
- Environmental and social support was made available to undertake Strategic Environmental Reviews (SERs). The Reviews identified and recommended the most appropriate technologies and regions to benefit from such help, and these have been accepted by the Ministry of Ecology and Natural Resources.

Promoting commercial and market development

- Marketing activities promoted the Facility to a wide range of stakeholders, including developers in Ukraine, advisory firms and banks to foster uptake of the financing.
- Effective screening and project pipeline preparation identified and supported technically and commercially viable projects.
- PSU further assisted relevant organisations to identify and develop methods for enabling and monitoring the sustainable implementation of RES-E.

Project development support

- Capacity building, training and project development support teams undertook due diligence, assisted prospective borrowers with project preparation, and ensured efficient tracking, monitoring and reporting.
- Independent legal counsel carried out due diligence, prepared legal documentation, and reviewed and amended relevant agreements.

Investment categories and assessment methodologies

USELF was designed to encompass all forms of renewable energy including biomass, hydro, wind, and solar. Eligible projects were required to:

- replace electricity generated from conventional energy sources
- provide significant reductions in GHG emissions
- be based on proven technology
- be financially viable.

Projects for the manufacture of renewable energy technologies or materials (such as biomass boilers or wood pellets) were also eligible on the basis of corporate loans rather than project finance. However no such projects have been developed during the current phase of USELF. General eligibility criteria were consistent with the Bank's normal rules for direct lending to corporate or limited recourse projects and there were no restrictions on the size of companies. A team of technical and financial experts assisted applicants with project assessment and loan application preparation. The project assessment mechanism is shown in Box 3 below.

BOX 3 THE ASSESSMENT PROCESS

Interested companies applied via the internet using the Technical Application Questionnaire on the USELF web site. Once eligibility had been confirmed, the EBRD signed a Mandate Letter with the borrower. Further evaluation followed, including technical and environmental due diligence as outlined below.

- Final eligibility check
- Technical analysis, project design, cost estimates, equipment selection, construction or contracting arrangements, and grid connection arrangements
- Commercial analysis of proposed contractual arrangements including licensing and permitting, land use, grid connection, off-take agreements, operating and maintenance arrangements
- Estimation of reductions in GHG emissions
- Assessment of operational or management measures that the sponsor would implement
- Evaluation of the borrower's compliance with national standards for environmental protection as well as for health and safety
- Confirmation of eligibility under specific technical criteria
- Financial and risk analysis.

Based on the above review, the EBRD made a final decision on the loan conditions and disbursement.

Project structure and approval process

Through the establishment of USELF, the EBRD developed an effective and highly additional⁴ financial instrument to meet the growing need for investment in renewable energy. As a framework programme, USELF enabled the Bank to provide smaller loans to individual projects that met the eligibility criteria. Financing was determined on a case-by-case basis according to typical bankability criteria for direct lending to corporate or limited-recourse projects where other financing facilities from the EBRD or the commercial sector were unavailable. EBRD loans provided up to 50 per cent, CTF concessional climate finance up to 20 per cent, and the remaining 30 per cent came from sponsor equity or other sources. The average tenor of individual loans was six to eight years for EBRD loans and up to 15 years for CTF financing.

The structure of USELF streamlined the approval process and reduced transaction costs. Financing of both EBRD and CTF funds as well as technical assistance was provided directly from the EBRD, through a simplified structure that included support from the USELF project support team. The team undertook technical and environmental due diligence as well as training and capacity building for developers, investors, bankers and other stakeholders. Borrowers worked with the USELF implementation team and the responsible EBRD officer throughout the project development phase.

⁴ It adds value to a project, particularly where other financing facilities from the commercial sector are unavailable.

USELF RESULTS AND IMPACTS

Project impact

After a slow start, USELF gained significant momentum during 2012 and 2013. It is now delivering impressive results.

The original targets of 10 projects, 90 MW of installed and grid-connected energy capacity, and 350,000 tonnes of CO₂ emissions avoided per annum were clearly ambitious given the ongoing effects of the financial crisis. It is therefore a major achievement that by the end of 2013 the Facility had reviewed 95 applications leading to a solid portfolio of seven signed projects. These totalled €83.4 million in project finance commitment. A further breakdown of the funding is illustrated in Table 1. With a robust project pipeline remaining, representing all renewable sub-sectors and totalling some €500 million in total potential project costs, the Facility is expected to maintain its current momentum, and continue contributing to market transformation in Ukraine. It is now critical to maintain this pace.

As of the end of December 2013, 58.2 MW of new renewable energy capacity had been financed and Ukraine is on course to realise carbon emission savings of more than 200,000 tonnes of CO₂ per year. This would be equivalent to 5 million tonnes of GHG emission reductions over the approximate 20-year life of the project.

