

## PROJECT INFORMATION DOCUMENT (PID) APPRAISAL STAGE

Report No.: PIDA9146

<b>Project Name</b>	Second Power Transmission Project (P146788)
<b>Region</b>	EUROPE AND CENTRAL ASIA
<b>Country</b>	Ukraine
<b>Sector(s)</b>	Transmission and Distribution of Electricity (100%)
<b>Theme(s)</b>	Infrastructure services for private sector development (70%), Regional integration (20%), Climate change (10%)
<b>Lending Instrument</b>	Investment Project Financing
<b>Project ID</b>	P146788
<b>Borrower(s)</b>	Ministry of Finance
<b>Implementing Agency</b>	National Power Company Ukrenergo (UE), Ministry of Energy and Coal Industry of Ukraine
<b>Environmental Category</b>	B-Partial Assessment
<b>Date PID Prepared/Updated</b>	27-Jun-2014
<b>Date PID Approved/Disclosed</b>	27-Jun-2014
<b>Estimated Date of Appraisal Completion</b>	27-Jun-2014
<b>Estimated Date of Board Approval</b>	30-Sep-2014
<b>Decision</b>	

### I. Project Context

#### Country Context

A weak external environment, delayed structural reforms, and poor macroeconomic management have led to stagnation in Ukraine. During 2001-2008, real GDP growth averaged 7.5 percent. After a deep contraction in 2009 precipitated by the global economic crisis, Ukraine experienced a modest recovery in 2010-2011. This was followed by economic stagnation in 2012-2013 due to economic mismanagement, declining investment, and weak external demand. In 2013, real GDP remained below its 2007 level. After a peak in 2009, inflation remained close to zero in 2012-2013, mainly because of the lack of utility tariff adjustments and tight monetary policy to support the de facto fixed exchange rate.

This economic stagnation was accompanied by an accumulation of unsustainable fiscal and external imbalances. Weak revenue performance, delayed tariff hikes in the gas and district heating sectors, and increases in wages and pensions led to a growing general government deficit that – including the deficit of the state energy company, Naftogaz – reached 6.7 percent of GDP in 2013. The rising fiscal deficit, in turn, exacerbated pressures on the external current account, which widened to 9.2 percent of GDP in 2013. Balance of payment pressures were amplified by large external debt

refinancing needs, limited access to external financing, and political uncertainty. Given the de facto exchange rate peg to the US dollar, these growing internal and external imbalances led to depletion of foreign exchange reserves.

The new Government of Ukraine (GoU) started implementation of reforms after a forced macroeconomic adjustment in early 2014. Faced with economic stagnation, mounting fiscal and external pressures, and a fragile banking system, the authorities undertook urgent measures to stabilize the economy. In late February 2014, to avoid an imminent balance of payment crisis, the authorities switched to a flexible exchange rate regime, resorted to fiscal consolidation, and requested a Stand-by Arrangement (SBA) with the IMF. GDP growth is expected to decline by 5 percent in 2014 in the baseline scenario before recovering to 2 percent in 2015. This scenario takes into account the slower growth of key trading partners, higher gas import prices announced in March 2014, and disruptions of economic activity in eastern Ukraine. The ongoing macroeconomic adjustment is expected to be contractionary in the short term and will negatively affect the purchasing power of households and businesses. Petro Poroshenko was elected President of Ukraine on May 25, 2014. He is expected to sign the Economic Part of the Association Agreement with the EU in Brussels on June 27, 2014.

The political situation in Ukraine remains volatile and there are several substantial risks, including the possibility of deeper and wider conflict that could affect implementation of the reforms. Possible deterioration of political and economic relations with Russia is a key risk that may impact the external trade and gas sectors. In these circumstances, given the vastness of the reform agenda, questions also remain about the new government's capacity to carry out reforms quickly and comprehensively.

