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R2016-0216/1
IDA/R2016-0258/1

November 4, 2016

Closing Date: Wednesday, November 23, 2016 at 6 p.m.

FROM: Vice President and Corporate Secretary

Uzbekistan - Modernization and Upgrade of Transmission Substations

Project Appraisal Document

Attached is the Project Appraisal Document regarding a proposed loan and a credit to Uzbekistan for a Modernization and Upgrade of Transmission Substations Project (R2016-0216[IDA/R2016-00258]), which is being processed on an absence-of-objection basis.

Distribution:
Executive Directors and Alternates
President
Bank Group Senior Management
Vice Presidents, Bank, IFC and MIGA
Directors and Department Heads, Bank, IFC and MIGA

Document of
The World Bank

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Report No: PAD1856

THE INTERNATIONAL DEVELOPMENT ASSOCIATION

AND

THE INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT

PROJECT APPRAISAL DOCUMENT

ON A

PROPOSED CREDIT

IN THE AMOUNT OF US$58 MILLION

AND A

PROPOSED LOAN

IN THE AMOUNT OF US$92 MILLION

TO THE

REPUBLIC OF UZBEKISTAN

FOR A

MODERNIZATION AND UPGRADE OF TRANSMISSION SUBSTATIONS PROJECT

NOVEMBER 2, 2016

Energy and Extractives Global Practice
Europe and Central Asia Region

CURRENCY EQUIVALENTS

(Exchange Rate Effective September 30, 2016)

Currency Unit = Uzbekistan Som (UZS)
US$1 = UZS 3,010.20

FISCAL YEAR
January 1 – December 31

ABBREVIATIONS AND ACRONYMS

CB	Circuit Breaker
CPF	Country Partnership Framework
CRP	Country Risk Premium
CQS	Selection Based on Consultant's Qualifications
DC	Direct Contracting
DSCR	Debt Service Coverage Ratio
EA	Environmental Assessment
EIRR	Economic Internal Rate of Return
EMP	Environmental Management Plan
ERP	Equity Risk Premium
ESMAP	Energy Sector Management Assistance Program
ESMF	Environmental and Social Management Framework
FIRR	Financial Internal Rate of Return
FM	Financial Management
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GIS	Gas Insulated Switchgear
GoU	Government of Uzbekistan
GRS	Grievance Redress Service
HV	High Voltage
ICB	International Competitive Bidding
IFC	International Financial Cooperation
IFRS	International Financial Reporting Standards
IUFR	Interim Unaudited Financial Report
LCS	Least Cost Selection
M&E	Monitoring and Evaluation
MFERIT	Ministry of Foreign Economic Relations, Investments, and Trade
MoF	Ministry of Finance
MSS	Mobile Substation
NCB	National Competitive Bidding
NPV	Net Present Value
O&M	Operations and Maintenance
PCB	Polychlorinated Biphenyl
PDO	Project Development Objective

PMU	Project Management Unit
POM	Project Operations Manual
QCBS	Quality- and Cost-based Selection
RFR	Risk Free Rate
SAIFI	System Average Interruption Frequency Index
SCADA	Supervisory Control and Data Acquisition
SME	Small and Medium Enterprise
SS	Safeguards Specialist
SSS	Single-Source Selection
TA	Technical Assistance
TPP	Thermal Power Plant
ToR	Terms of Reference
TTP	Talimarjan Transmission Project
UE	Uzbekenergo Joint Stock Company
UNDB	United Nations Development Business

Regional Vice President:	Cyril E. Muller
Country Director:	Lilia Burunciuc
Senior Global Practice Director:	Riccardo Puliti
Practice Manager:	Ranjit J. Lamech
Task Team Leaders:	Mitsunori Motohashi
	Sunil Kumar Khosla

REPUBLIC OF UZBEKISTAN
MODERNIZATION AND UPGRADE OF TRANSMISSION SUBSTATIONS PROJECT

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MAP: IBRD 42243

PAD DATA SHEET

Republic of Uzbekistan

Modernization and Upgrade of Transmission Substations (P156584)

PROJECT APPRAISAL DOCUMENT

EUROPE AND CENTRAL ASIA REGION

ENERGY AND EXTRACTIVES GLOBAL PRACTICE

Report No.: PAD1856

Basic Information		
Project ID P156584	EA Category B - Partial Assessment	Team Leader(s) Mitsunori Motohashi, Sunil Kumar Khosla
Lending Instrument Investment Project Financing	Fragile and/or Capacity Constraints [ ]	
	Financial Intermediaries [ ]	
	Series of Projects [ ]	
Project Implementation Start Date 24-Nov-2016	Project Implementation End Date 31-Dec-2022	
Expected Effectiveness Date 31-Mar-2017	Expected Closing Date 31-Dec-2022	
Joint IFC No		

Practice Manager/Manager	Senior Global Practice Director	Country Director	Regional Vice President
Ranjit J. Lamech	Riccardo Puliti	Lilia Burunciuc	Cyril E Muller

Borrower: Republic of Uzbekistan					
Responsible Agency: UZBEKENERGO					
Contact:	Fazlitdin Salamov		Title:	Chairman	
Telephone No.:	998-71-233-61-28		Email:	sjsc@uznet.net.	

Project Financing Data(in USD Million)					
[X]	Loan	[ ]	IDA Grant	[ ]	Guarantee
[X]	Credit	[ ]	Grant	[ ]	Other

Total Project Cost:	196.30	Total Bank Financing:	150.00

Financing Gap:	0.00

Financing Source	Amount
BORROWER/RECIPIENT	46.30
International Bank for Reconstruction and Development	92.00
International Development Association (IDA)	58.00
Total	196.30

Expected Disbursements (in USD Million)

Fiscal Year	2017	2018	2019	2020	2021	2022	2023	0000	0000	0000
Annual	5.00	20.00	20.00	35.00	35.00	20.00	15.00	0.00	0.00	0.00
Cumulative	5.00	25.00	45.00	80.00	115.00	135.00	150.00	0.00	0.00	0.00

Institutional Data

Practice Area (Lead)

Energy & Extractives

Contributing Practice Areas

Environment & Natural Resources, Gender, Governance, Social, Urban, Rural and Resilience Global Practice

Proposed Development Objective(s)

The project development objective is to improve the technical efficiency and reliability of the power transmission networks in Uzbekistan.

Components

Component Name	Cost (USD Millions)
Component 1. Electricity Transmission System Upgrade	191.30
Component 2. Institutional Development and Technical Assistance	5.00

Systematic Operations Risk- Rating Tool (SORT)

Risk Category	Rating
1. Political and Governance	Substantial
2. Macroeconomic	Substantial
3. Sector Strategies and Policies	Moderate
4. Technical Design of Project or Program	Low

5. Institutional Capacity for Implementation and Sustainability	Substantial
6. Fiduciary	Substantial
7. Environment and Social	Low
8. Stakeholders	Moderate
9. Other	
OVERALL	Moderate

Compliance

Policy

Does the project depart from the CAS in content or in other significant respects?	Yes [ ]	No [X]
Does the project require any waivers of Bank policies?	Yes [X]	No [ ]
Have these been approved by Bank management?	Yes [X]	No [ ]
Is approval for any policy waiver sought from the Board?	Yes [ ]	No [X]
Explanation:		
Does the project meet the Regional criteria for readiness for implementation?	Yes [X]	No [ ]

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**

Legal Covenants

Name	**Recurrent**	**Due Date**	**Frequency**
Debt Service Coverage Ratio	**X**		Yearly

Description of Covenant

Except as the Bank shall otherwise agree, the Project Implementing Entity shall ensure that its estimated

net revenues shall be at least equal to the estimated maximum debt service requirements of the Project Implementing entity for any such fiscal year on all debt of the Project Implementing Entity.

Name	Recurrent	Due Date	Frequency
Environmental and Social Safeguards	X		CONTINUOUS

Description of Covenant

The Borrower/Recipient shall cause the Project Implementing Entity to implement the Project in accordance with the Environmental and Social Management Framework.

Name	Recurrent	Due Date	Frequency
Retroactive Financing	X		CONTINUOUS

Description of Covenant

Withdrawals from Portion A of the Credit up to an aggregate amount not to exceed $3,000,000 may be made for payments made prior to this date but on or after November 15, 2016, for Eligible Expenditures.

Conditions

Source Of Fund	Name	Type
IBRD	Execution of Subsidiary Agreement	Effectiveness

Description of Condition

The Subsidiary Agreement has been executed on behalf of the Borrower and the Project Implementing Entity.

Source Of Fund	Name	Type
IBRD	Adoption of Project Operational Manual (POM)	Effectiveness

Description of Condition

The Borrower and the Project Implementing Entity have adopted the POM satisfactory to the Bank.

Source Of Fund	Name	Type
IBRD	Execution and Delivery of Financing Agreement	Effectiveness

Description of Condition

The Financing Agreement has been executed and delivered and all conditions precedent to its effectiveness or to the right of the Borrower to make withdrawals under it have been fulfilled.

Source Of Fund	Name	Type
IBRD	Payment by the Borrower of the Front-end Fee	Disbursement

Description of Condition

No withdrawal shall be made from the Loan Account until the Bank has received payment in full of the Front-end Fee.

Source Of Fund	Name	Type
IDA	Execution of Subsidiary Agreement	Effectiveness

Description of Condition

The Subsidiary Agreement has been executed on behalf of the Recipient and the Project Implementing Entity.

Source Of Fund	Name	Type
IDA	Adoption of Project Operational Manual (POM)	Effectiveness

Description of Condition

The Recipient and the Project Implementing Entity have adopted the POM satisfactory to the Bank.

Source Of Fund	Name	Type
IDA	Execution and Delivery of Loan Agreement	Effectiveness

Description of Condition

The Loan Agreement has been executed and delivered and all conditions precedent to its effectiveness or to the right of the Recipient to make withdrawals under it have been fulfilled.

Team Composition

Bank Staff

Name	Role	Title	Specialization	Unit
Mitsunori Motohashi	Team Leader (ADM Responsible)	Senior Energy Specialist	Team Leader	GEE03
Sunil Kumar Khosla	Team Leader	Lead Energy Specialist	Task Team Leader	GEE02
Fasliddin Rakhimov	Procurement Specialist (ADM Responsible)	Procurement Specialist	Procurement	GGO03
Galina S. Kuznetsova	Financial Management Specialist	Sr Financial Management Specialist	Financial Management	GGO21
Arcadii Capcelea	Safeguards Specialist	Senior Environmental Specialist	Environmental Safeguards	GEN03
Artur Kochnakyan	Team Member	Senior Energy Specialist	Energy Economist	GEE03
Dung Kim Le	Team Member	Program Assistant	Program Assistant	GEE03
Elena Klementyeva	Team Member	Program Assistant	Program Assistant	ECCUZ
Emil Zalinyan	Team Member	Energy Specialist	Economic and Financial Analyses	GEE03
Hiwote Tadesse	Team Member	Operations Analyst	Quality/Operations	GEE03
Jasna Mestnik	Team Member	Finance Officer	Finance Officer	WFALN
Katharina B. Gassner	Team Member	Senior Energy Economist	Energy Economist	GEE03

Koji Nishida	Team Member	Senior Energy Specialist	Power Engineering	GEE03
Nikolai Soubbotin	Counsel	Lead Counsel	Country Lawyer	LEGLE
Rebecca Emilie Anne Lacroix	Safeguards Specialist	Social Development Specialist	Social Development	GSU03
Samuel Kwesi Ewuah Oguah	Team Member	Energy Specialist	Power Engineering	GEESO

Extended Team

Name	Title	Office Phone	Location

Locations

Country	First Administrative Division	Location	Planned	Actual	Comments
Uzbekistan	Surxondaryo	Surxondaryo Viloyati	X		Surkhandarya
Uzbekistan	Qashqadaryo	Qashqadaryo Province	X		
Uzbekistan	null	Samarkand	X		
Uzbekistan	Bukhara	Bukhara	X		
Uzbekistan	Namangan	Namangan Province	X		
Uzbekistan	Jizzax	Jizzakh Province	X		Jizzakh
Uzbekistan	Andijon	Andijan	X		
Uzbekistan	Toshkent Shahri	Tashkent	X		
Uzbekistan	null	Fergana	X		
Uzbekistan	Toshkent	Navoi	X		

Consultants (Will be disclosed in the Monthly Operational Summary)

Consultants Required ? Consulting services to be determined

I. STRATEGIC CONTEXT

A. COUNTRY CONTEXT

1. **Uzbekistan is a lower-middle-income, resource-rich, and double landlocked country strategically located in the heart of Central Asia.** It is the only country in the region to border all the other countries in Central Asia (Kazakhstan, Kyrgyz Republic, Tajikistan, and Turkmenistan) and with its 31.8 million inhabitants, accounts for close to a half of the region's population. The country has significant mineral wealth, and its economic and social prospects are important for the people in the country and the rest of the Central Asian countries.

2. **According to the official statistics, Uzbekistan has made steady progress in reducing poverty and boosting shared prosperity.** The proportion of households living under the national poverty line halved from 27.5 percent in 2001 to 13.5 percent in 2015. Over the recent past, growth appears to have been equitable with a slight increase in the share of total income earned by households in the bottom 40 percent of the income distribution. The Gini coefficient is officially reported to have declined from 0.39 in 2001 to 0.29 in 2013. However, considerable geographic disparities remain and the poorest provinces are those with a largely rural population and low population density.

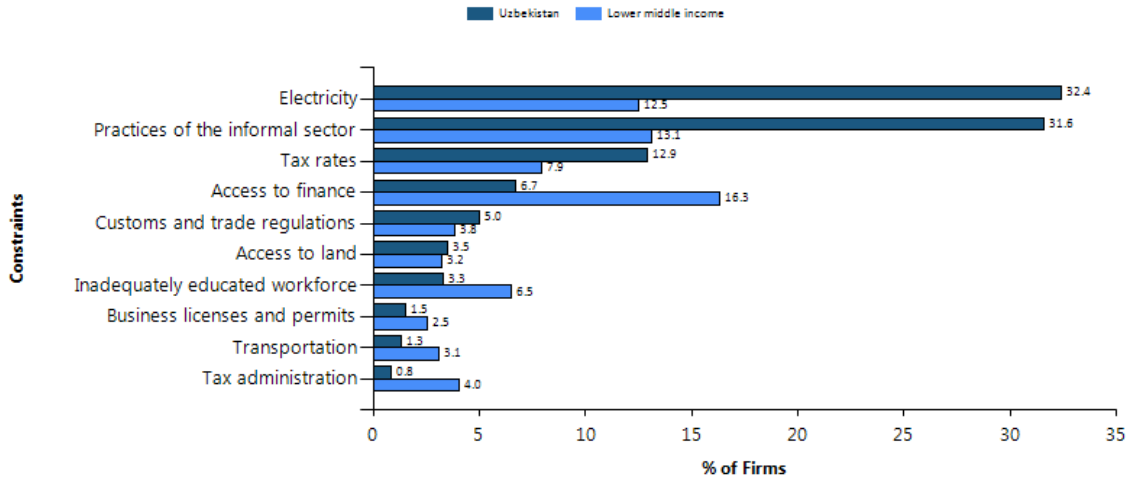
3. **The positive progress is mainly attributable to the country's robust economic growth**. Over the 2001–2014 period, annual gross domestic product (GDP) growth averaged 7.3 percent, and over the last decade, Uzbekistan has had the highest growth rate in the Europe and Central Asia region and was one of the eight fastest growing economies in the world. The country benefited from favorable trade terms for its key export commodities, including copper, gold, natural gas, and cotton, that lasted for a number of years. In the recent past, despite a weakening external environment, countercyclical policies in the 2011–2013 period were successful in maintaining GDP growth. However, due to a larger external shock in 2014–2015 that resulted in a deeper export decline coupled with a sharper decline in remittances, the economy is expected to have slowed to 7 percent growth in 2015 and will likely continue to negatively affect growth over the medium term.