FIGURE 2: SECTOR BREAKDOWN OF SIGNED PROJECTS

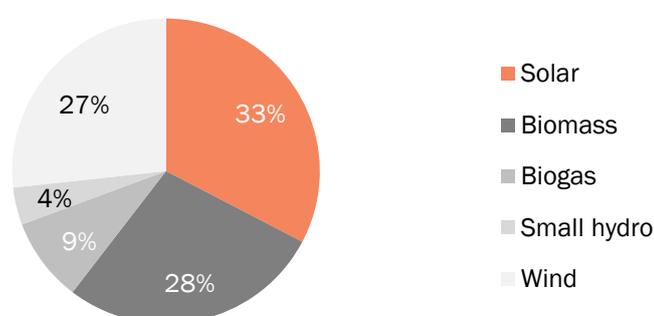


TABLE 1: SIGNED PROJECTS

Operation name	Sector	Year signed	Project budget (€ million)	EBRD loan (€ million)	CTF loan (€ million)	Anticipated CO ₂ savings kt/year	Energy generation electricity – GWh/year	Implementation status
Ivankiv Biomass	Biomass	2013	25.9	9.9	5.6	128	121	Under construction
Eco-Optima Wind Farm	Wind	2012	20.5	9.5	3.8	26.9	25.4	Under construction
Porogi Solar Energy	Solar	2012	9.5	4.1	1.6	5.3	5	Operating
Sunelectra Power	Solar	2013	9.3	3.9	1.5	5.1	4.8	Operating
Gnatkov Solar Energy	Solar	2013	9	3.8	1.6	8.0	8.5	Operating
Ecoprod Biogas	Biogas	2013	5.4	3.1	1.1	9.8	9.9	Under construction
Visum Hydropower small hydro power plants	Small hydro	2012	3.8	1.3	0.7	26.9	25.4	First plant under construction, second plant awaiting start of construction
Total			83.4	35.6	15.9	210	200	

Market transformation impact

USELF has become a key catalyst in the development of the Ukrainian renewable energy sector by:

1. Demonstrating the potential for project finance in the sector
2. Establishing a community of local developers and building their capacity
3. Working with the Ukrainian government to develop enabling regulation and legislation.

USELF has shown strong results in meeting targets. It has strengthened the regulatory and policy environment and capacity building of project developers, financial institutions and policy-makers. Given the reluctance of commercial banks to engage in renewable non-recourse finance when the programme was first initiated, the establishment of the portfolio and related non-recourse finance structures for projects has built a foundation for the ongoing development of renewable energy. Several first-of-a-kind projects are being deployed, including Ukraine's first project-financed wind farm and biogas plants. The Facility has helped to establish commercial standards, including off-take structures, contract templates, and project documentation for use across the industry.

The combination of ad-hoc and systematic exchanges of information through the technical assistance program has proven effective and useful for all stakeholders, especially for NERC, project developers and local communities. Their needs, and the issues that have arisen during interactions with developers, have driven the prioritisation of project activities.

Key achievements in Ukraine legislation and regulation

- Parliament revised renewable energy source (RES) laws to align with good international practice, including the following.
 - new definitions distinguishing between renewable energy sources and alternative energy sources
 - Reduction of solar feed-in tariff (FIT, or 'green' tariff) to reflect growing commercialisation
 - Introduction of FIT for biogas, sewage gas and landfill gas projects
 - Clearer definitions of wind power plants for FIT levels
 - Promotion of small-scale generation – small-scale solar photovoltaics and small hybrid power plant (HPP) installations – introduced into legislation.
- The Local Share Content (LSC) provision has been abolished for small hydro projects, and recommendations made to abolish LSC provision for biomass and biogas projects
- NERC approved the FIT methodologies and procedures and these are now operational
- Regulations on "Requirements for wind and solar power plants to connect to the grid" were developed together with NERC and submitted to the Cabinet for approval
- An EU Accreditation mechanism was established, including a registry for RES-E generation facilities
- A methodology for monitoring detailed technical and operational procedures for assessment and approval of renewable energy projects was adopted and has proven to be effective
- An SER of biogas, biomass, small hydro, solar, and wind technologies in key regions with RES potential was undertaken in close cooperation with the national authorities in Ukraine.

IMPLEMENTATION CHALLENGES AND LESSONS LEARNED

While the seven signed projects and the legislative and regulatory progress have been significant catalysts for the Ukrainian renewable energy market, establishing facilities such as USELF is not an easy task. Along the way there have been substantial challenges, both expected and unexpected.