### **Sectoral and institutional Context**

Ukraine's energy demand and supply have been growing rapidly. Following the collapse of the Soviet Union and the decline in economic activity, Ukraine's power sector output also dramatically dropped, from 296 terawatt hour (TWh) in 1990 to a low 170 TWh in 2000. Output increased to 179 TWh in 2003 and grew to 198 TWh in 2012 as the economy recovered from the global financial crisis. The total installed generating capacity of the Ukrainian power system in 2012 was 53.8 gigawatts (GW). Given a maximum peak load of 31.8 GW (February 2012), there is a surplus of installed capacity of approximately 59 percent. The relatively low increase in installed generating capacity from 52.9 GW in 2000 to 53.7 GW in 2013 compared to the growth in demand, from 123 TWh in 2000 to 147.2 TWh in 2013, reflects the reduction in the present surplus generating capacity to a more prudent level. It should be noted that thermal power plants' (TPPs) capacity is still underutilized, accounting for 44.7 percent of energy generation (whereas the installed capacity share of TPPs is 61 percent), although it is tending to decrease, caused by aging and lack of rehabilitation. Nuclear power plants (NPPs) account for 45.5 percent (25.7 percent of installed capacity) and hydropower plants (HPPs) for 5.5 percent (10 percent of installed capacity).

Main characteristics and conditions of Ukraine's transmission network. At the beginning of 2014, Ukraine's transmission system comprised 136 substations (SS). The total installed capacity of transformers was about 78,900 megavolt-amperes (MVA) (including auxiliary power transformers – 452,781 MVA) and 22,892 km (by circuits) of backbone and overhead transmission lines. A large number of SSs and overhead lines (OHLs) are old and have exhausted their useful life, requiring urgent replacement. According to data provided by Ukrenergo (UE), 16,700 km of transmission

lines have been in operation for over 30 years (72.8 percent of all lines), of which 10,890 km have been in operation for more than 40 years (47.5 percent of all lines). For reference, the projected useful life of OHLs is 40 years. This suggests further aging and inadequate rates of reconstruction of transmission lines, which has led to complications in their operation. According to UE data, as of December 31, 2012, 229 out of 343 auto-transformers (AT) were over 25 years old (the standard lifespan), which means that 67 percent of ATs have exceeded their projected useful life and should be replaced.

In 2011, the absolute technical losses in the transmission grid in eight power systems reached 4.1 TWh, or 2.51 percent of the 163.5 TWh gross supply in relative terms. In 2012, this number increased slightly to 4.2 TWh, or 2.53 percent of the 168.8 TWh gross supply in relative terms. At the same time, it should be noted that in 2012 the level of technical failures of main network equipment on OHLs and SSs, the major cause of Energy Not Served (ENS), reached 156.86 MWh. The increase in demand and changes in power flows, coupled with extended periods of insufficient investment, render the network structure unable to support the present load. As currently configured, the transmission network is characterized by high technical losses and poor reliability, instability, and unavailability and low quality of power supply. This is costly, inconvenient, and potentially dangerous to customers. This situation is aggravated by the fact that SS equipment, transmission lines, relay protection, and control systems are outdated or have exhausted their designed operational life. These problems go beyond the sector itself, posing a threat to sustainable economic growth, with adverse effects on products and services in the country, as well as creating barriers to the integration of renewable energy in Ukraine.

Ukraine's power sector and its challenges. Main players of Ukraine Power Sector are presented in Figure 2 of PAD. The early reforms after Ukraine's independence focused on increasing competition and fell far short of improving efficiency in the power sector. Despite positive developments in power system reforms over the past 12 years, the sector continues to be plagued by high levels of financial insolvency and operating inefficiencies, and still faces significant challenges. Against this backdrop, for Ukraine's electricity sector to provide a reliable and high-quality electricity supply able to meet growing demand and to take advantage of the proximity to the European Network of Transmission System Operators for Electricity (ENTSO-E), the sector needs to tackle the challenges described below.