4. **Uzbekistan's broad development objective is to create new jobs sustainably, and its long-term development goal is to become an industrialized, upper-middle-income country by 2030**. To support the strategic objectives for economic development, the Cabinet of Ministers presented its Program of Action that sets seven strategic objectives for 2015 and subsequent years: (a) increase the competitiveness of the economy; (b) provide complete freedom for private sector development; (c) reduce the level of government involvement in the economy to a strategically and economically reasonable size; (d) strengthen corporate governance; (e) deepen domestic industrial production; (f) strengthen infrastructure; and (g) create the conditions for rapid job creation. The Program of Action recognizes that implementation will be the biggest challenge and that successful implementation requires major changes in economic governance.

5. **However, aging infrastructure poses one of the key constraints to the achievement of the country's long-term development priorities.** Although Uzbekistan has generally maintained its infrastructure (roads, irrigation network, electricity, and gas distribution) in better conditions than some other former Soviet Union countries, its infrastructure is aging and

becoming obsolete, which negatively impacts the quality of infrastructure services. This is reflected in firms listing lack of a reliable electricity supply as a key constraint in the country's business environment (Figure 1). Therefore, considerable investment is needed to ensure the availability and quality of infrastructure services that underpin the diversification of economic activities, enhanced productivity, and job creation.

Figure 1. Business Environment Constraints in Uzbekistan and Lower-middle-income Countries



Source: World Bank Enterprise Surveys: http://www.enterprisesurveys.org/.

6. **Therefore, improving the performance of the energy sector directly contributes to increasing business activities and job creation.** Investments in the sector have direct benefits on job creation across the electricity supply chain.[1] Reliable power supply also indirectly contributes to the creation of employment opportunities in productive sectors that use electricity as an input factor for production through its contribution to an improved investment climate for the private sector. Over 32 percent of firms operating in Uzbekistan identify the lack of reliable electricity as a major constraint to doing business, and average losses due to electricity outages are reported to represent approximately 7 percent of annual sales.[2] In addition, reliable electricity and heating supply play important roles in social development and improving health and education development outcomes.

B. Sectoral and Institutional Context

Sector Background

7. **The demand for electricity in Uzbekistan is primarily driven by industrial and residential customers, and the supply-demand balance has been generally tight.** In 2014, the total electricity consumption was 43,955 GWh, of which industrial customers accounted for 41.4 percent, residential demand 24.5 percent, and agriculture 20 percent. Driven by the industry- and export-led growth pursued under the Uzbekistan Development Vision 2030 and the growth in

[1] See Box 2.1 (Annex 2) for the impacts of power projects on growth and job creation.
[2] www.enterprisesurveys.org, 2013 data.

disposable income, the demand for electricity is expected to grow predominantly among the industrial and residential customers. Under the base-case demand growth projection, the electricity supply gap is expected to emerge as early as in 2016 and continue to grow if the required investments are not made on time.

8. **The country's energy mix for electricity generation is predominantly based on natural gas and a substantial portion of generation assets are past their operating life**. About 82 percent of the total installed capacity of 12,510 MW in Uzbekistan is natural gas-based, followed by hydropower (12 percent) and coal (5 percent). Moreover, nearly 40 percent of the total installed capacity is past or close to the end of its operating life. As the generating assets are aging, older thermal power plants (TPPs) are becoming obsolete and operating less efficiently than modern equivalent plants elsewhere.

9. **Key transmission and distribution infrastructure is also aging because the network was developed during the Soviet era as part of the regional grid in Central Asia**. The country has more than 230,000 km of transmission and distribution lines. The network is interconnected with neighboring countries through 500 kV and 220 kV transmission lines. Some of the transmission and distribution lines, substations, and auxiliary facilities built during the Soviet era have become obsolete and past their economic life (Table 1). For this reason, the electricity losses are high, estimated at 20 percent of net generation, and the utilities are incurring additional operations and maintenance (O&M) expenses to source spare parts that are no longer easily available and to cope with frequent outages of equipment.

Table 1. Transmission Lines and Substations by Voltage, Length/Quantity, and Age

Voltage (kV)	Length (km)/Quantity	Average Age (years)
Transmission Lines	**(length)**	
500	2,257	28
220	6,079	30
110	15,300	28
Substations	**(quantity)**	
500	5	25–30
220	70	25–40

Source: World Bank (2013) Uzbekistan: Energy/Power Sector Issues Note; and Uzbekenergo Joint Stock Company (UE).

10. **In the last decade, some sector reform measures have been undertaken with the objective of improving the functioning of the sector, and the emerging sector structure resembles a functional single buyer model managed under a vertically-integrated holding company.** The Government of Uzbekistan (GoU) has embarked on various reform measures, including functional unbundling of generation, transmission, distribution, and dispatch. The majority of the country's power generation, transmission, and distribution assets are owned and operated by subsidiaries of a single holding company, Uzbekenergo (UE). The UE, composed of over 50 subsidiary companies, owns and operates 7 TPPs, 29 hydropower plants, and 3 combined heat and power plants. Its subsidiary, Energosotish, is the single buyer and supplier in the sector. Uzelectroset is the system operator providing dispatch, transmission, and network services, and includes seven high-voltage (HV) transmission network affiliate operators. Electricity distribution is managed by 14 regional electricity distribution companies. However,

most of these companies do not operate as independent companies with sufficient accountability, responsibility, and decision-making authorities.

Sector Challenges and Initiatives

11. Figures 2 to 4 represent enterprise surveys in Uzbekistan.

Figure 2. Number of Electrical Outages in a Typical Month

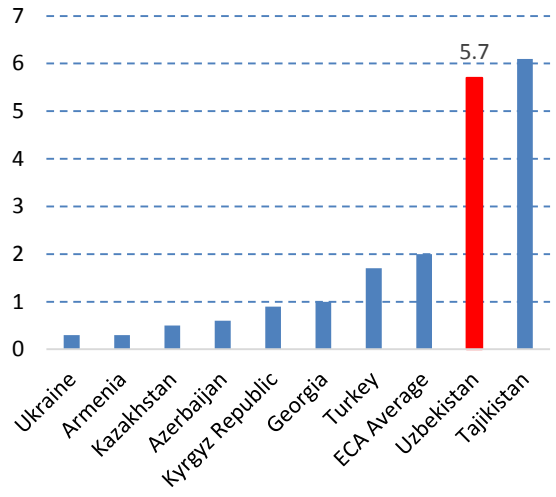


Figure 3. Duration of a Typical Electrical Outage (hours)

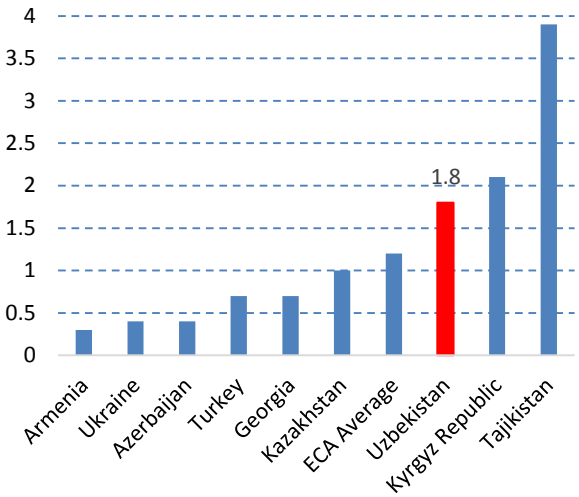
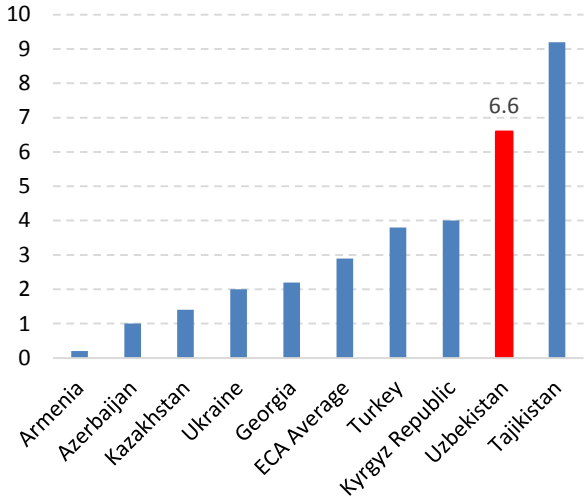


Figure 4. Average Losses due to Electrical Outages (% of annual sales)



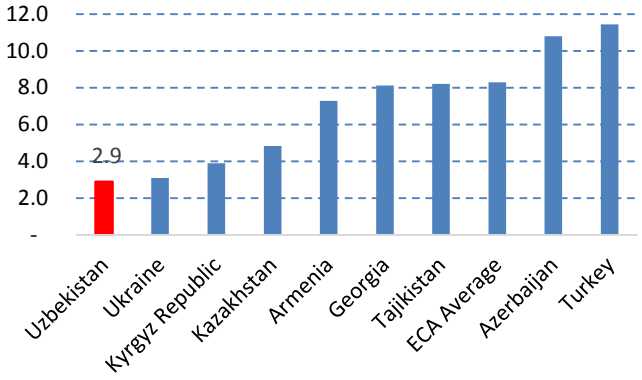
Source: World Bank Enterprise Surveys: http://www.enterprisesurveys.org/

12. **The supply of electricity is increasingly becoming unreliable because of the aging infrastructure along the electricity supply chain and insufficient investments for rehabilitation**. Failures of old transmission and distribution infrastructure and transmission capacity bottlenecks contribute to unreliable electricity supply, higher maintenance costs, and

higher system losses. Blackouts are becoming common in some areas, especially during winter months when the demand is high. The country's electricity reliability indicators are worse than most other countries in the region. Firms report that close to 7 percent of their revenues are lost because of electricity outages (Figure 4). It is estimated that the unserved supply of electricity in 2010 was 860 GWh (about 1.7 percent of total consumption), incurring an economic loss of US$52 million during the winter because of unreliable supply.[3]

13. **For this reason, modernization of the transmission and distribution infrastructure has been prioritized to improve the efficiency and reliability of electricity supply**. In addition to power generation projects being implemented to address the demand-supply challenges, the UE has been investing in the transmission system since 2001, gradually adding and rehabilitating the transmission lines and substations between major power plants and load centers. The World Bank supported the Talimarjan Transmission Project (TTP), which has helped improve the reliability of electricity supply in the southwestern regions. However, significantly more upgrades of the existing and obsolete transmission and distribution lines will be needed, and the cost of such investment is estimated at US$1.3 billion by 2020.

Figure 5. Energy Intensity (constant 2011 purchasing power parity US$ per kg of oil equivalent)



Source: World Bank. 2015. World Development Indicators.

14. **To mitigate the tight demand-supply balance, energy efficiency needs to be improved both on the demand- and supply-side, which will require adoption of modern technologies and practices.** Energy intensity in Uzbekistan is among the highest in the world. The country uses close to thrice the Europe and Central Asia average to produce a unit of GDP (Figure 5). In addition, the aging of TPPs, and transmission and distribution lines contribute to supply-side inefficiencies. The weighted average thermal efficiency of existing gas-fired TPPs is 33 percent compared to the efficiencies of 53 percent to 56 percent achieved by modern combined cycle gas turbines; the system losses (technical and nontechnical losses combined) estimated at 20 percent of net generation are also relatively high; and the inefficiencies along the electricity supply chain are estimated to cost the economy at least US$1.5 billion annually.[4]

[3] World Bank. 2013. "Uzbekistan: Energy/Power Sector Issues Notes".
[4] World Bank. 2013. "Uzbekistan: Energy/Power Sector Issues Notes".

15. **Replacing aging infrastructure and introducing modern technology options require considerable investment.** It is estimated that about US$8.4 billion is required in the power sector to replace aging generation plants and rehabilitate transmission and distribution lines.[5] In the past, such investment has been publicly funded, incurring a fiscal burden to the country. Given that the share of fossil fuel subsidies in GDP, at 21.7 percent, is already among the highest in the world[6] and the prevailing environment of weak commodity prices, this is unlikely to be sustainable. For this reason, there is a need to be selective with public sector investment and to explore alternative financing arrangements, including facilitation of private sector investment in the sector and gradual adjustment of tariffs to ensure cost recovery of the long-term marginal cost.

16. **Despite several adjustments in the end-user electricity tariffs, which have contributed to the UE's improved financial performance, the company faces some financial challenges**. The electricity tariffs are regulated by the Central Government. Since 2004, the retail tariffs have been regularly adjusted, increasing on average from US$0.018 per kWh in 2004 to US$0.059 per kWh in 2015. As a result, the UE's overall financial performance and profitability have generally improved. However, the company faces challenges in cash management, due in part to the slow collection of electricity bills and high accounts receivables, which has triggered a low debt service coverage ratio (DSCR). As new assets are added to the company's balance sheets, the UE's long-term financial viability will depend on the improvements in operational efficiency (that is, increase in power generation efficiency and reduction in technical and commercial losses), collection performance, and regular and cost-reflective tariff adjustments, including revenue requirement for capital expenditures.

17. **A number of measures will be undertaken to improve the UE's financial performance**. The ongoing Advanced Electricity Metering Project aims to establish the much-needed reliable and transparent revenue system for accounting for the electricity supplied to the consumers in three oblasts (regions) and also track revenue received by the utility, which will help reduce commercial losses of the UE's three regional power distribution companies and improve their revenue collection. Reducing the country's high transmission and distribution losses will contribute to improving the UE's financial position. Moreover, in the interim, the World Bank has been in discussion with the Government to prepare a financial recovery plan for the UE. The ongoing technical assistance (TA) on energy subsidies, which aims to support the Government to develop a comprehensive set of measures to reduce energy subsidies in the sector, is also under implementation.

Rationale for the World Bank's Involvement

18. **The World Bank Group mobilizes good industry practices from around the world and focuses on key areas in the energy sector. The close alignment with the GoU's priorities and intensive dialogue led to the World Bank Group becoming a partner of choice in the sector for the GoU.** As described in the preceding section, the areas of the World Bank Group's engagement include supply-side and demand-side energy efficiency, utility accountability

[5] World Bank. 2013. "Uzbekistan: Energy/Power Sector Issues Notes".
[6] International Energy Agency Fossil Fuel Subsidy Database; International Monetary Fund (2013) Article IV Report.

enhancement, renewable energy development, and strengthened transmission and distribution linkages, all aimed at addressing the aforementioned sector challenges in a comprehensive manner, supplying reliable power to deficit regions, supporting economic growth, and ensuring future energy growth with a lower carbon footprint. The World Bank Group, since its engagement in the Uzbek energy sector has become a strong partner with the GoU in both knowledge and investment activities. As described in more detail below, the proposed project will support the introduction of technologies and practices that have not yet been implemented hitherto in Uzbekistan.

19. **The proposed focus of the project on transmission substations supplements external assistance provided by other development partners in associated areas, such as power generation, transmission lines, and distribution.** The development partners active in the sector include the Asian Development Bank, the Islamic Development Bank, and the Japan International Cooperation Agency, and their areas of focus include power generation (new plants and rehabilitation of existing ones), transmission lines (rehabilitation and extension), and distribution (advanced meters). The proposed project will improve efficiency and reliability of the network and thereby complete the activities undertaken by other development partners.

C. Higher Level Objectives to which the Project Contributes

20. **The proposed project supports Uzbekistan's long-term national development strategy and priorities and helps create jobs**. The country aims to create new jobs sustainably and become an industrialized, high-middle-income country by 2030. The proposed project is expected to have direct impacts on employment during the installation and O&M stages. While the number may not be large, the O&M of substations would create sustained employment opportunities. Moreover, the improved and reliable supply of electricity is expected to have immediate impacts on supporting industries and small and medium enterprises (SMEs) improve their productivity, expand business activities, and thereby help create jobs.

21. **The proposed project supports the World Bank Group's twin goals of ending extreme poverty and promoting shared prosperity**. A reliable supply of electricity is crucial for supporting business activities, which would contribute to economic growth and job creation, and enhancing the people's livelihood. It directly contributes to the priorities set under the Country Partnership Framework (CPF) for the period FY16–FY20 that aims to support the creation of new productive and sustainable jobs through, among others, improved public service delivery. Improved efficiency and reliability of electricity supply is expected to enable the development of human capital and facilitate the provision of infrastructure services needed for job creation. Efficient and reliable power supply is also interlinked with other focus areas under the CPF and would contribute to promote private sector growth and improve agricultural productivity.