Developing renewable energy capacity takes time

It took some time for USELF to see its first project success. Original expectations of the pace at which projects could be developed and the financing facility used were overly optimistic given the legislative and market barriers and the low level of experience within the project development community. USELF was subsequently extended for two years from 2011. The groundwork paid off with the completion of seven project signings by the end of 2013, and a strong pipeline of 16 potential projects for signing in both Phase I and the proposed Phase II.

Importance of dedicated support resources

The implementation of USELF demonstrates unequivocally that technical assistance support is essential for the success of such innovative facilities. More specifically, USELF has benefited greatly from the work of the project support team and legal advisors.

Marketing and outreach

Given the nascent stage of the renewable energy industry and lack of experienced project developers, considerable effort was spent on finding the right marketing activities to reach appropriate stakeholders. This intensive communications effort resulted in 95 applications across all renewable energy sectors. However, quality was varied, underlining the need for further focused support for project preparation.

Training and capacity building for developers and investors

To overcome the limited experience of project developers, the support teams shared commercial and market development best practices with project developers and bankers through awareness-raising, training and capacity-building activities. These included seven training workshops, and two specialised workshops for banks focusing on EBRD environmental and social requirements. Capacity-building efforts have now begun to focus on direct assistance to eligible project developers.

BOX 4 PROJECT DEVELOPER HANDBOOK

A key feature of training activities has been the creation of a project developer handbook for Ukraine. The publication is to be designed as a comprehensive information resource for potential investors and developers of renewable energy projects. The handbook will include presentations and training materials on renewable energy resources in Ukraine, as well as contact details of main sector stakeholders. It will also outline development procedures, integration procedures and standards, overviews of supporting legislation and of critical risks and constraints, along with other issues identified during the assessments of training needs. Preparation of the handbook has been delayed until early 2014 while the first projects are deployed. These will provide meaningful case studies for inclusion in the handbook.

Regulatory and institutional challenges

Overall, there has been good progress on raising awareness of real versus perceived risks of renewable energy projects. However, the latter remain high with regard to the country, sector, and regulatory environment in Ukraine. Such perceptions create a barrier to more rapid implementation of renewable energy projects, despite the advances in policy and regulation outlined above.

Other challenges also persist, such as the LSC requirement. Despite recent progress, concerns about implementation of the LSC requirement are ongoing. Depending on the commissioning date, LSC requires local content of 30 to 50 per cent for renewable energy projects. Given the trade-distorting nature of the LSC, the EBRD will continue to focus policy dialogue efforts on achieving further reforms in this area.

BOX 5 LOCAL SHARE CONTENT REQUIREMENT

In Ukraine an increasing share of renewable energy project costs must be sourced domestically to be eligible for feed-in-tariffs (FITs). FITs had been set initially with a moderate LSC requirement on materials, equipment, capital assets, and works and services of Ukrainian origin. However, this requirement has since risen. The LSC now stands as follows:

- Wind, solar and biomass projects commissioned after 1 July 2013 – 30 per cent (biogas – after 1 January 2014)
- Wind, solar and biomass projects commissioned after 1 July 2014 – 50 per cent (biogas – after 1 January 2015)

LSC requirements can distort trade and act as a barrier to the development of renewable energy projects. A May 2013 World Trade Organization (WTO) appellate panel report concluded that the Government of Ontario's use of Minimum Required Domestic Content Levels in their FIT programme was in not in line with Canada's WTO obligations, and recommended that Canada bring its measures into conformity with these obligations. Although no case has been brought against Ukraine with regard to the LSC, and Ukraine was not a party to the Canadian case, this outcome could have implications for the government of Ukraine.

The EBRD has been involved in policy dialogue on the abolishment of LSC provisions. These efforts seem to be paying off. Draft laws are now in circulation aimed at eliminating LSC requirements in certain technologies (biomass and biogas) or, alternatively, at reducing the LSC to 25 per cent, or preventing it from rising beyond 50 per cent. Removal of the LSC requirement for all renewable energy projects remains a key priority for the replenishment of USELF and will continue to be at the top of the Bank's agenda for policy dialogue.

Commercial sector challenges

As noted earlier, the overall lack of project finance in Ukraine was particularly challenging in the renewables sector. Relatively few foreign investors have entered the market (only 5 per cent of project applicants), and the flow of investment and knowledge transfer into Ukraine is therefore limited. Insufficient access to equity funds for the mainly domestic developer community and the limited number of engineering, procurement and construction (EPC) contractors in Ukraine have also had a negative impact on the development of the project finance market.

Despite these difficulties, overall, USELF is on track to create a successful market for renewable energy in Ukraine. This assumes that all projects – both signed and pipeline – proceed as expected, without unforeseen reform reversals in either the regulatory or business environment.