Challenge No. 1: To further improve the functioning of the electricity market through the introduction of reforms that would gradually replace the single-buyer wholesale electricity market (WEM) with a bilateral contracting market and a balancing mechanism. Although the current model of a single-buyer WEM was introduced before the basic financial, legal, and regulatory conditions were in place, Ukraine has made substantial progress in improving the functioning of the existing market model since 2000. However, the current single-buyer structure of the WEM has enabled government agencies to interfere excessively in the administration of the market, thereby undermining the market's ability to function as an effective price-setting mechanism. On October 24, 2013, the Ukrainian Parliament approved the law "On Operating Principles of the Electricity Market of Ukraine," which replaced the single-buyer WEM with a bilateral contracting market and a balancing mechanism. The law was signed by the President on November 26, 2013, and became effective on January 1, 2014. Now Ukraine has three years to prepare for the complete launch of the WEM, starting from July 1, 2017, including implementation of the following elements: (i) a bilateral contract market; (ii) a "day-ahead" (spot) market; (iii) a balancing market; (iv) a market of ancillary services, and (v) a retail electricity market, as prescribed in the law. EU has provided a

grant through EBRD Grant facility to help with the implementation of the WEM law and EBRD is now engaged in selection of consultants who will assist the National Electricity Regulator Commission (NERC) and the Ministry of Energy and Coal Industry of Ukraine (MoECI) in implementation of the law and drafting sub laws, methodologies, procedures needed.

Challenge No. 2: To improve and maintain the financial viability of the power sector. Despite significant improvement, electricity supplies in Ukraine still include large implicit subsidies which have had severe macroeconomic and structural implications. The three key factors accounting for implicit subsidies are: non-payments; excessive losses; and tariffs below economic costs, which steadily increased since 2000. The following issues will have to be resolved to achieve and sustain financial viability: (i) high inter-enterprise debts; (ii) tariffs below economic cost-recovery levels; and (iii) high transmission and distribution losses. Thus, Ukraine will need to develop and implement a medium-term tariff policy designed to bring electricity tariffs up to economic cost-recovery levels. One of the key challenges of financial viability is to make sure that tariffs are set at a sufficiently high level for the Transmission/Balancing Market Operator to cover capital costs of investments and to ensure that system auxiliary services provided by the Operator are included in tariffs.

Challenge No. 3: To strengthen the institutional capacity and financial and administrative independence of the sector's regulator (National Electricity Regulator Commission – NERC). Currently, NERC does not have enough budgetary, financial, and administrative independence to perform its duties in an efficient manner. A draft law in its third iteration is under discussion in the Parliament and represents a major advance in the right direction, but it is not enough. It is necessary to revise the draft law to incorporate suggestions/changes, which are fully in compliance with the EU Third Energy Package, EU Directive for the Power Sector and Energy Community Treaty (ECT) requirements. As part of triggers set by the First Development Policy Loan, approved by the World Bank Board on May 22, 2014, the Bank team will support NERC to update this law. NERC requested Bank's assistance to shape the law to meet the EU Third Energy package and the Bank team hired an expert to provide guidance to NERC.

Challenge No. 4: To improve the efficiency of the operation of energy sector utilities. To improve payment discipline, financial solvency of the sector, and its operating performance, beginning in 1998 and continuing through 2012, the government initiated the privatization of regional electricity distribution companies (oblenergos) and thermal generation companies. To date, the government has been modestly successful in privatizing oblenergos and three generation companies that were state owned. However, questions have been raised as to whether the privatized oblenergos' performance has improved with respect to operational and financial efficiency and investments. Private investors should be required to bring distribution network assets up to internationally accepted technical standards to improve reliability and quality of service to consumers. This would lead to reduction of both technical and commercial losses, and promote efficiency and a viable distribution system. Similarly, private investors in thermal power should be required to bring power plants up to internationally accepted environmental and technical standards to improve the efficiency and reliability of electricity supply. For those utilities under public ownership, such as the power transmission system, including the dispatch center, and HPPs and NPPs, the strategy to improve efficiency could be achieved through tariff surcharges provided by NERC, through borrowing from IFIs, or as part of proper asset revaluation, which is reflected in an increase in tariffs. An additional challenge existing now is the adoption and implementation of the "grid code" and "distribution code" that govern the technical performance (operation) of grid companies,

including transmission operation and distribution companies.