22. **Moreover, the project is aligned to the higher-level objectives of the World Bank Group Energy Sector Directions Paper** that adopts tailored approaches to support client countries in securing affordable, reliable, and sustainable energy supply needed to end poverty and promote shared prosperity. In accordance with the paper, the project will strive to increase the efficiency of the existing energy infrastructure through rehabilitation, modernization, and adaptive management as a cost-effective means of delivering more energy while reducing fuel

consumption and greenhouse gas (GHG) emissions. In addition, the proposed project encompasses activities in support of the long-term system-wide optimization.

II. PROJECT DEVELOPMENT OBJECTIVES

A. PDO

23. The project development objective (PDO) is to improve the technical efficiency and reliability of the power transmission networks in Uzbekistan.

B. PROJECT BENEFICIARIES

24. The project will rehabilitate and upgrade transmission substations located in Andijan, Bukhara, Jizzakh, Kashkadarya, Navoiy, Surkhandarya, Samarkand, Fergana, Namangan Regions and Tashkent City and Region that are used to supply electricity to end consumers through electricity distribution companies. In this sense, households and enterprises will indirectly benefit from the enhanced reliability of electricity services supplied by electricity distribution companies. This entails most of the population, which is estimated to be approximately 31.8 million. The proposed project is also expected to improve the UE's financial performance and operational efficiency through reduced system losses and O&M expenses. This will eventually reduce wasted energy in the medium- to long-term, which will also reduce GHG emissions and benefit the environment.

C. PDO LEVEL RESULTS INDICATORS

25. The proposed PDO indicators are the following:

(a) Electricity losses per year in the project area (target substations) (percentage, Core Sector Indicator)

(b) Number of outages of major equipment in the substations covered under the project (number per year for target substations)

(c) Average interruption frequency per year in the project area SAIFI (number, Core Sector Indicator)

(d) Direct project beneficiaries (number); of which female (percentage)

26. The proposed intermediate indicators are the following:

(a) Number of substations rehabilitated under the project (number)

(b) UE group transition to IFRS is fully complete (Yes/No)

(c) Percentage of registered project-related grievances responded to within stipulated service standards for response times (percentage); disaggregated by gender (percentage)

III. PROJECT DESCRIPTION

A. PROJECT COMPONENTS

27. In the transmission subsector in Uzbekistan, there are 75 HV (220–500 kV) electricity transmission substations. According to a technical audit conducted, 62 substations require modernization and replacement of electrical equipment because of obsolete technology and aging. One of the substations to be rehabilitated was commissioned in 1947. The failures of substations cause unreliable and poor quality electricity supply, increased losses, and higher maintenance costs. In recent years, the average occurrence of electrical equipment failures has doubled from about 35 per year in the 2001 to 2008 period to about 76 per year between 2008 and 2013. The proposed project will support modernization of the priority substations that were identified to be in need of replacement/rehabilitation.

28. The proposed project consists of two components with the following estimated costs: (a) Electricity Transmission System Upgrade (US$191.3 million) and (b) Institutional Development and Technical Assistance (US$5 million).

Component 1. Electricity Transmission System Upgrade (US$191.3 million: IBRD/IDA - US$145 million, GoU/UE - US$46.3 million)

29. This component will support rehabilitation, upgrade, and expansion of existing substations of 220 kV and higher voltage in Uzbekistan's national grid.

Subcomponent 1.1. Rehabilitation and Upgrade of Transmission Substations

30. This subcomponent aims to modernize the major substation equipment. To maximize use of UE's available in-house resources, a list of 22 high priority substations located in Andijan, Bukhara, Jizzakh, Kashkadarya, Navoiy, Surkhandarya, Samarkand, Fergana, Namangan Regions and Tashkent City and Region have been identified, for which modernization will be prioritized. Details of the remaining substations will be defined during the implementation of the proposed project, when a feasibility study will be completed for those substations and subject to the availability of funding. Modern gas insulated switchgear (GIS) technology, which has not hitherto been introduced in the country, will be adopted for installation at the Yuksak substation in Tashkent City. The compact GIS technology is expected to improve safety and reduce operational costs and the land area required for replacement works, and would thereby facilitate expansion of the substation located in urban Tashkent to integrate future 500 kV injection.

Subcomponent 1.2. Emergency Outage Management Systems

31. This subcomponent aims to build resilience to the system through acquisition of one to two 110 kV/medium-voltage mobile substations (MSSs) and emergency restoration system for speedy repair of outages in HV transmission lines, including 500 kV lines. This is also a technology that has not yet been introduced to the country. The main purpose of installing MSSs is to ensure that the outages during rehabilitation of substations will be minimized and that subsequently they will be used as a backup to build resilience against disasters and/or for emergency restoration of any substation with major outage.

Component 2: Institutional Development and Technical Assistance (US$5 million: IBRD/IDA - US$5 million)

32. This component will cover activities designed to support institutional development of the UE, including but not limited to, corporate governance enhancement of the UE; International Financial Reporting Standards (IFRS) transition support and audits; key sector studies for further development of the energy sector; and capacity building and training.

Subcomponent 2.1.UE IFRS Transition Support and Corporate Governance Enhancement

33. This activity will continue to support the UE's strengthening of financial management (FM) and its transition to the full IFRS across the company, including the subsidiaries, preparation of consolidated financial statements, and enhancement of the company's corporate governance. This activity is now critical, as the preparation of IFRS financial statements is mandated by the Presidential Decree starting from 2015. Indicative areas of support include, among others, the following:

- Project and entity audits;
- Assistance with the IFRS implementation within the UE group in the areas following the audit of the consolidated financial statements prepared in accordance with IFRS;
- Follow up assistance for internal audit development within the UE group; and
- Corporate governance enhancement. This activity will finance capacity building for the UE in introducing modern and effective methods of corporate governance. Indicative areas of support include, but are not limited to: (a) training and capacity building; and (b) improvement of the control environment and enterprise risk management.

Subcomponent 2.2. Key Sector Studies

- **Feasibility studies for future projects.** This study will assess the technical, economic, financial, social, and environmental feasibility of future investment in new areas to be identified and agreed (as required).
- **Other key sectoral studies.** Other key studies to support improvement of energy sector performance will be defined and undertaken during project implementation.

Subcomponent 2.3. Capacity Development of Sector Entities

34. This activity will support further strengthening of the UE, the Project Management Unit (PMU), and other relevant sector entities' capacity through training and study tours to expose them to international practices. The focus areas will be

- new technologies to facilitate modernization of the assets and practices in the sector, such as GIS, MSS, Supervisory Control and Data Acquisition (SCADA), and other relevant training to support implementation of the proposed project;

- training in system planning and operations;

- trainings in certification on IFRS for the key financial staff of the UE and its subsidiaries;

- training in preparing and implementing emergency response; and

- other training activities as appropriate.

B. PROJECT FINANCING

35. The project will be funded by (a) an IDA credit of approximately US$39.16 million equivalent on IDA regular blend terms, (b) an IDA credit of approximately US$18.84 million equivalent on hard terms, (c) an IBRD loan of US$92 million, and (d) GoU counterpart funding of approximately US$46.3 million equivalent. Advance contracting and retroactive financing shall apply for this project. An aggregate amount not to exceed US$3 million from the IDA Credit may be made for eligible expenditures prior to the date of the Financing Agreement but on or after November 15, 2016. To be eligible for financing, procurement shall follow the World Bank's Procurement Guidelines, Financing Agreement, Loan Agreement, and Procurement Plan. Following the positive outcome of advance procurement under the TTP, two International Competitive Bidding (ICB) packages for the proposed project were issued in April 2016. In addition, the Energy Sector Management Assistance Program (ESMAP) is providing additional support in system planning.[7]

36. A summary of project cost estimates by components is provided in Table 2.

Table 2. Summary of Project Costs by Components (US$, millions)

Component	Estimated Cost	Financing	
		World Bank	GoU/UE
1. Electricity Transmission System Upgrade	191.3	145	46.3
2. Institutional Development and Technical Assistance	5	5	0
Total	**196.3**	**150**	**46.3**

37. The proposed project is a stand-alone Investment Project Financing (IPF). The World Bank loan and credit will be on-lent by the Ministry of Finance (MoF) to the UE under a Subsidiary Loan Agreement.

[7] The ESMAP is supporting the Power Sector Planning Study (P157270) to identify priority generation investments to meet future demand growth of electricity and meet the policy goals around fuel diversification and sustainability.

C. Lessons Learned and Reflected in the Project Design

38. The project incorporates lessons learned from previous World Bank engagements in Uzbekistan and similar transmission substation modernization projects implemented by the World Bank elsewhere. The design of the project reflects the following lessons learned:

(a) Close alignment of the World Bank's operations to the Government's priorities and continued intensive dialogue fostered a good working relationship between the two parties that resulted in the World Bank being selected as a partner of choice in the sector. The sustained dialogue and close supervision will be continued with enhanced oversight during project implementation.

(b) Formation and early engagement of a competent counterpart project team are essential for successful implementation of the project. The proposed project will be implemented by the same PMU that successfully handled the TTP with its members well versed in relevant World Bank guidelines and procedures.

(c) Advanced preparation of bidding documents and initiation of procurement during the project preparation stage, as well as early launch of a feasibility study, enhance the readiness for project implementation. This was a new milestone for Uzbekistan achieved under the TTP and has been incorporated and carried out during preparation of the proposed project.

(d) Upfront training in procurement and contract management for staff of the implementing agencies helps enhance project implementation. This will be continued under the proposed project where necessary.

IV. IMPLEMENTATION

A. Institutional and Implementation Arrangements

39. The proposed project will be implemented by the UE. The company is controlled by the GoU through the Company Council and the Board. The Company Council is the supreme managerial body of the company, consisting of nine members, including a chairman appointed by the Cabinet of Ministers. The company Board is an executive body, consisting of five members. The UE is a well-established power utility and has solid technical capacity in implementing power projects.

40. Day-to-day supervision and management responsibility for the project will be assigned to the PMU established within the UE, which has been managing the recently completed World Bank-funded transmission project since 2011. The PMU will be responsible for preparation and implementation of the project, including preparation of project plans, procurement documents, progress reports, and management of all consulting and investment contracts. Core staff of the PMU has been appointed and their terms of reference (ToR) agreed with the World Bank.

B. Results Monitoring and Evaluation

41. The UE board will be responsible for monitoring overall project outcomes. The performance indicators of the project have been discussed and agreed with the UE, and a baseline has been established. Monitoring and evaluation (M&E) of the project will involve: (a) quarterly progress reports, (b) regular supervision missions, and (c) a midterm review of implementation progress and outcomes. The PMU will prepare project reports covering all components of the project. The reporting format will be agreed upon in the Project Operations Manual (POM).

42. The results of the M&E activities will be used to improve the implementation process. At the project level, the UE's current capacity to carry out M&E of the project is somewhat limited, because of its relative inexperience with World Bank or other externally funded projects. For this reason, M&E capacity strengthening initiatives are proposed. As part of the project's Component 2 (Institutional Development and Technical Assistance), financing will be made available for general institutional strengthening of the UE.

C. Sustainability

43. The GoU is fully committed to upgrading obsolete transmission assets in the country, and there is broad support for improving the efficiency of the country's infrastructure services. The selection of the first 22 substations was approved by the Cabinet of Ministers, which demonstrates the strong endorsement of the proposed scope of work. The UE has a good track record in O&M of its transmission assets. The sustainability of the project will be enhanced through the inclusion of power transmission infrastructure investment costs and the costs for an adequate level of O&M expenses in the end-user tariffs, which are approved by the MoF, in accordance with the regulatory principle of cost recovery and return on assets, as specified by the Government Decree No. 430 (adopted on September 16, 2004).

V. KEY RISKS

A. Risk Ratings Summary Table

44. The risk ratings are summarized in Table 3.

Table 3. Systematic Operations Risk Rating Table

Risk Category	Rating
1. Political and Governance	Substantial
2. Macroeconomic	Substantial
3. Sector Strategies and Policies	Moderate
4. Technical Design of Project	Low
5. Institutional Capacity for Implementation and Sustainability	Substantial
6. Fiduciary	Substantial
7. Environment and Social	Low

8. Stakeholders	Moderate
Overall	**Moderate**

B. Overall Risk Rating and Explanation of Key Risks

45. The proposed overall risk rating for the project is Moderate. As described below, the key risks rated Substantial are related to Political and Governance, Macroeconomic, Institutional Capacity for Implementation and Sustainability, and Fiduciary risks. Some of these risks may combine with one another and affect the project implementation.

46. **Political and governance risks**. Political and governance risks are rated "substantial", reflecting the ongoing political transition after the passing of the country's first Head of State. Presidential elections are scheduled for early December 2016. The Bank will be monitoring the transition process closely and adapt its program, if necessary and when requested, to changing priorities of the incoming Government.

47. **Macroeconomic risks**. The uncertain global and regional economic environment poses a substantial macroeconomic risk that could affect project implementation. While Uzbekistan's economy proved more resilient than most during the 2008-09 global downturn, it remains vulnerable to external shocks affecting commodity prices and remittances. Prolonged slower growth in key trading partners, such as China, Russia, and Kazakhstan, would slow export growth and further reduce remittances. A further drop in commodity prices would undermine external and fiscal balances. The Bank will continue to monitor regional economic developments.

48. **Implementation delays (governance and fiduciary risks)**. Through the implementation of the ongoing World Bank-funded projects, the UE has strengthened its project management capacities. However, there is still a risk of delays, especially in the areas of procurement and FM. Moreover, delays are exacerbated by country regulations applied to contracts with international suppliers/consultants that result in prolonged approval and registration of new contracts by the Ministry of Foreign Economic Relations, Investments and Trade (MFERIT). This has predominantly affected contracts for consultancy and supply and installation. Although the issue may not be fully resolved, the proposed project will: (a) advance preparation of the procurement documents (detailed design, bidding documents, and bill of quantities); (b) provide adequate training on relevant World Bank guidelines and procedures; and (c) closely engage MFERIT during all stages of project preparation and implementation to address some of these risks.

49. **UE's financial viability (institutional sustainability risks)**. As described below in the economic and financial analysis section and Annex 5, the UE's financial performance has been deteriorating over the past years, mainly due to increased indebtedness, slow collection of receivables, and the depreciating Uzbekistan Som. As a result, the company has not complied with the DSCR covenant under the ongoing Advanced Electricity Metering Project. The company has submitted a proposed corporate financial recovery plan that would present concrete actions to maintain the financial indicators of the company at levels acceptable to the World Bank in the near future, and this will be implemented over two years, until 2018, to make the UE financially sustainable.

VI. APPRAISAL SUMMARY

A. Economic and Financial Analyses

Project Economic Analysis

50. Overall, the project is economically viable with an economic internal rate of return (EIRR) of 14.7 percent and a net present value (NPV) of US$65.8 million without social value of carbon. The project will result in net emissions reduction of 5.1 million tCO_2e, which is equivalent to the avoided energy use of over 6 million homes in Uzbekistan in one year. The NPV and EIRR of the project with social value of carbon are assessed to be US$104.5 million and 16.8 percent, respectively. The results of the sensitivity analysis suggest that the project is economically robust even in the case of substantial variation of main variables that affect its economic viability, such as higher investment cost and less reduction in technical losses.

51. The economic analysis of the project was done based on the incremental benefits and costs of the project. The economic and financial analysis of the project covers only the investments in rehabilitation of the substations. The main economic benefits of the project are the: (a) reduction in the unserved energy in the areas served by the 22 substations to be rehabilitated under the proposed project; (b) reduction of technical losses at those substations; and (c) reduction of O&M costs at those substations. The economic benefit of the improved reliability of 22 substations was quantified as avoided unserved energy due to reduced incidence of equipment failures at the substations, which lead to unserved energy in the service areas dependent on those substations. The rehabilitation of the substations will also reduce the O&M costs at substations given the severe dilapidation of the equipment, which requires significant expenses each year to maintain it in operational condition. The rehabilitation of substations under the proposed project will also generate economic benefits in the form of reduction of technical losses at substations and are quantified as avoided economic costs of meeting increasing electricity demand. On the other hand, the economic costs of the project include the equipment supply and installation costs for rehabilitation of 22 substations. Estimates of the NPV and EIRR are shown in Table 4, and further details are provided in Annex 5.