TABLE 2: SUMMARY OF QUANTITATIVE TARGETS AND RESULTS

Indicator	Original target	Results at end of 2013
Total number of projects	40 firms contacted and 10 projects signed	95 submissions made and 7 projects signed
Total CO ₂ emission reductions as a result of the use of renewable electricity	7 million tonnes (over 20-year lifetime) by 2014	5 million tonnes (over 20-year lifetime)
New renewable power generation capacity installed (MWe)	90 MWe	58.2 MWe
Total electricity generated from renewables (GWh per year)	370 GWh per year by 2014	200 GWh per year

CONCLUSIONS AND LOOKING AHEAD

At present, USELF is well-established operationally. The Facility is ready to continue delivering innovative financing solutions for renewable energy projects in Ukraine without modifications to its operational modalities. A small but solid base of renewable energy projects has now been implemented in Ukraine. As a result, greater understanding, awareness, and experience of renewable energy opportunities and risks have emerged in the investor and financial community. In addition, a stronger enabling framework of legislation, regulation and procedures should further catalyse the market.

With the contribution of concessional climate finance, a strong technical assistance programme, good cooperation between various partners, the implementing consultants, and the government of Ukraine, and some patience, USELF has successfully laid the foundation for the emergence of a sustainable renewable energy sector in Ukraine.

With the initial allocation of the Facility now largely committed, and a robust project pipeline in place, the EBRD is planning Phase II, to be co-financed by the CTF, subject to approval by the CTF Trust Fund Committee. This will be launched in 2014. Given the crucial role that technical assistance played in the successful implementation of Phase I, approvals have already been received in parallel for technical assistance with further pipeline preparation and project development support. Funding from the EU Neighbourhood Investment Facility as well as bilateral donors is expected to support further vital policy dialogue and project development support work.

USELF CASE STUDIES

Porogi solar project

Rengy Development LLC established a special purpose company, Green Agro Service LLC (GAS), in the region south of Vinnitsa, becoming the first PV solar facility directly financed by the EBRD and the first USELF project to be commissioned in December 2012.



The project aims to achieve:

- Increased power generation from renewable energy sources
- Improved quality and reliability of power supply
- Reduced GHG emissions
- Limited-recourse financing for future projects in Ukraine.

Total peak capacity of the project is 4,495 kW, producing around 5,000 MWh of electricity per year to the local electricity grid of Vinnitsaoblenergo. The planned electricity output of the plant will reduce GHG emissions by around 5,000 tCO₂ per annum. The funding has been provided in two parallel tranches: an 8-year EBRD loan of €4.1 million and a 15-year loan of €1.6 million from the CTF.

TABLE 3: POROGI SOLAR PROJECT

Region	Vinnitsa
Type of renewable energy	Solar power
Project goal	Generation of about 5.0 GWh per year of renewable electricity
Main investments	PV modules with a peak capacity of 245 Wp, installed on fixed galvanized-steel mounting racks; AEG inverters
Investment volume	Over €9 million (including VAT)
Energy production	Approximately 5,000 MWh per year
CO₂ emissions	Approximately 5,000 tCO ₂ per year

Ecoprod biogas project

Ecoprod, a large diversified agricultural company, will use its waste by-products to generate 10 GWh of biogas per year. The company has 18,000 ha of land and some 4,500 head of dairy cattle. It produces a wide range of agricultural products to a diversified base of domestic and international customers.



Ecoprod will construct a facility that is expected to be similar to the Farmatic plant in Neubukow, Germany, shown above.
(Photo: Lars Klinkmueller/CarboCycle)

Construction of a biogas plant provides an excellent opportunity for the company to use waste by-products, including manure from animal breeding, silage and other residues to produce biogas, generate additional revenue streams and reduce energy costs. Using 44,500 tonnes of feedstock to produce about 5.8 million m³ STP (see footnote⁵) of biogas per year, the plant will employ a commercially-proven wet mesophilic three-stage fermentation technology.

Biogas will be used to run gas engines in two co-generation units with a gross power capacity of about 1.5 MWe and an efficiency of about 40 per cent. At 7,500 full-load operation hours, total net electricity generation for feed-in to the grid system will be close to 10,000 MWh per year. This will be sold at the FIT rate under the Green Tariff Law. In addition, the heat heat will be used partly for drying purposes during Ecoprod's production processes.

TABLE 4: ECOPROD BIOGAS PROJECT

Location	City of Volnovakha in Donetsk oblast
Type of renewable energy	Biogas
Project goal	Generation of about 10 GWh per year net electricity
Main investments	Steel hydrolysis and fermentation reactors, combined heat and power units for power generation, concrete storage tanks and process automation equipment
Investment volume	Over €5 million (including VAT)
Energy production	Approximately 10,000 MWh per year
CO₂ emission	Approximately 9,800 tCO ₂ per year

⁵ STP = standard temperature and pressure

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