Challenge No. 5: To implement policy and institutional reforms. After having observer status since November 2006, Ukraine officially became a member of the Energy Community Treaty (ECT) in September 2010 with the signing of the protocol that defined the implementation schedule of the *acquis communautaire*. ECT's goals are to promote energy security, stability, development, and solidarity by integrating the energy market, mutual relations, and harmonization of rules, regulations, and policies with those adopted in the EU, as well as coordination of energy policies. The final purpose of ECT membership is to synchronize the operation of Ukraine's Unified Power System (UPS) with EU power systems. Being part of ECT has a number of requirements, including adaptation of Ukraine's legislation to EU Directives, unbundling of energy assets, and provision of third-party access to the network, to name a few. Energy sector reforms are identified as a priority objective by MoECI and outlined in Annex 8-1. Detailed actionable steps for implementation of the strategy are provided in a separate action plan developed and introduced in March 2012, and updated annually. The Presidential Administration and MoECI started implementation of the reform program in 2006, when the Energy Strategy until 2030 was approved. This Strategy recently went through a complete revision and was finalized in July 2013, culminating in approval by the Cabinet of Ministers. The focus has mainly been on changing the legislative framework in the sector. A cornerstone of this reform is the implementation of a new model of WEM, and continuation of reforms following ECT requirements.

Development Partners: Cooperation in the energy sector is high on the agenda of several donors, notably the European Commission, and Governments of Japan, Germany (DfiD) and Sweden (Sida), although the overall donor support to the sector declined in the last few years after USAID and CIDA reduced their assistance and focused on the Chernobyl sarcophagus project and the nuclear safety and coal sector restructuring. Several donors work on Energy Efficiency but do not have the capacity to follow Power Sector Reforms. At the same time, it should be noted that Energy Sector Reforms, which help establish a framework for sector-wide cooperation and partnership, link major IFIs including EBRD, EIB, KfW and bilateral donors in assisting Ukraine to reform and to further develop its large and strategically important energy sector.

The Second Power Transmission Project (PTP2) will address a number of the above challenges, while providing a strategic framework for the development of Ukraine's power sector in a sustainable manner. In this context, Ukraine, with the support of the World Bank, has been implementing Energy Sector Reforms since 2004. The main objectives of these reforms are to: provide investments for energy infrastructure; improve the safety and reliability of the power supply; contribute to the uninterrupted operation of the Ukrainian energy market; and support Ukraine in its legislative, institutional, and technical harmonization of the energy sector with the European Union's (EU) Internal Energy Market. In support of these reforms, PTP2 (the Project) will focus on the development of comprehensive plans to be prepared taking into consideration strategic directions for Ukraine's power system, including: (i) scale-up of renewable power integration and low carbon development; (ii) plans and requirements for network integration/synchronization with ENTSO-E; and (iii) development of a competitive electricity market. These plans will underpin the selection of and rationale for specific investment projects financed by the proposed Project (Annex 8-1 of PAD). The proposed Project will help UE overcome the challenges of strategic planning, implementation, and finance of transmission system rehabilitation and upgrade in a way that ensures stable operation of the system. Ukraine's power system comprises eight regional systems, the most challenged of which (in terms of number of faults, ENS, and technical losses) are: (i) the

Central Power System, which includes four regions – Kiev, Cherkassy, Zhitomir, and Chernigov – and Kyiv city, Ukraine’s capital (a total population of 8.4 million people); and (ii) the Northern Power System, which includes three regions – Kharkiv, Poltava, and Sumy (a total population of 5.8 million people). While the Project’s institutional reforms and Balancing Market and Smart Grid elements will have a nationwide impact, investments in the rehabilitation of the transmission SSs and integration with ENTSO-E will focus on these two regional power systems, impacting almost one-third of Ukraine’s population.

## II. Proposed Development Objectives

To improve the reliability of power transmission system and support implementation of the Wholesale Electricity Market in Ukraine.