Table 4. Summary of Project Economic Analysis

	NPV (US$, millions)	EIRR (%)
Without social value of carbon		
Base case	65.8	14.7
a. 20 percent higher investment cost	46.0	12.9
b. 20 percent less reduction in technical losses	33.6	12.6
c. 20 percent lower-than-anticipated avoided unserved energy due to equipment failure	65.8	14.7
d. Combination of a, b, and c	13.7	10.9
With social value of carbon		
Base case	104.5	16.8
a. 20 percent higher investment cost	84.7	14.8
b. 20 percent less reduction in technical losses	64.2	14.4
c. 20 percent lower-than-anticipated avoided unserved energy due to equipment failure	104.5	16.8
d. Combination of a, b, and c	44.3	12.7

Project Financial Analysis

52. The results of the project financial analysis suggest that the project is financially feasible with a financial NPV of US$1,067.6 million and a financial internal rate of return (FIRR) of 16.6 percent. The results of the sensitivity analysis suggest that the project is financially robust even in the case of substantial variation of the main variables that affect its economic viability, such as higher investment cost and less reduction in technical losses.

53. The financial viability of the project was assessed based on the incremental cash inflows and outflows from the UE's perspective. The financial benefits of the project for the UE are (a) the incremental revenue from the sale of electricity due to reduced incidence of equipment failures and reduced technical losses at 22 substations and (b) O&M cost savings due to anticipated improved performance of the substation equipment after rehabilitation. The financial costs of the project are the equipment supply and installation costs for rehabilitation of 22 substations. Estimates of the NPV and EIRR are shown in Table 5 and further details are provided in Annex 5.

Table 5. Summary of Project Financial Analysis

	NPV (US$, millions)	FIRR (%)
Base case	**1,067.6**	**16.6**
a. 20 percent higher investment cost	1,042.8	15.3
b. 20 percent less reduction in technical losses	837.2	15.1
c. 20 percent lower-than-anticipated avoided unserved energy due to equipment failure	1,067.5	16.6
d. Combination of a, b, and c	812.2	13.9

Analysis and Forecast of Financial Performance of the UE

54. **Current financial performance.** In 2013–2014, all measures of operating performance, profitability, and liquidity deteriorated in the UE. Profitability of the company has suffered from narrowing of the gross margin from 17 percent in 2013 to 14 percent in 2014 (see Annex 5 for details). The UE's ability to meet its current liabilities, as measured by current ratio, has declined from 1.23 in 2013 to 1.12 in 2014, due primarily to increased short-term borrowings and larger debt service requirements on its long-term debt. The UE's rising indebtedness and low capacity to generate sufficient cash from operations have significantly impacted its solvency leading to a declining DSCR, which slid from 0.86 in 2013 to 0.50 in 2014.

55. The UE struggled with cash collections, which averaged about 91 percent of annual sales. As a result, the company had to attract expensive short-term commercial debt to cover the emerging shortfall in cash. Recurring problems with cash collections combined with increased debt payments in the near future may substantially undermine the financial viability of the company. However, it is expected that the ongoing support to improve the company's metering infrastructure will enhance its revenue management.

56. **Projected financial performance.** The major threats to financial viability of the company will be the unfavorable development of the foreign exchange rate and the persistence of low collection rate. Financial deficit of the company due to suboptimal collection rate of 90

percent is forecast to grow to about US$351 million by 2020 to be covered by expensive short-term commercial loans. This would further worsen the liquidity and solvency of the company. The current ratio will sink below the current level of 1.12. The UE would have continued difficulties servicing its debt without improvement in the DSCR. The total annual required principal and interest payments on debt is forecast to increase from about US$282 million in 2015 to US$438 million in 2020.

B. TECHNICAL

57. The project scope of Component 1 is based on a recent feasibility study, which was conducted by the Technical Institute in Tashkent. The feasibility study has identified the first 22 substations as priority for rehabilitation/upgrading based on the equipment age, failure frequency, capacity constraints, O&M costs, spare parts availability, and equipment losses. From a power engineering perspective, the technical needs for rehabilitation/upgrading of those substations have been determined by the appraisal process and are described in more detail in Annex 2.

58. For the 22 substations, major equipment such as transformers, circuit breakers (CBs), disconnect switches, and instrument transformers will be replaced with modern equipment, which will improve operational reliability and efficiency. Newly installed gas insulated CBs will enable efficient and reliable transmission operations compared with existing oil CBs, while modern transformers will reduce energy transformation losses. The Yuksak substation will adopt GIS technology for 220 kV and 110 kV systems to improve safety and reliability and to reduce operational costs, as well as the land area required for replacement works and for future expansion. Digital numerical protection relays to be installed, which will replace obsolete mechanical relays, will improve transmission operational reliability. This will be an essential step for future SCADA introduction into the country's system, and the substations to be supported under the project will be SCADA-ready.

59. Emergency outage management systems will also be purchased not only as a temporary transmission equipment during the rehabilitation work but also as a backup to build resilience against disasters and/or for emergency restoration of any substation with major outage, as practiced by modern utilities in developed countries.

60. The UE is technically capable of implementing the replacement work for conventional substations as it has been conducting similar work so far and the proposed equipment is widely used all over the world. For the adoption of GIS technology, it is envisaged that international consultants will support the UE in detailed design, procurement, and supervision of the installation works.

C. FINANCIAL MANAGEMENT

61. The World Bank conducted an assessment of the FM arrangements for the project in February 2016 (and updated in May 2016) and confirmed that the arrangements meet the minimum World Bank requirements. It was agreed that the existing FM and disbursement arrangements under the TTP would be replicated for the proposed project, including staffing. A draft POM, including the format of quarterly interim unaudited financial reports (IUFRs) was

prepared by the UE. The FM risk is assessed as substantial because of expected delays in the submission of project and entity audits (a recurring problem under the TTP). The audit contract for 2015–2016 was signed only in late June 2016. The TTP 2015 project audit report was already submitted by the UE and was found acceptable. However, the submission of the audited entity statements for 2015 is expected to be delayed until early 2017 because of the delayed process of the preparation of the consolidated financial statements in accordance with IFRS. The waiver to proceed to Negotiations and Board presentation has been approved by the respective managers in line with OP/BP 10.0.

62. The IUFRs will be due within 45 days of the end of each quarter. There will be annual audits of projects and entity financial statements due in 6 (six) months after the end of reporting period[8]. The latter will be prepared in accordance with IFRS for the consolidated UE group financial statements. Both sets of audited financial statements will be made publicly available by the UE. In addition, the World Bank will make them available to the public on its website in accordance with the World Bank Policy on Access to Information.

63. Regarding the disbursement arrangements, the proceeds of the IBRD loan and the IDA credits will be disbursed in accordance with the disbursement procedures of the World Bank: advances, direct payments, special commitments, and reimbursement accompanied by appropriate supporting documentation—summary sheets with records and/or statement of expenditures—in accordance with the procedures described in the World Bank's Disbursement Guidelines. The UE will open separate designated accounts for IBRD and IDA funds in a commercial bank acceptable to the World Bank in U.S. dollars to cover the loan's and credits' shares of eligible project expenditures. The ceiling of the designated accounts is specified in the Disbursement Letters.

D. PROCUREMENT

64. The World Bank maintains a regular dialogue with the GoU in support of its ongoing efforts to improve the country's public procurement system. As part of such interactions, the Bank has conducted the Country Procurement Assessment Report (CPAR) in 2003 and identified the following inadequacies in the system, which are still valid: (a) absence of a unified legislative framework; (b) inefficient and non-transparent procurement practices; (c) absence of a single institution with oversight or regulatory authority for public procurement; (d) low capacity for reviewing bidders' complaints; (e) complicated internal review/approval of bid evaluation reports which leads to low accountability and delays; (f) no comprehensive anti-corruption measures; and (g) low skills and capacity of the staff handling public procurement at every administrative level. Private sector suppliers and contractors remain unsatisfied with the rules governing public procurement and have little confidence in the system's fairness. Though the Government has started extensive reforms of its public procurement system, the recent assessments under the Country Integrated Financial Assessment and the Public Expenditure and Financial Accountability studies indicate that there is not much change in the public procurement environment yet. Thus, the procurement environment is considered a high risk.

[8] One fiscal year of the Borrower.

65. The World Bank has assessed the UE's procurement capacity. The PMU that managed the World Bank-financed TTP will be responsible for carrying out procurement under this project. The assessment has identified the following procurement risks: (a) the government decrees and rules and regulations have internal conflict in major provisions, particularly, the price verification by MFERIT during the mandatory contract expertise, which leads to considerable delays in project procurement and implementation; (b) the difficulty in obtaining bank guarantee for bid security and performance security by local bidders (especially by joint ventures) and non-availability of alternative instruments for this purpose; and (c) delays in signing of bid opening minutes or evaluation reports given the existence of a large number of inter-ministerial tender and bid evaluation committees comprising high ranking officials. As a result, the time between bid opening and start of contract implementation often ranges from 8 to 12 months. The risk mitigation plan is provided in Annex 3. After risk mitigation, the procurement capacity and arrangements at the project level are considered acceptable. Procurement training will be provided to the procurement specialist and the UE staff throughout project implementation.

66. Procurement for the project will be carried out according to the World Bank's 'Guidelines: Procurement of Goods, Works, and Non-Consulting Services under IBRD Loans and IDA Credits and Grants by World Bank Borrowers', published in January 2011 and revised in July 2014 (Procurement Guidelines) and 'Guidelines: Selection and Employment of Consultants under IBRD Loans and IDA Credits and Grants by World Bank Borrowers', published in January 2011 and revised in July 2014 (Consultant Guidelines). Guidelines on Preventing and Combating Fraud and Corruption in project financing by IBRD loans and IDA credits and grants, dated October 2011 and revised January 2011, shall apply to this project. More detailed information concerning the procurement under the project is described in Annex 3.

E. SOCIAL (INCLUDING SAFEGUARDS)

67. The planned renovation investments will exclusively take place within the footprint of existing substations and on fenced-off state-owned land. Although no land acquisition is anticipated, the PMU will screen for any such impacts as part of the preparation of the Environmental and Social Management Plan.

68. **Gender.** Current outages affect both business and residential consumers of electricity. Enhanced electricity supply will benefit household members who spend time at home, such as children who are studying, and could help ease women's time burden by making the use of electrical appliances more convenient. Time-use studies in Uzbekistan show that women spend almost three times more time than men engaged in unpaid work. Women use almost 63 percent of this time for housekeeping activities, such as cooking, cleaning, laundering, ironing, and repairing clothing compared to 11.5 percent spent by men on such activities. Improving the quality and reliability of supply will reduce limitations to using timesaving home appliances or computers and other educational technology in schools, reduce expenditure on backup sources of supply such as batteries and candles, and improve residents' security through the improved availability of streetlights. Reliable power supply could enable women to operate small enterprises and participate in income-generating and community activities. The consultation sessions that will be organized as part of the UE's overall outreach effort will take into account women's time burden to ensure sound female participation. Gender-disaggregated data will be

collected to help monitor the use of the UE's complaints management services by women and men.

F. ENVIRONMENT (INCLUDING SAFEGUARDS)

69. The proposed civil works and dismantling or installing of electrical equipment will generate some adverse impacts related to dust and noise; air and water pollution; construction wastes; asbestos; and health and labor safety issues. All of them will be minor, of limited duration, influence a relatively small area, and occur primarily during the construction phase.

70. The project will bring positive economic and social impacts, as the proposed activities will increase efficiency and reliability of electricity supply for the population and economy of the large area of the country. In accordance with the World Bank's safeguard policies, the project is placed in the World Bank's Category B, which is applied to all proposed projects that have potential environmental impacts.

71. As not all the substations that will be supported under the project have been identified, except for the first 22, the Borrower prepared an Environmental and Social Management Framework (ESMF), in accordance with the World Bank safeguards policies, which will guide the Environmental Assessment (EA) process during the project implementation phase. Overall, the main goal of the ESMF is to avoid, minimize, or mitigate potential negative environmental and related social impacts caused by implementation of the project. The ESMF has to ensure that the identified subprojects are correctly assessed from an environmental and social point of view and that a subproject-specific Environmental Management Plan (EMP) addressing site-specific environmental impacts is designed and implemented. The ESMF prepared by the Borrower outlines EA procedures and mitigation requirements for the modernization of electrical stations, which will be supported by the project, and provides details on the national and World Bank EA rules and procedures, emphasizing the existing differences and how they will be solved; potential impacts and main mitigation activities; details on the Statement of the Draft of Environmental Impacts, EMP Checklist and Statement of Environmental Consequences to be prepared for all substations selected for modernization; and requirements for conducting monitoring and reporting activities, as well as institutional responsibilities for EMPs implementation.

72. A large sample of oil from transformers was tested by the UE, and no polychlorinated biphenyls (PCBs) were identified. In case PCBs are found in transformer oils in the future, the World Bank proposes that the UE follow the rules and requirements as prescribed in the 'Guidebook on Environmental Sound PCB Management in Electrical Equipment' (prepared under the Moldova - Persistent Organic Pollutants Stockpiles Management and Destruction Project) which is based on best international practice in this regard. The equipment containing and polluted by PCBs will be labeled, keeping the used oil and contaminated transformers in tanks in a guarded facility, until proper utilization/disposal measures are in place. The specified document provides all necessary details on PCB storage and transportation, as well as existing alternatives for its disposal. This is in line with the Stockholm Convention requirements on the elimination of the use of PCBs in equipment (for example, transformers, capacitors, or other receptacles containing liquid stocks) by 2025. In according with the World Bank requirements, the draft ESMF has been disclosed in-country on December 31, 2015 and at the InfoShop on January 24, 2016, and consultations with all interested parties were held on January 19, 2016.

73. **Climate and disaster risk**. The project has been screened for climate and disaster risks, and it is not expected to be impacted by historical or future climate and geophysical hazards. The main potential hazards evaluated are changes in temperature and precipitation. Average temperature in the hottest month of July is 28.29^{o}C and is expected to rise to an average of 29.48^{o}C between 2020 and 2039. Projected maximum temperature in the hottest month of July between 2020 and 2039 is 37.18^{o}C. This is within the operating limit of equipment. More rainfall is expected during the typically drier months of February and March (up from 34.49 mm and 35.26 mm to 41.44 mm and 38.67 mm respectively) but the change in average volume in the wettest month of January is expected approximately 1.93 mm. Substation drainage design standards will continue to ensure adequate flow to reduce the risk of flooding. Moreover, a mobile substation is included under the project with the primary objective of reducing the duration of outages during maintenance works and equipment outages. While flooding or extreme temperatures are not expected to impact the project sites, this mobile substation can also be deployed to assist with outages caused by extreme natural events, thereby improving the resilience of the power system.

G. CITIZEN ENGAGEMENT AND BENEFICIARY FEEDBACK

74. The project will use existing channels for engaging with citizens. The UE customer services department enables citizens to submit questions or complaints. Though few of these are related to transmission issues, in an effort to enhance overall UE customer services, the project will monitor the complaints that are received as part of the Results Framework. This will be disaggregated by gender to allow analysis of any specific concerns raised predominantly by female or male customers. At the national level, the e-governance platform is increasingly used as a means of disseminating information and also allows citizens to submit questions or complaints. However, expensive and poor internet connectivity limit the use of the portal outside Tashkent and for regions outside Tashkent, local community groups (known as 'Mahalla') or homeowners' associations will be used as the main channel for interacting with citizens.

75. Installation and repair works will be scheduled to keep power outages at a minimum during project implementation but consumers are likely to experience some power outages. The UE will post outage schedules on its portal and disseminate the same through Mahalla committees. By announcing and adhering to outage schedules, consumers can better plan activities around the expected loss of power. Beneficiary feedback will be used to improve scheduling of works during implementation. Consultations with women and men will be conducted to collect feedback on the best times for the unavoidable power outages associated with the rehabilitation works (throughout the day, as well as in the calendar year) to ensure that disruptions do not disproportionately affect people with family responsibilities. These will be organized with the help of Mahalla committees in a representative number of communities. The feedback will be used to help the UE plan overall works.

H. WORLD BANK GRIEVANCE REDRESS

76. Communities and individuals who believe that they are adversely affected by a World Bank (WB) supported project may submit complaints to existing project-level grievance redress mechanisms or the WB's Grievance Redress Service (GRS). The GRS ensures that complaints received are promptly reviewed in order to address project-related concerns. Project affected

communities and individuals may submit their complaint to the WB's independent Inspection Panel which determines whether harm occurred, or could occur, as a result of WB non-compliance with its policies and procedures. Complaints may be submitted at any time after concerns have been brought directly to the World Bank's attention, and Bank Management has been given an opportunity to respond. For information on how to submit complaints to the World Bank's corporate Grievance Redress Service (GRS), please visit http://www.worldbank.org/GRS. For information on how to submit complaints to the World Bank Inspection Panel, please visit www.inspectionpanel.org

Annex 1: Results Framework and Monitoring

Project Development Objectives											
PDO Statement											
The project development objective is to improve the technical efficiency and reliability of the power transmission networks in Uzbekistan.											
These results are at	Project Level										
Project Development Objective Indicators											
		Cumulative Target Values									
Indicator Name	Baseline	YR1	YR2	YR3	YR4	YR5	YR6	YR7	YR8	YR9	End Target
Electricity losses per year in the project area (target substations) (Percentage) (Sector Core)	0.71	0.71	0.60	0.50	0.40	0.25					0.25
Number of outages of major equipment in the substations covered under the project (Number per year for target substations)	103.00	103.00	90.00	70.00	40.00	10.00					10.00
Average interruption frequency per year in the project area SAIFI	59.00	59.00	59.00	59.00	59.00	58.00					58.00

(Number) (Sector Core)											
Direct project beneficiaries (Number in millions) - (Core)	0.00	0.00	11.00	16.50	22.00	29.10					29.10
Female beneficiaries (Percentage - Sub-Type: Supplemental) - (Core)	0.00	0.00	50.00	50.00	50.00	50.00					50.00
Intermediate Results Indicators											
		Cumulative Target Values									
Indicator Name	Baseline	YR1	YR2	YR3	YR4	YR5	YR6	YR7	YR8	YR9	End Target
Number of substations rehabilitated under the project (Number)	0.00	0.00	5.00	10.00	15.00	22.00					22.00
UE group transition to IFRS is fully complete (Yes/No)	No	No	No	Yes	Yes	Yes					Yes
Percentage of registered project-related grievances responded to within stipulated service standards for response times (Percentage)	0.00	100.00	100.00	100.00	100.00	100.00					100.00
Percent of registered project-	0.00	100.00	100.00	100.00	100.00	100.00					100.00

related grievances responded to within stipulated service standards for response times – disaggregated by gender (Percentage)											

Indicator Description				
Project Development Objective Indicators				
Indicator Name	Description (indicator definition, and so on)	Frequency	Data Source/Methodology	Responsibility for Data Collection
Electricity losses per year in the project area (target substations)	Electricity losses per year in the project area refers to the difference between energy coming in to and going out of the substations to be supported under the project.	Annual	UE	UE
Number of outages of major equipment in the substations covered under the project	Number of electricity outages of major equipment in the substations covered under the project measures the failures of major equipment, such as transformers, CBs, arresters, among others, that occur in a given year in the substations to be supported under the project.	Annual	UE	UE
Average interruption frequency per year in the project area SAIFI	This is equivalent to the so-called SAIFI. As the SAIFI data is not available, the indicator was calculated based on the number of end-user supply interruptions and the number of total end users for project areas. In this case, interruption means the number of blackouts felt by end users regardless of the causes, which could be shortage of supply and failures of distribution lines, distribution substations, transmission lines, transmission substations, and generators. As the number of affected customers for each interruption was not available while the value is essential to obtain the SAIFI, it was assumed that 10% of the total customers were impacted by each interruption. The SAIFI for each project area was calculated as below. The impact rate of 10% was obtained by discussions with the UE teams. The 2015 SAIFI of 59 is used as a baseline value. The project will reduce the likelihood of outages at 22 substations and will reduce the	Annual	UE	UE

	likelihood of load shedding caused by the limitation of substation capacity, which will be increased by the project. However, still the majority of the interruptions are caused by faults on other elements such as distribution lines. It was assumed that the project would improve the SAIFI by one point from 59 to 58 based on discussions.			
Direct project beneficiaries	Direct beneficiaries are people or groups who directly derive benefits from an intervention This indicator requires supplemental information. Supplemental Value: Female beneficiaries (percentage). Based on the assessment and definition of direct project beneficiaries, specify what proportion of the direct project beneficiaries are female. This indicator is calculated as a percentage.	Annual	UE	UE
Female beneficiaries	Based on the assessment and definition of direct project beneficiaries, specify what percentage of the beneficiaries are female.	Annual	UE	UE
Intermediate Results Indicators				
Indicator Name	Description (indicator definition, and so on)	Frequency	Data Source/Methodology	Responsibility for Data Collection
Number of substations rehabilitated under the project	Number of substations rehabilitated under the project. Rehabilitation for a substation is considered complete when the installation of planned equipment is completed and accepted by the UE.	Quarterly	UE	UE
UE group transition to IFRS is fully complete	The IFRS UE transition to IFRS is considered complete when IFRS consolidated financial statements for the UE Group are prepared and submitted for the audit within four months from the end of the calendar year; and the audit opinion is issued within six months from	Annual	UE	UE

	the end of the calendar year.			
Percentage of registered project-related grievances responded to within stipulated service standards for response times	The indicator captures the extent to which grievances related to the projects are addressed. The service standards for response times are the ones used internally by the UE, according to which customers' complaints are expected to be responded within 15 days.	Quarterly	UE	UE

Note: * The number of connections (5.3 million) in the project area multiplied by the country's average size of household (5.5). SAIFI –System Average Interruption Frequency Index.

Annex 2: Detailed Project Description

1. In the transmission subsector in Uzbekistan, there are 75 HV (220–500 kV) electricity transmission substations. According to a technical audit conducted, 17 substations commissioned between 1947 and 1970 are fully worn out; and 35 that were commissioned between 1971 and 1985 are obsolete. The failures of substations cause unreliable and poor quality electricity supply, increased losses, and higher maintenance costs. The occurrence of electrical equipment failures has doubled in recent years, from about 35 per year between 2001 and 2008 to about 76 per year between 2008 and 2013. As a result, it is estimated that the UE has been losing approximately US$24 million per year due to higher maintenance costs and foregone revenues. To ensure efficient and reliable operation of the power system, the UE has identified that 62 substations require modernization and replacement of electrical equipment. The proposed project will modernize part of the HV substations identified in need of replacement/rehabilitation.

Table 2.1. Status of Transmission Substations

Year of Commissioning	Number of 220–500 kV Substations	Status
1947–1970	17	Physically worn
1971–1985	35	Obsolete
1991–2013	23	Functional
Total	**75**	

2. The proposed project consists of two components with the following estimated costs: (a) Electricity Transmission System Upgrade (US$191.3 million) and (b) Institutional Development and Technical Assistance (US$5 million).

Component 1. Electricity Transmission System Upgrade

Subcomponent 1.1. Rehabilitation and Upgrade of Transmission Substations

3. This subcomponent will support rehabilitation and upgrade of existing and priority substations in major load centers. To maximize use of available in-house resources with the UE, a list of 22 high priority substations located in Andijan, Bukhara, Jizzakh, Kashkadarya, Navoiy, Surkhandarya, Samarkand, Fergana, Namangan, and Tashkent regions have been identified (Table 2.2). The locations of the substations identified are presented in the map. Details of the remaining substations to be supported under the proposed project will be defined during project implementation. All works are expected to occur within an existing secured substation perimeter.

Table 2.2. List of Substations for Modernization and Upgrade (First 22 Substations)

No.	Substation	Year of Commissioning	Region	Trafo	CB	DS	IT	SA	CCP
1	220 kV Karshi	1977	Kashkadarya	—	Y	Y	Y	Y	Y
2	220 kV Muborek [a]	1967	Kashkadarya	—	Y	Y	Y	Y	Y
3	220 kV Chimia	1976	Navoi	—	—	—	Y	Y	Y
4	500 kV Karakul	1972	Bukhara	—	—	Y	Y	Y	Y
5	220 kV Bukhara	1964	Bukhara	—	Y	—	Y	Y	Y
6	220 kV Katta-Kurgan	1980	Samarkand	—	Y	Y	Y	Y	Y

7	220 kV Samarkand	1969	Samarkand	Y	Y	Y	Y	Y	Y
8	220 kV Kizil	1968	Bukhara	—	Y	—	Y	Y	Y
9	220 kV Yuksak[b]	1947	Tashkent City	Y	Y	Y	Y	Y	Y
10	220 kV Adolat	1953	Tashkent Region	Y	—	Y	Y	Y	Y
11	220 kV Kuylyuk[1]	1957	Tashkent City	Y	—	Y	Y	Y	Y
12	220 kV Chirchik	1971	Tashkent Region	Y	—	Y	Y	Y	Y
13	220 kV Jizzakh	1961	Jizzakh	Y	Y	Y	Y	Y	Y
14	220 kV Ozodlik	1973	Tashkent City	—	Y	Y	Y	Y	Y
15	220 kV Fergana	1964	Fergana	Y	Y	Y	Y	Y	Y
16	220 kV Sokin	1976	Fergana	Y	Y	Y	Y	Y	Y
17	220 kV Yulduz	1968	Andijan	Y	Y	Y	Y	Y	Y
18	500 kV Lochin	1975	Andijan	—	Y	—	Y	Y	Y
19	220 kV Sardor	1968	Namangan	—	Y	Y	Y	Y	Y
20	220 kV Uzgarish	1974	Fergana	—	Y	Y	Y	Y	Y
21	220 kV Sherabad	1966	Surkhandarya	Y	Y	Y	Y	Y	Y
22	220 kV Denau	1965	Surkhandarya	Y	Y	Y	Y	Y	Y

Note: Trafo = Transformer; CB = Circuit breakers; DS = Disconnect switches; IT = Instrument transformers; SA = Surge arresters; CCP = Communication and control panels

[a] 35 kV current limiting reactor will be replaced.

[b] GIS substation.

4. Detailed description of the rehabilitation/upgrading work for the first 22 substations is as follows:

(1) 220 kV Karshi substation

The Karshi substation is connected with 500 kV Guzar, 220 kV Kasan and Shurtan substations, as well as the Talimarjan and Navoi TPPs consisting of six 220 kV and nine 110 kV outgoing lines. Two 125 MVA transformers step down 220 kV to both 110 kV and 35 kV while two 63 MVA transformers step down 35 kV to 6 kV. Bus configurations on 220 kV and 110 kV are the double bus with transfer bus scheme. The project will replace 35 kV and 6 kV CBs, 220 kV disconnection switches, instrument transformers of all voltage levels, and 220 kV, 110 kV, and 35 kV arresters, as well as communication and control equipment.

(2) 220 kV Muborek substation

This substation has two 220 kV feeders connecting with Muborek TPP and Karakul-Bazar substation. Two 40 MVA transformers step down 220 kV voltage directly to 35 kV and 6 kV. The 220 kV configures the single bus with a sectionalized CB scheme. The following equipment will be replaced because of aging and obsolescence: 35 kV and 6 kV CBs; and disconnection switches, instrument transformers and arresters of all voltage levels, as well as communication and control equipment. The 35 kV current limiting reactors will be also replaced.

(3) 220 kV Chimia substation

The Chimia substation, equipped with two 200 MVA 220/110/10 kV transformers, is connected with Navoi TPP through three 220 kV lines and with the 220 kV Suvil, Katta-Kurgan, and Tsemzavod substations through 220 kV single circuit lines. The substation supplies electricity through 16 numbers of 110 kV outgoing lines. Both 220 kV and 110 kV buses form double bus with transfer bus configuration. The project will replace obsolete 220 kV and 110 kV current transformers and arresters, as well as communication and control equipment.

(4) 500 kV Karakul substation

The Karakul substation, which is one of seven 500 kV transmission substations in the country, is connected with the Turkmenistan system through one 500 kV tie line and also with the 500 kV Guzar substation through single circuit line. The latter will be reconnected to the Talimarjan TPP. The Karakul substation also has one 220 kV interconnection line with the 220 kV substation in Turkmenistan and is connected with the neighboring 220 kV Kizil, Bukhara, Turon, and Karakul-Bazar substations through nine 220 kV lines. The substation has a 500 kV ring bus configuration and a 220 kV double bus with a transfer bus configuration. Two 500 MVA transformers are installed to step down 500 kV to 220 kV and 10 kV. The following major equipment will be replaced under the proposed project because of aging and obsolescence: 220 kV disconnection switches and 500 kV and 220 kV instrument transformers and arresters, as well as communication and control equipment.

(5) 220 kV Bukhara substation

The Bukhara substation is equipped with two 125 MVA 220/110/35 kV transformers, as well as one 10 MVA transformer and a 6.3 MVA 35/6 kV transformer. The substation has five 220 kV outgoing bays to connect with the neighboring Navoi TPP, Karakul substation, and Turon substation and nine 110 kV feeders. The following major equipment will be replaced because of aging and obsolescence keeping bus configurations: 35 kV and 6 kV CBs; instrument transformers of all voltage levels; and 220 kV and 110 kV arresters, as well as communication and control equipment.

(6) 220 kV Katta-Kurgan substation

The Katta-Kurgan substation is located between Chimiya and Samarkand substations with connections through single circuit 220 kV lines. The substation is equipped with two 125 MVA 220/110 kV transformers. The project will replace the following major equipment: 35 kV CBs; 220 kV, 110 kV, and 35 kV disconnection switches; 220 kV and 110 kV instrument transformers; and 220 kV, 110 kV, and 35 kV arresters, as well as communication and control equipment.

(7) 220 kV Samarkand substation

This substation has a triple-circuit 220 kV line connected with the 500 kV Sogdiana substation and a single-circuit connection with the 220 kV Katta-Kurgan substation. The substation is equipped with two 200 MVA 220/110 kV, one 125 MVA 220/110 kV, and two 16 MVA 110/35/6 kV transformers. The two obsolete 16 MVA 110/35/6 kV transformers will be replaced with two 25 MVA 110/35/6 kV transformers. The other equipment to be replaced includes: 35

kV CBs and 220 kV, 110 kV, and 35 kV disconnection switches, instrument transformers and arresters, as well as communication and control equipment.

(8) 220 kV Kizil substation

This substation, which has a connection only with the 220 kV Karakul substation through a 220 kV double circuit line, is equipped with one 25 MVA transformer and one 20 MVA 220/35 kV transformer. The 35 kV CBs and 220 kV and 35 kV instrument transformers and arresters will be replaced together with communication and control equipment.

(9) 220 kV Yuksak substation

The Yuksak substation, an important supply hub for the city of Tashkent and located in a densely built-up area, receives supply from the Tashkent TPP through a 220 kV single-circuit line and has a 220 kV connection with the 220 kV Kuylyuk substation. The substation also has six 110 kV outgoing feeders. The substation's 220 kV and 110 kV switchgears will be replaced with GIS components mainly to secure additional space for future 500 kV introduction and the proposed rehabilitation work. Accordingly, the substation's bus configuration will be changed to improve supply reliability. Potential bus configurations for 220 kV and 110 kV are the one and half CB bus scheme and the double bus with single breaker bus scheme, respectively. In addition, the substation's existing two 125 MVA 220/110/10 kV transformers will be upgraded to two 200 MVA transformers while the existing two 40 MVA 110/35/6 kV transformers along with one 20 MVA 110/35/6 kV transformer will be replaced with 63 MVA transformers. Medium to low voltage power transformers will also be replaced. Other equipment to be replaced includes 220 kV, 110 kV and 35 kV CBs, disconnection switches, instrument transformers, and arresters. The 10 kV and 6 kV switchgears and communication and control equipment will be also replaced.

(10) 220 kV Adolat substation

The Adolat substation is located in an industrial area in the Tashkent region. The substation has five 220 kV feeders to be connected with the 220 kV Kara-Kir-Sai, Kuylyuk, and Faiz-bad substations, as well as the Novo-Angren TPP. The substation also has 14 110 kV outgoing feeders. The substation currently adopts the double bus with a transfer bus scheme for both 220kV and 110kV. The existing two 220/110/10 kV transformers with a capacity of 200 MVA will be replaced by two 250 MVA transformers. The 220 kV and 110 kV disconnection switches, instrument transformers and arresters will be also renewed, together with communication and control equipment.