## III. Project Description

### Component Name

Rehabilitation of Transmission Substations

### Comments (optional)

Replacement of outdated high voltage equipment, installation of gas-insulated switchgears, and replacement of auxiliary power equipment, protective layering and substation control and automation systems in selected high voltage transmission substations.

### Component Name

Electricity Market Enhancement

### Comments (optional)

This component consists of four subcomponents: Subcomponent 2.1: Installation and connection of reactive power compensation devices for selected high voltage transmission substations. Subcomponent 2.2: Smart Grid introduction through purchase and installation of Smart Grid solutions. Subcomponent 2.3: Balancing market support through purchase and installation of hardware, software, metering and other related elements needed by the Project Implementing Entity for selected substations and the Project Implementing Entity. Subcomponent 2.4: Support for institutional development of the Project Implementing Entity.

### Component Name

Institutional Strengthening of MoECI

### Comments (optional)

Technical assistance to MoECI on (a) procurement, financial management and project management; (b) development of feasibility studies for future projects in the energy sector, technical assistance for preparation of analysis, studies and roadmaps related to reforms in the energy sector; and financing of training.

## IV. Financing (*in USD Million*)

Total Project Cost:	354.93	Total Bank Financing:	306.50
Financing Gap:	0.00		
<b>For Loans/Credits/Others</b>			<b>Amount</b>
Borrower			0.00
International Bank for Reconstruction and Development			306.50
Clean Technology Fund			48.43

Total	354.93
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## V. Implementation

The proposed Project's institutional and implementation arrangements will take advantage of existing institutional systems. The MoECI and UE already have well-functioning Project Implementation Units (PIUs) staffed with technical experts/safeguards specialists, financial management specialists, and procurement specialists. The Bank will provide further training to the PIUs to strengthen their capacity if needed.

UE will be the responsible implementing agency for Components 1 and 2. Its PIU will have fiduciary responsibility, including M&E functions related to the Project's key performance indicators. UE's PIU is well staffed and functioning properly, with Project coordinators appointed for each subcomponent and one director. MoECI will be the responsible implementing agency for Component 3 of the proposed Project. MoECI's PIU will have fiduciary responsibility, including monitoring and evaluation (M&E) functions related to the Project's key performance indicators. The Project Operational Manuals (POMs) will be developed and adopted by the time of loan effectiveness.

## VI. Safeguard Policies (including public consultation)

Safeguard Policies Triggered by the Project	Yes	No
Environmental Assessment OP/BP 4.01	x	
Natural Habitats OP/BP 4.04		x
Forests OP/BP 4.36		x
Pest Management OP 4.09		x
Physical Cultural Resources OP/BP 4.11		x
Indigenous Peoples OP/BP 4.10		x
Involuntary Resettlement OP/BP 4.12		x
Safety of Dams OP/BP 4.37		x
Projects on International Waterways OP/BP 7.50		x
Projects in Disputed Areas OP/BP 7.60		x

**Comments (optional)**

## VII. Contact point

### World Bank

Contact: Dmytro Glazkov  
 Title: Operations Officer  
 Tel: 5262+300 / 3  
 Email: dglazkov@worldbank.org

### Borrower/Client/Recipient

Name: Ministry of Finance  
 Contact: Viktoriia Kolosova  
 Title: Deputy Director of Department of IFIs  
 Tel: 380-44-2775482

Email: kolosova@minfin.gov.ua

**Implementing Agencies**

Name: National Power Company Ukrenergo (UE)

Contact: Konstantin Ushchapovskiy

Title: Director

Tel: 380-44-2383015

Email: kanc@nec.energy.gov.ua

Name: Ministry of Energy and Coal Industry of Ukraine

Contact: Vadym Ulyda

Title: Deputy Minister

Tel: 380-44-2063801

Email: vadym.ulyda@mev.energy.gov.ua

**VIII. For more information contact:**

The InfoShop

The World Bank

1818 H Street, NW

Washington, D.C. 20433

Telephone: (202) 458-4500

Fax: (202) 522-1500

Web: <http://www.worldbank.org/infoshop>