(11) 220 kV Kuylyuk substation

The Kuylyuk substation has eight 220 kV outgoing lines connected with the Tashkent TPP, as well as the Yuksak, Adolat, and Faiz-Bad substations, and four 110 kV feeders. The substation's bus configuration is the double bus with a transfer bus for both 220 kV and 110 kV. The substation is equipped with five main transformers: two 125 MVA 220/110/10 kV transformers, which will be replaced with two 200 MVA transformers, one 30 MVA 220/110 kV transformer, and two 63 MVA 110/35/10 kV transformers. The project will also replace 220 kV and 110 kV disconnection switches and 220 kV, 110 kV, and 35 kV instrument transformers and arresters, as

well as 6/0.4 kV transformers, 6 kV switchgears, communication and control equipment, and 35 kV current limiting reactors.

(12) 220 kV Chirchik substation

The Chirchik substation has a connection with the 220 kV Chrvak substations and Tashkent TPP through four 220 kV lines. The substation also has 11 110 kV outgoing feeders. The substation adopts the double bus with transfer bus configurations for both 220 kV and 110 kV. Both of the main 220/110/35 kV 125 MVA transformers will be replaced with two 200 MVA transformers. Other equipment to be replaced includes 35/0.4 kV transformers; 220 kV and 110 kV disconnection switches; 220 kV, 110 kV, and 35 kV instrument transformers and arresters; and communication and control equipment.

(13) 220 kV Jizzakh substation

The Jizzakh substation is connected with the Syr Darya TPP and the 220 kV Bobur substations through a single circuit 220 kV line. Nine 110 kV feeders come out from the substation, which have a single bus with sectionalized CB scheme for 220 kV and a double bus with transfer bus scheme for 110 kV. The substation is equipped with two 125 MVA 220/110/10 kV transformers, both of which will be upgraded to 200 MVA. The 220 kV and 110 kV CBs will also be renewed together with other equipment: 110 kV disconnection switches; 220 kV and 110 kV instrument transformers; and 220 kV, 110 kV, and 35 kV arresters, and 35 kV current limiting reactors, in addition to communication and control equipment.

(14) 220 kV Ozodlik substation

The Ozodlik substation has two 200 MVA 220/110/10 kV transformers. The 220 kV of the substation configures a single bus with sectionalized bus scheme for two 220 kV line bays while a double bus with transfer bus scheme is adopted for 110 kV side for 10 line bays. While the transformers will remain unchanged, other equipment including 220 kV and 110 kV CBs, disconnection switches, instrument transformers and arresters will be replaced. Communication and control equipment will be also renewed.

(15) 220 kV Fergana substation

This substation has 220 kV connections with Paulgan and Sokin substations through a single circuit line. Generators at Fergana TPP are also interconnected at the substation. The substation's 220 kV system applies ring bus configuration, while double bus with transfer bus scheme is adopted for the 110 kV system, which has 12 outgoing feeders. The substation's 220/110/10 kV 125 MVA transformer and 200 MVA transformer will be replaced with two 200 MVA transformers. The equipment to be replaced includes 220 kV and 110 kV CBs, disconnection switches, instrument transformers and arresters, as well as communication and control equipment, and 10 kV switchgears.

(16) 220 kV Sokin substation

The Sokin substation, located close to the Kyrgyzstan border, has a double circuit interconnection line with the 220 kV Alay substation in Kyrgyzstan and is connected with the

500 kV Lochin substation and 220 kV Fergana substation through 220 kV lines. There are 5 existing and 1 potential 220 kV bays and 16 existing and 6 potential 110 kV bays in the substation. The double bus and transfer bus scheme is applied for both 220 kV and 110 kV systems and will be unchanged. The substation has one 200 MVA transformer and one 125 MVA 220/110/10 kV transformer. The latter will be replaced with a 200 MVA transformer. The 220 kV and 110 kV CBs, disconnection switches, instrument transformers, and arresters will be also replaced together with communication and control equipment.

(17) 220 kV Yulduz substation

This substation's 220 kV and 110 kV systems configure a double bus with transfer bus scheme to accommodate five 220 kV line bays, which are connected with the 500 kV Lochin substation and 220 kV Khakent and Kristal substations, and 11 110 kV line bays. The two existing 125 MVA 220/110/10 kV transformers will be replaced with two new transformers with a capacity of 200 MVA. The 220 kV and 110 kV equipment such as CBs, disconnection switches, instrument transformers and arresters, will be replaced together with 10 kV switchgears, and communication and control equipment.

(18) 500 kV Lochin substation

The Lochin substation is a key 500 kV substation interconnected with the Kyrgyzstan grid. The substation has two existing 500 kV lines which are connected with the Uzbekistan substation and Kyrgyzstan's Toktogul TPP, one potential 500 kV line bay, and eight 220 kV line bays which are connected with the Sokin, Khakent, Yulduz, and Kyrgyzstan's Uzlovaya substations. The substation is equipped with two 500 MVA 500/220/10kV transformers and configures 500 kV ring bus and 220 kV double bus with transfer bus schemes. The substation's obsolete CBs, instrument transformers, and arresters of 500 kV and 220 kV in addition to communication and control equipment will be replaced.

(19) 220 kV Sardor substation

This substation has three 220 kV outgoing feeders connected with Obi-Khaet, Kzyl-Ravat, and Kristal substation and 16 110kV outgoing feeders. Two 200 MVA 220/110/10 kV transformers are installed, while both 220 kV and 110 kV systems configure a double bus with transfer bus scheme. The 220 kV and 110 kV CBs, disconnection switches, instrument transformers and arresters will be replaced. Communication and control equipment will also be replaced.

(20) 220 kV Uzgarish substation

The Uzgarish substation has 220 kV connections with the 220 kV Obi-Khaet substation and the 500 kV Uzbekistan substation, and is expected to have an additional circuit on the 220 kV Uzgarish-Uzbekistan line. The substation has two 200 MVA 220/110 kV transformers and forms a double bus with a transfer bus scheme for both 220 kV and 110 kV. The equipment to be replaced includes 220 kV and 110 kV CBs, disconnection switches, instrument transformers and arresters, as well as communication and control equipment.

(21) 220 kV Sherabad substation

This substation is connected with the 500 kV Surkhan substation and the 220 kV Denau and Gulcha substations through four 220 kV circuits. The existing two 63 MVA transformers and one 125 MVA transformer with a voltage of 220/110/10 kV will be replaced with two 200 MVA transformers. Other equipment to be replaced includes the 220 kV and 110 kV CBs, disconnection switches, instrument transformers and arresters, as well as communication and control equipment.

(22) 220 kV Denau substation

The Deanu substation has one 220 kV line connected with the Sherabad substation and another 220 kV line which was connected with the Tajikistan grid but is now disconnected. The two existing 20 MVA transformers and one 40 MVA transformer with a voltage of 220/35/6 kV will be replaced with two 63 MVA transformers. Other equipment to be replaced includes 220 kV CBs, disconnection switches, instrument transformers and arresters, as well as communication and control equipment.

Subcomponent 1.2. Emergency Outage Management Systems

5. This subcomponent aims to build resilience to the system through acquisition of one or two 110 kV/medium-voltage mobile substations (MSSs) and emergency restoration system for speedy repair of outages in HV transmission lines, including 500 kV lines. This is also a technology that has not yet been introduced to the country. The main purpose of installing MSSs is to ensure that the outages during rehabilitation of substations will be minimized and that subsequently they will be used as a backup to build resilience against disasters and/or for emergency restoration of any substation with major outage.

Component 2. Institutional Development and Technical Assistance

6. This component will cover three areas.

Subcomponent 2.1.UE IFRS Transition Support and Corporate Governance Enhancement (US$3 million)

7. This activity will continue to support the UE's strengthening of FM and its transition to the full IFRS across the company, including the subsidiaries, preparation of consolidated financial statements, and enhancement of the company's corporate governance. This activity is now critical, as the preparation of IFRS financial statements and introduction of modern methods of corporate governance are mandated by the Presidential Decree starting from 2015. Indicative areas of support include, among others, the following:

- Project and entity audits
- Assistance with the IFRS implementation within the UE group in the areas following the audit of the consolidated financial statements prepared in accordance with IFRS
- Follow up assistance for the internal audit development within the UE group

- Corporate governance enhancement. This activity will finance capacity building for the UE in introducing modern and effective methods of corporate governance in accordance with the Presidential Decree dated 24.04.2015 #UP-4720 'On measures to introduce the modern methods of corporate governance in joint stock companies' and compliance with the Corporate Governance Code introduced and recommended for application on December 31, 2015. Indicative areas of support include, but are not limited to (a) training and capacity building, including knowledge exchange for the UE's senior and middle management; and (b) improving control environment through building capacity also in assisting in introducing enterprise risk management

Subcomponent 2.2. Key Sector Studies

- **Feasibility studies for future projects.** This study will assess the technical, economic, financial, social, and environmental feasibility of future investment in new areas to be identified and agreed (as required)

- **Other key sectoral studies).** Other key studies to support improvement of energy sector performance will be defined and undertaken during project implementation.

Subcomponent 2.3. Capacity Development of Sector Entities

8. This activity will support further strengthening of the UE, the PMU, and other relevant sector entities' capacity through training and study tours to expose them to international practices. The focus areas will be

- new technologies to facilitate modernization of the assets and practices in the sector, such as GIS, MSS, SCADA, and other relevant training to support implementation of the proposed project;

- training in system planning and operations;

- trainings in certification on IFRS for the key financial staff of the UE and its subsidiaries;

- training in preparing and implementing emergency response; and

- other training activities as appropriate.

Assessment of Technical Options

9. Given that the proposed project will revamp a large portion of the key transmission substations that are crucial for maintaining the reliability of the national grid, there is a need to ensure that appropriate technology is introduced to ensure resilient, cost-efficient, and flexible operation of the national grid. In this context, several technical options will be applied for the proposed project: (a) GIS; (b) MSS and Emergency Restoration System; (c) bus configurations; (d) equipment standardization; (e) readiness of the substations for future SCADA system use; and (f) transmission analysis software.

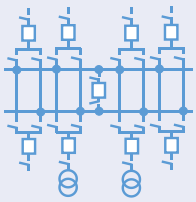
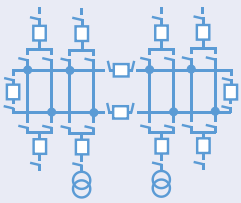
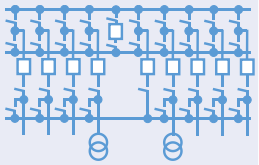
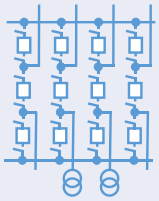
10. **GIS**. The advantages of GIS include its compactness, safety, and pollution/snow tolerance compared with air-insulated switchgear. An indicative cost estimate suggests that a GIS will cost about 1.4 times more than an air-insulated switchgear, without considering land costs. Life cycle cost analysis, which takes into account O&M costs, as well as land costs, indicates that GIS is the preferred option. GISs would be suitable where land vacated after replacement work, could be used where the substations are exposed to chemical and metallurgical pollution, which would reduce life and increase maintenance costs for air-insulated substations. GISs can also be used for temporary purposes during replacement work and subsequently used as permanent installations or spare equipment.

11. GISs will be installed in the Yuksak (220/110/35/10/6 kV) substation. Complete 220 kV and 110 kV switchgears and bus bars will be replaced by GIS modules. The installation of GIS, instead of the traditional air-insulated switchyard will help in creating space for future 500 kV injection in the substation and further add to cost economy of future grid expansion.

12. **MSS**. One to two MSSs will be procured as part of the proposed project. A typical MSS includes a transformer and switchgears mounted on a trailer. It is used not only as a temporary supply equipment during replacement of a transformer or a switchgear to minimize power interruptions, but also as an emergency supply equipment in case of malfunctioning of those equipment, to enhance resilience of the transmission system. The proposed voltage of MSS is 110 kV/medium-voltage because 220 kV and 110 kV systems have sufficient system redundancy: in case of a failure of one element, such as a transformer or CB, the remaining elements still can serve interrupted feeders.

13. **Bus configurations**. A typical 220 kV bus configuration in Uzbekistan is the double bus with a transfer bus scheme. With a one and half CB configuration, which is widely applied in utilities all over the world, the same reliability level can be attained with fewer equipment, smaller space, and less capital cost. For the Yuksak substation, where GIS technology will be introduced and therefore total configuration change is possible, the one and half breaker scheme for 220 kV and the double bus with single breaker configuration for 110 kV are proposed. For the remaining 21 substations, where traditional air-insulated switchgears will be adopted, the existing configuration (double bus with transfer scheme) will be maintained because of space constraints. For these 21 substations, only major equipment, such as transformers, CBs, isolators, current transformers/potential transformers, and control and relay protection system will be replaced and other equipment with longer service lives, such as bus bars, connectors, insulators, and support structures, will remain unchanged (also see Figure 2.1).

Figure 2.1. Bus Configuration Options

	Double Bus Single Breaker	Double Bus Single Breaker Four Bus Tie	Double Bus Transfer Bus	One and Half Circuit Breaker
Scheme				
Reliability	Moderate	High	High	Very High
Space	Moderate	Moderate	Large	Large
Cost	Low	High	High	Moderate
Application	110kV SSs with fewer feeders	110kV SSs with more feeders	110kV and 220kV SSs which should keep original configuration due to space issue	220kV SSs which require high reliability

14. **Equipment standardization**. Given that a large number of the country's substations will be rehabilitated under the project, some of the technical specifications for major equipment should be standardized to allow for parallel operations and compatibility of spare parts. Under the proposed project, the installed capacities of 220 kV autotransformers and 110 kV transformers will be standardized to help reduce inventories and interchangeability of equipment in substations. These ratings, as well as medium voltage, would be finalized as part of specification discussions, by when the recommendation on medium voltage would also be available from the ongoing consultancy on distribution system standardization and modernization.

15. **SCADA**. This is widely applied in modern power systems to enable an operator to achieve real-time data acquisition, remote control, historical data analyses, and reports generation. To enable remote, automatic, and real-time system monitoring and control capability, the UE has agreed to develop a road map with support from a consultant for modernizing its dispatch system with the goal of introducing a modern SCADA system. The road map would clearly establish the current status and capabilities of the power system, identify the expected capabilities needed to modernize the grid, highlight the gaps, propose available technologies (including their costs, benefits, and risks), and define incremental steps needed to move toward modernization.

16. **Transmission analysis software.** To optimize the transmission system planning and analysis capabilities of the relevant sector entities, the TA component under the proposed project will support the purchase of a transmission simulation software and associated training activities.

17. **System planning analysis.** A least-cost planning study is implemented in conjunction with the proposed project, with participation from the UE, Uzelectroset, and Sredazenergoset Project. This will help improve efficiency of dispatch and assess least-cost supply options. A model will be built using the General Algebraic Modelling System and transferred to the UE, Uzbelectroset, and Sredazenergoset Project. As the capacity of respective agencies is further developed, a proprietary planning package can be purchased for use in the future. Training will be carried out for participating officials from these agencies.

Box 2.1. Growth and Employment Impacts of Power Projects

Economic growth and job creation are key components for achieving the World Bank Group's twin goals of eradicating extreme poverty and boosting shared prosperity. According to a systematic review conducted in the International Financial Cooperation (IFC) (2015) on evaluations of power investments, two main channels are discernible through which reliable electricity can contribute to economic growth and job creation: (a) direct impact of job creation and income growth in the power sector and (b) secondary impacts achieved through business expansion and job creation in productive sectors.

Direct Impacts. Power investments create employment opportunities directly across the electricity supply chain, including, among others, the following areas: employment in manufacturing of capital assets, civil works, and construction of associated infrastructure, supply and installation of equipment, and O&M of the assets invested. A review of impact studies identified largest impacts of job creation during the manufacturing, construction, and installation stages. Employment during the O&M stage, while smaller in number, can be sustained over a longer period.

Secondary Impacts. More importantly, power investments help create jobs in productive sectors that use electricity as an input factor of production, including industry, SMEs, and agriculture. Electricity can increase productivity and thereby contribute to the expansion of business and employment. The review found that the impacts of job creation are typically larger through this channel than the ones directly created within the power sector as long as power investments remove bottlenecks prevailing in the power system as a whole, reduce outages, and improve reliability. The impacts on industry are largest and immediate. For example, evaluations based on input-output analyses or econometric models suggest that the results are in tens to hundreds of thousands jobs created, depending on the power delivery and industry structure reflected in macroeconomic data. Evaluations document that jobs in the SME sector are created through the expansion of operations. Available evidence is scarcer for agriculture. Several studies document that productivity improved mainly through the use of electrical irrigation equipment.

Source: IFC (2015) 'Review of the Growth and Employment Impacts of Power Projects'.

Annex 3: Implementation Arrangements

Project Institutional and Implementation Arrangements

1. The proposed project will be implemented by the UE. The UE is controlled by the GoU through the company council and the board. The company council is the supreme managerial body of the company, consisting of nine members, including a chairman appointed by the cabinet of ministers. The company board is an executive body, consisting of five members. The UE became a joint stock company in July 2015 with a view to further commercialize its operations and enhance its competitiveness.

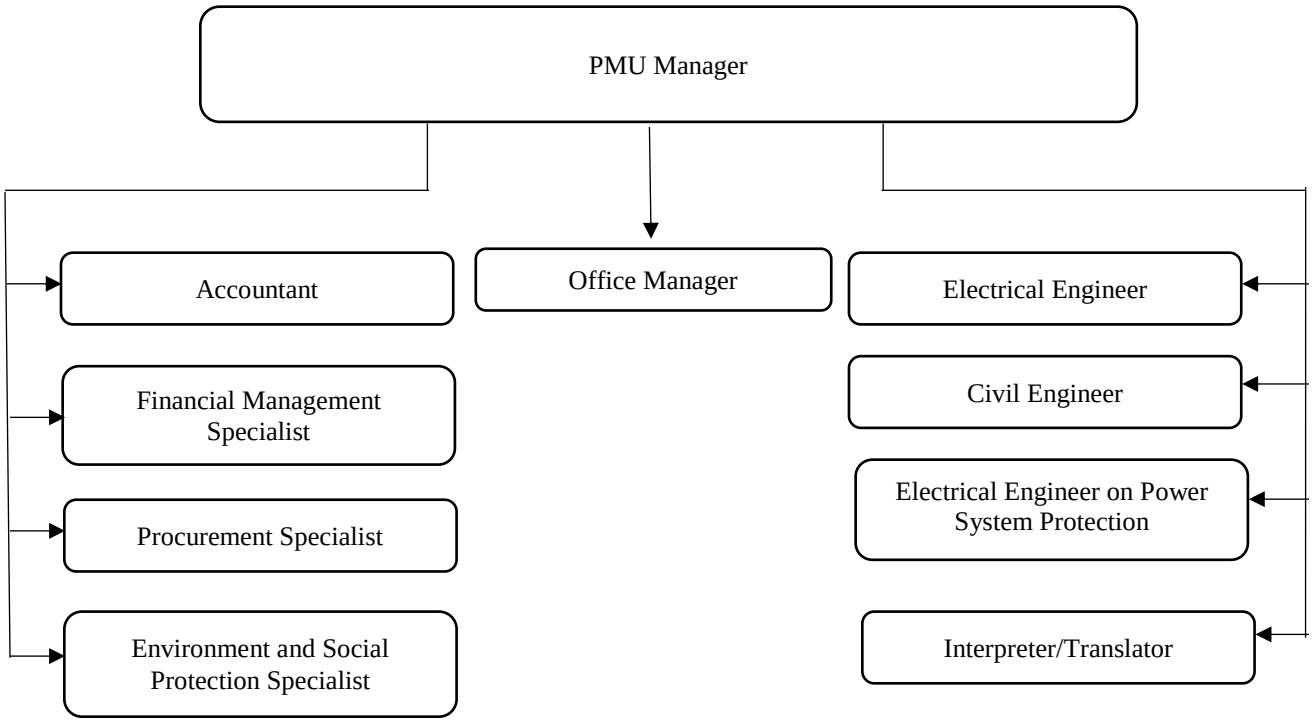
2. The UE's senior management will provide strategic guidance to the project implementation. It will provide guidance on the issues of business process reengineering and coordination among different departments and subsidiaries for the project implementation.

3. Day-to-day supervision and management responsibility for the project will be assigned to the PMU established within the UE, which managed the World Bank-funded transmission project between March 2010 and June 2016. The PMU will be responsible for the preparation and implementation of the project, including preparation of project plans, procurement documents, progress reports, and management of all consulting and investment contracts. Core staff of the PMU has been appointed with ToR agreed with the World Bank.

4. A tendering committee has been established within the UE and will make procurement-related decisions for contracts below US$5 million in value, including approval of bidding documents, bid evaluation reports, and contract awards. For contracts above US$5 million, such procurement-related decisions are made by the inter-ministerial tender committee, consisting of 15 senior government officials.

5. The PMU, funded by the UE's internal sources, has been designated by the UE management to manage all contracts financed under the project on behalf of the UE. It will be responsible for preparing project plans, project progress reports, applications for withdrawal of funds, quarterly project financial statements, and any other reports required by the World Bank and will assist the Tendering Committee in conducting procurement. The PMU will be the main point of contact for day-to-day communication between the UE and the World Bank.

Figure 3.1. PMU Organogram



6. The PMU consists of a project manager, qualified technical experts (electrical and civil engineers), procurement specialists, project accountants (including FM specialists), environmental and social safeguards officers, office manager, and other staff members. The PMU manager directly reports to the chairman of the UE. The PMU will include the officials and responsibilities described in Table 3.1.

Table 3.1. Summary of Responsibilities

Function	Main Responsibilities
Project manager	Overall responsibility for project implementation, coordination, and supervision of project implementation
Technical experts (electrical and civil engineers)	Power engineering and other technical aspects of the project
Procurement specialist	All relevant project procurements in accordance with applicable guidelines
FM specialist	All relevant project FM (disbursement)
Project accountants	All relevant project accounting in accordance with applicable guidelines
Environmental and social safeguards officers	Compliance with environmental and social safeguards and public relations
Office manager	Office management

7. **POM.** To guide the implementation process, the UE will prepare and adopt a POM. This will describe detailed arrangements and procedures for (a) institutional coordination and day-to-day execution of the project; (b) project budgeting, disbursement, and FM; (c) procurement; (d) M&E, reporting, and communication; and (e) any other administrative, financial, technical, and organizational arrangements and procedures that will be relevant for project implementation.

8. **Progress reports.** The PMU will draft quarterly progress reports on the implementation status of the project. The reports will review procurement, physical implementation progress, financial performance, progress toward achievement of the agreed results indicators, and any issues encountered during the reporting period.

9. **Capacity development.** To address the relative inexperience of the UE staff with World Bank-funded projects, the proposed project will (a) avail funds for institutional development under Component 2 and (b) provide adequate training on relevant World Bank guidelines and procedures.

Financial Management, Disbursements, and Procurement

Financial Management

10. Similar to the TTP, all fiduciary arrangements for the project will be carried out by the PMU within the UE staffed with people with relevant experience. The TTP had satisfactory FM arrangements, which will be replicated for the proposed project. The only recurring FM issue was constant delays in audit reports submission, but it was for reasons outside the control of the PMU. Similar problems are expected under the proposed project, hence the 'Substantial' FM risk rating.

11. The internal control procedures for the project are described in the draft POM (based on the TTP POM), which was already prepared by the UE and will need only slight modifications. The POM describes planning and budgeting, internal controls, accounting, financial reporting, disbursement, and audit. There are proper payments' authorization controls and a segregation of duties. The existing accounting software, 1C, will be used for project accounting and reporting purposes with a slight upgrade similar to the TTP. It was agreed with the UE management that the accounting and disbursement staff who had worked on the TTP would be transferred to the PMU for the proposed project.

12. The UE will be responsible for producing all financial reports for the World Bank. Project IUFRs will be prepared based on the TTP format, starting from the quarter in which the first project disbursements occur. The IUFRs will be due within 45 days of the end of the quarter.

13. The project and entity audits will be conducted by independent private auditors acceptable to the World Bank using International Standards on Auditing. The auditors will be engaged through standard ToR acceptable to the World Bank and procured by the UE in accordance with World Bank's procurement guidelines. The cost of the audit will be financed from the proceeds of the loan. Entity financial statements will be IFRS consolidated financial statements.

14. The audited financial statements together with the auditor's opinion and the Management Letter will be provided to the World Bank by the UE within six months of the end of the fiscal year. Following the World Bank's formal receipt of the project and entity audited financial statements from the borrower, the World Bank will make them available to the public on its website in accordance with its Access to Information Policy. In addition, the UE will make the

project's audited financial statements available to the public on a schedule acceptable to the World Bank.

Disbursements

15. The proceeds of the IBRD loan and IDA credits will be disbursed in accordance with the relevant disbursement procedures of the World Bank. The proceeds will be used to finance project activities through the disbursement procedures currently used, that is, advances, direct payments, special commitments, and reimbursement accompanied by appropriate supporting documentation (Summary Sheets with records and/or Statement of Expenditures) in accordance with the procedures described in the World Bank's Disbursement Guidelines. The minimum application size will be specified in the Disbursement Letters.

16. The UE will open two segregated designated accounts in a commercial bank acceptable to the World Bank and agreed with the MoF in U.S. dollars to cover the loan and credit's shares of eligible project expenditures. The ceiling of the designated accounts will be specified in the Disbursement Letters. The PMU will be responsible for submitting quarterly replenishment applications with appropriate supporting documentation along with a reconciled bank statement. The designated accounts will be audited annually in conjunction with the audit of the project financial statements.

Procurement

17. **General.** Procurement for the proposed project will be carried out in accordance with the World Bank's 'Guidelines: Procurement of Goods, Works, and Non-consulting Services under IBRD Loans and IDA Credits and Grants by World Bank Borrowers', dated January 2011 (revised July 2014) (Procurement Guidelines), 'Guidelines: Selection and Employment of Consultants under IBRD Loans and IDA Credits and Grants by World Bank Borrowers' dated January 2011 (revised July 2014) (Consultant Guidelines), and provisions stipulated in the Financing Agreement. If there is conflict between the Government decrees, rules and regulations, and the World Bank's Procurement and Consultant Guidelines, then the World Bank's guidelines shall prevail. In addition, the project will also follow 'Guidelines on Preventing and Combating Fraud and Corruption in Projects Financed by IBRD Loans and IDA Credits and Grants', dated October 15, 2006 and revised in January 2011. For each contract to be financed by the World Bank, the different procurement methods or consultant selection methods, the need for pre-qualification, estimated costs, prior review requirements, and time frame are agreed between the borrower and the World Bank project team in the Procurement Plan. The Procurement Plan will be updated at least annually or as required to reflect the actual project implementation needs and improvements in institutional capacity.

18. The items to be procured will include the following:

- **Procurement of Goods, Works and Non-consulting Services**. All goods, works and non-consulting services required for the Project and to be financed out of the proceeds of the Loan/Credit shall be procured in accordance with the requirements set forth or referred to in Section I of the Procurement Guidelines, and with the relevant provisions of the legal agreements.

- **Consultants' Services**. All consultants' services required for the Project and to be financed out of the proceeds of the Loan/Credit shall be procured in accordance with the requirements set forth or referred to in Sections I and IV of the Consultant Guidelines and with the relevant provisions of the legal agreements.

19. The PMU under the UE in Tashkent is responsible for the day-to-day implementation of the Modernization and Upgrade of Transmission Substations Project. The PMU is financed by the UE and it has already successfully implemented the World Bank's projects earlier. The new project responsibilities would be fixed by order of the UE or other appropriates authorities. The PMU has a procurement specialist. After the project effectiveness, the project may hire a procurement assistant consultant/specialist having the technical education and possessing a working knowledge of English.

20. The PMU will assist the UE in project implementation and conduct procurement under the project. Further, the procurement specialist and assistant, the relevant staff of the PMU, UE, and Evaluation Committee members shall be trained in the World Bank's Procurement/Consultant Guidelines.

21. In line with the Memorandum of Understanding signed between the World Bank and the Government on May 13, 2016, the project will initiate advance procurement as early as possible. The existing PMU has a successful experience in conducting advance procurement.

22. The project will provide adequate additional budget to cover the procurement consultant/specialist's and other concerned PMU and UE staff training costs and equipment needed for the project management and training.

Record Keeping

23. The procurement specialist of the PMU will be responsible for maintaining procurement files/records. Separate files should be maintained for each contract (including both hard copy and electronic copy). All the procurement documents (including bids, technical and financial proposals of consulting services) should be kept to the end of the project and then transferred to the government archives. The originals of various valuable documents (such as bid security, performance guarantee, and advance guarantee) shall be kept in the safe by the PMU's accountant.

Risk Analysis and Mitigation Measures

24. **Procurement risk assessment and mitigation.** An assessment of the procurement capacity of the PMU has been carried out.

25. The PMU, which was established for the implementation of the TTP, will implement the new project. The UC/PMU has extensive experience of working under the World Bank-financed TTP. Both the head of the PMU, who was the procurement specialist for the TTP, and the procurement specialist have experience in carrying out and managing procurement under World Bank procurement guidelines. The PMU has adequate capacity for handling procurement for the project.

26. The Procurement Capacity Assessment identified the following additional risks: (a) the Government decrees and rules and regulations have internal conflict in major provisions such as price verification which leads to considerable delays in project procurement and implementation; (b) the difficulty in obtaining World Bank guarantee for bid security and performance security by local bidders (especially joint ventures) and non-availability of alternative instruments for this purpose; (c) a large number of inter-ministerial tender/bid evaluation committees comprising high- ranking officials results in delayed signing of bid opening minutes and evaluation reports (sometimes up to two months); (d) from bid opening to the start of contract implementation takes a minimum of 8 to 12 months; and (e) considerable procurement delays are caused by contract expertise by the MFERIT; (f) staff of implementing agency have limited experience in World Bank procedures and guidelines; and (g) government officials may intervene in the procurement decisions under the project. The risks identified and mitigation measures are summarized in Table 3.2.

Table 3.2. Risks Identified and Mitigation Measures

Description of Risk	Rating of Risk	Mitigation Measures	Residual Risk
The Government decrees and rules and regulations do have internal conflict in major provisions such as price verification.	S	The World Bank Procurement and Consultant Guidelines shall be followed.	M
Large number of inter-ministerial tender and bid evaluation committees comprising high-ranking officials leads to substantial delays in signing bid opening minutes and evaluation reports.	S	The PMU will monitor to ensure that bid opening minutes and evaluation reports are signed on time.	M
Import contract registration requirements are arduous and may seriously affect procurement and contract implementation.	H	The project team will monitor contract award notification and publication of contract award details according to the World Bank Procurement and Consultant Guidelines. The team will further monitor receipt of signed prior review contracts and take timely action to ensure that the World Bank guidelines are followed.	S
Staff of implementing agency have limited experience with World Bank procedures and guidelines.	S	Regular training of the UE and the PMU staff in procurement and providing an international procurement consultant for the first year shall reduce this risk.	M
Government officials may intervene in the procurement decisions under the project	H	The POM shall clearly define the responsibilities of the project stakeholders in the procurement process. Strict adherence to the World Bank's Procurement Guidelines will minimize this risk. The World Bank team will follow up closely to ensure that the procurement procedures are followed strictly. Any complaints shall be handled consistently and followed up until fully addressed.	S
Average	S		M

Note: H = High; S = Substantial; M = Moderate; and L = Low.

27. The POM will include the detailed internal approval procedures and processes. The price verification and reasonableness of the recommended contract value will be carried out as part of bid evaluation only and the contracts will be awarded and signed as soon as the World Bank's no-objection is issued; and the signed contract and performance security (whenever required) will be submitted to the World Bank within four weeks of the no-objection to the bid evaluation report. The POM will include the complaint registration and handling mechanism, so any complaint is treated fairly and openly. Any complaint concerning the procurement or other aspects of the project implementation have to be registered and dealt with within a time frame agreed in the POM.

28. **Procurement supervision and procurement post review.** Routine procurement reviews and supervision support will be provided by the procurement specialist based in the region/country office. In addition, two supervision missions are expected to take place per year during which ex post reviews will be conducted for the contracts that are not subject to World Bank prior review on a sample basis (for example, 15 percent of the contracts). One ex post review report will be prepared per fiscal year, including findings of physical inspections for not less than 10 percent of the contracts awarded during the review period.

29. **Disclosure.** The following documents shall be disclosed in the UC website: (a) Procurement Plan and updates, (b) invitation for bids for goods and works for all the ICB and NCB contracts, (c) request for expression of interest for selection/hiring of consulting services, (d) contract awards of goods and works procured following the ICB/NCB procedures, (e) list of contracts/purchase orders placed following the shopping procedure on quarterly basis, (f) short list of consultants, (g) contract award of all consultancy services, (h) list of contracts following Direct Contracting (DC) or Selection Based on Consultant's Qualifications (CQS) or Single-Source Selection (SSS) on a quarterly basis, (i) monthly physical and financial progress of all contracts, and (j) action taken report on the complaints received on a quarterly basis. The works bidding documents shall include a clause to put up a notice board in the construction site disclosing the contract details (description, contractor name and contract amount, starting date, completion date, physical progress, and financial progress).

30. The following details shall be sent to the World Bank for publishing in the World Bank's external website and the UNDB: (a) invitation for bids for procurement of goods and works using ICB procedures, (b) Request for Expression of Interest for consulting services with estimated cost more than US$200,000, (c) contract award details of all procurement of goods and works using ICB procedure, (d) contract award details of all consultancy services with estimated cost more than US$200,000, and (e) list of contracts/purchase orders placed following SSS or CQS or DC procedures on a quarterly basis.

Procurement Plan

31. The UE has developed the Procurement Plan covering procurement activities for the entire period of project implementation and it shall be continuously updated as the project progresses. The procurement and changes thereto will be reviewed and approved by the World Bank. The Procurement Plan will be published on the World Bank's external website and the UE website by the time of project negotiations. The POM will elaborate on the appropriate mechanisms for procurement according to the World Bank's guidelines. The General

Procurement Notice and advertisement of the procurement opportunities will be published on the United Nations Development Business (UNDB), on the UE/PMU's website and Uzbek media. The ICBs and major consultancy services will also be published on the same websites and the UNDB.

Anticorruption Measures

32. The World Bank's 'Guidelines On Preventing and Combating Fraud and Corruption in Projects Financed by IBRD Loans and IDA Credits and Grants', dated October 15, 2006 and revised in January 2011, and the transparency and disclosure provisions of its Procurement and Consultant Guidelines (published in May 2004 and revised in October 2006), will apply.

Table 3.3. Procurement Plan - Goods

Date of Procurement Plan:
24.10.2016

Description	Procurement Method	World Bank Review (Prior/Post)	Date of Draft BD to World Bank	Date of Contract Completion
Autotransformers and power transformers **	ICB	Prior	March 17, 2016	June 30, 2017
Power transformers **	ICB	Prior	April 14, 2016	May 30, 2017
MV and LV power equipment	ICB	Prior	October 13, 2016	August 31, 2017
HV power equipment	ICB	Prior	November 11, 2016	October 31, 2017
Relay protection and MV, LV power equipment	ICB	Prior	December 1, 2016	December 31, 2017
HF equipment and accumulator battery	ICB	Prior	November 8, 2016	October 31, 2017
Reinforced concrete products	ICB	Prior	November 21, 2016	August 11, 2017
Metal rollings	ICB	Prior	November 21, 2016	August 11, 2017
Cables and wires	ICB	Prior	November 21, 2016	August 11, 2017
Linear-coupling fittings and insulators	ICB	Prior	November 21, 2016	August 11, 2017
MSS	ICB	Prior	January 11, 2017	December 31, 2017
GIS substation 220/110/10 kV	ICB, EPC	Prior	January 11, 2017	December 31, 2017
Specialized machinery	ICB	Prior	January 31, 2017	November 30, 2017

Note: BD = Bid Document; EPC = Engineering, Procurement, and Construction; MV = Medium Voltage; LV = Low Voltage

** Procurement activities started already.

Table 3.4. Procurement Plan - Consultancy

Contract Description	Selection Method	World Bank Review (Prior/ Post)	Draft RFP (inclding ToR, short list)	Date of Contract Completion
Project and entity audits	LCS	Prior	January 31, 2017	December 30, 2018
Assistance with the IFRS implementation within the UE group	QCBS		May 15, 2017	April 30, 2018
Transmission System Planning	QCBS		July 15, 2017	June 30, 2018
Pre-feasibility study for SCADA system	QCBS		August 15, 2017	July 10, 2018
Feasibility study for future projects	QCBS		September 15, 2017	August 1, 2018
Other key sectoral studies	QCBS		October 15, 2017	October 1, 2018
Capacity development of sector entities	QCBS		November 15, 2017	September 1, 2018

Note: RFP = Request for Proposal.

Table 3.5. Thresholds for Procurement Methods and World Bank's Prior Review

Expenditure Category	Contract Value Threshold (US$)	Procurement Method	Contracts Subjects to Prior Review (US$)
Goods (including technical services)	≥500,000	ICB	All ICB contracts
	<500,000	NCB	First 2 contracts
	≤100,000	Shopping	First 1 contract
	n.a.	DC*	All DC contracts ≥50,000
Consultant services (including training)	≥200,000	QCBS/QBS/LCS/FBS [a, b]	≥100,000 for firms and all SSS contracts
	<200,000	CQS	
	n.a.	SSS*	
	n.a.	IC	≥50,000 for individuals
Works	≥1,500,000	ICB	First ICB contract. Then ≥5,000,000.
	≤1,500,000	NCB	First contract

Note:

a. Short list may comprise entirely of national consultants for assignments of less than US$300,000 equivalent per contract;

b. As appropriate, these methods may be adopted for assignments costing less than US$200,000;

c. Shall be pre-determined in the Procurement Plan and approved by the World Bank.

QBS = Quality Based Selection; FBS = Fixed Budget Selection; IC = Individual Consultants

* To be reflected and agreed in the Procurement Plan in advance.

Environmental

33. **ESMF implementing responsibilities.** The overall responsibility of the project implementation, including the EA and monitoring, lies with the UE. The company currently implements two other World Bank-funded projects—the TTP and Advanced Electricity Metering Projects—and its EA capacity based on these two projects until now has been qualified as Satisfactory.

34. **PMU's main EA tasks.** The day-to-day project activities will be the major responsibility of the PMU which will also be responsible for ensuring that project activities are being assessed from an environmental point of view and that requested EA documents are prepared and the EMPs are adequately implemented. The main EA duties for the PMU are as follows: (a) coordination of environmental and EA-related issues; (b) based on subproject design preparing Statement of the Draft of Environmental Impacts, EMP Checklist, and Statement of Environmental Consequences for all selected electrical stations; (c) monitoring environmental impacts within the overall monitoring of the subprojects EMPs implementation; (d) communicating with the EA competent authorities (MoEn, SEI); and (e) reporting on the EMP's implementation.

35. **PMU safeguards specialist.** For implementing environmental safeguards, a safeguards specialist (SS) will be hired within the PMU. The SS's main responsibility will be to coordinate all the EA activities and ensure adequate implementation of the EMPs' requirements. Its role will be to ensure the main PMU EA duties specified above are efficiently implemented. One of the most important tasks for the SS would be to selectively visit subprojects and ensure proper monitoring of the EMPs' implementation. To strengthen the SS capacity, the World Bank environmental specialist will provide the SS with on-the-job training on implementing environmental safeguards.

36. **Subprojects' EA.** Based on the ESMF, the PMU will prepare for all supported electrical stations the following EA documents: (a) at the initial stage of the project design, the Statement of the Draft of Environmental Impacts; (b) based on the detailed technical design, a simple EMP; and (c) before electrical station commissioning, a Statement of Environmental Consequences. As the project will involve typical small-scale civil works, as well as dismantling and installing new electrical equipment, the ESMF proposes to use a generic EMP Checklist-type format ('EMP Checklist'), developed by the World Bank to provide 'pragmatic good practice' and designed to be user-friendly and compatible with safeguard requirements. The document covers typical avoidance of and preventive and mitigation approaches for such types of activities with localized impacts. According to the national EA legislation, all the documents specified earlier are subject to the State Ecological Expertise at the oblast-level review and approval.

37. **EMPs disclosure and public consultation.** As the proposed activities will be implemented on existing, well-fenced electrical stations which usually are located outside of the settlements, or which have a clearly designed sanitary zone, there is no need for a special public hearing of the EMP, though the project beneficiary should provide information to all interested parties about the civil works and electrical stations renovation activities by installing a notice plate placed at the rehabilitation. Furthermore, other specific information related to the project activities and EA should also be publicly available online on the project or the UE website.

Based on that, the public consultation can be done virtually by receiving relevant questions/proposals online and taking them into consideration while finalizing the substations' EMPs.

38. **Integration of the ESMF and EMP requirements into project documents.** The ESMF and EMP provisions would be used for the following: (a) inclusion of environmental requirements in the POM and in construction contracts for individual subprojects, both into specifications and bills of quantities, and the contractors will be required to include the cost in their financial bids (this might be done by attaching part 2 and 3 of the EMPs to the contracts); (b) highlighting of EMP follow-up responsibility within the PMU; and (c) specification of M&E of mitigation/ avoidance measures.

39. **Monitoring responsibilities.** During the subproject's implementation, the PMU will perform regular supervisions of the sites to confirm compliance with the EMP requirements. Separately, World Bank experts will also carry out annual site-specific visits to review progress in the EMPs' implementation. In the case of noncompliance, the PMU SS will investigate the nature and reasons for noncompliance, and a decision will have to be made on what is needed to bring a subproject into compliance or whether financing should be suspended.

40. **Reporting.** The status of compliance with agreed environmental mitigation measures is to be reported by contractors to the PMU and then to the World Bank by the PMU in their regular (semiannual) progress reports. In addition, the PMU makes available information on monitoring of environmental management activities and mitigation measures in its routine reporting on subproject implementation to the World Bank and during periodic World Bank implementation support visits.

Social

41. **Screening for impacts covered under OP 4.12.** The planned renovation investments will exclusively take place within the footprint of existing substations and on fenced-off, state-owned land. As such, no land acquisition is anticipated and OP 4.12 is not triggered. However, the PMU will screen for any impacts covered under OP 4.12 as part of the preparation of the EMP. Specifically, the PMU will ensure that there are not formal or informal owners or users of the land being used for the investments.

42. **Citizen engagement and beneficiary feedback.** The UE customer services department enables citizens to submit questions or complaints. The PMU will be responsible for responding to any complaints that will be received through this channel. The PMU will also liaise with the customer services department to collect the necessary monitoring data for the indicator in the Results Framework on the number of complaints that are received. The PMU will work with the customer services department to ensure that the data collected is disaggregated by gender (that is, reports on the number of women and men who submit complaints). In cooperation with the Mahalla committees and in a representative number of communities, the PMU will also organize consultation sessions with women and men on the best times for the unavoidable power outages associated with the rehabilitation work, and post outage schedules on its portal and disseminate them through Mahalla committees. These activities will be reported on as part of the quarterly progress reports submitted to the World Bank.

Monitoring and Evaluation

43. The PMU will conduct M&E of the project. Progress reports will be prepared by the PMU on a quarterly basis to monitor the implementation progress and results of the project. The PMU will liaise with the World Bank for technical, financial, procurement, FM, safeguards, and other project implementation matters. The World Bank team will also supervise the project implementation at least twice a year. A project completion report will be prepared to evaluate the project performance and outcomes upon completion.

Annex 4: Implementation Support Plan

Strategy and Approach for Implementation Support

1. The strategy for implementation support has been developed taking into consideration the nature of the project and its risk profile. The aim of the strategy is to provide flexible, efficient, and risk-focused implementation support to the client.

2. The project will be implemented by the UE. Through the implementation of World Bank-funded projects, the UE has strengthened its project management capacities. However, there is still a risk of delays, especially in the areas of procurement and FM.

3. The project therefore requires strengthened World Bank supervision during implementation. The main focus of the project supervision, especially during the early stage of project implementation, will be (a) ensuring that the UE will be able to handle the increased volume of procurement and contracts for implementing Component 1 and (b) ensuring that the UE will be able to manage the project activities in accordance with the schedule.

4. **Procurement support.** Implementation support from the World Bank for procurement will include (a) providing training in the World Bank procurement procedures to the staff of the UE; (b) reviewing procurement documents and providing timely feedback to the procurement officers at the implementing agency; (c) providing detailed guidance on the World Bank's Procurement Guidelines to the procurement officers; and (d) monitoring procurement progress against the detailed Procurement Plan, which will be updated as needed to reflect project implementation needs and improvements in institutional capacity. Throughout implementation, the World Bank team will work with the project coordinator and procurement officers at the UE.

5. **FM support.** The World Bank will continue to review the project's FM system including, but not limited to, accounting, reporting, and internal controls. Throughout project implementation, the World Bank team will work with the project coordinator to assist in improving the UE's FM and reporting arrangements.

6. **Support team.** The World Bank's task team will be selected from across various relevant sector units to ensure effective, efficient, and timely implementation support to the client.

Implementation Support Plan

7. Project implementation support will build on the experience of earlier World Bank engagement. The Tashkent Country Office has a locally based energy specialist who will be available for day-to-day implementation support activities, with additional support from headquarters and elsewhere. In addition, regular fiduciary and safeguards support to the project team and the implementing agency will be provided.

8. **Technical support.** Technical knowledge of transmission engineering and technologies will be required for Component 1 (Electricity Transmission System Upgrade), particularly of substation design, to design appropriate technical specifications. There is also a need for knowledge and experience of contract management to prepare bidding documents, supervise the procurement process, evaluate bids, and implement the project. During project implementation,

technical supervision is required to ensure that contractual obligations are appropriately met. Moreover, the concurrent rehabilitation of major substations requires understanding of the national power system and a coordinated approach to address potential impacts on the grid stability during construction. The World Bank team will include an experienced transmission engineer with extensive knowledge of procurement of transmission contracts and power systems and will accompany the UE staff on regular project site visits throughout the duration of the project. The project will provide financing for an owner's engineer who will assist the UE with preparation and implementation of the GIS technology.

9. **Institutional support.** For Component 2 (Institutional Development and Technical Assistance), it is expected that expertise in power sector reform, electricity tariff methodology, institutional development, and FM will be required. From the World Bank team, experienced specialists in respective areas will assist the UE in preparing the ToRs for these assignments and will help the UE supervise the activities.

10. **Fiduciary support.** The World Bank's task team will help the UE identify capacity-building needs to strengthen FM and procurement capacity. Regular FM and procurement supervision will provide timely advice on budget planning and streamlining of the procurement process. The PMU will be responsible for compilation of annual project financial statements for independent external auditing. Project financial statements will be audited by an independent auditor acceptable to the World Bank.

11. **Environmental and social safeguards.** Compliance with environmental and social safeguards will be the primary responsibility of the PMU. This includes implementation of the Resettlement Policy Framework (if necessary), and the ESMF. Environmental and Social Impact Assessments/Environmental Social Management Plans will be prepared as and when necessary during project implementation. The World Bank's environmental and social safeguards specialists will provide guidance to the UE's specialists in addressing any issues as they may arise.

12. **Financial analysis.** Regular reviews of the UE's financial performance will be required. The review will focus on updating corporate financial analysis of the UE, assessing the company's operational efficiency, and determining the adequacy of prevailing electricity tariffs.

13. **M&E.** The UE has developed some M&E capabilities through earlier engagement with World Bank-funded projects. The UE will further strengthen its capacity for monitoring and tracking results. The World Bank's M&E specialist will be available to support the UE as needed.

14. The main focus of support from the World Bank task team to implementation during the project period is summarized in Table 4.1.

Table 4.1. Implementation Support

Time	Focus	Skills Needed	Resource Estimate
First 12 months	Procurement of consultancy services for project design, preparation of bidding documents, and solicitation and evaluation of bids	Technical and procurement	Approximately 9–12 weeks for each team member
	Development and improvement to FM systems	FM	
	Development and improvement to procurement and contract management systems	Procurement	
	Contract management for the transmission system upgrade component	Technical and procurement	
12–48 months	Technical implementation support	Energy specialist, financial analyst, power engineer	Approximately 9–12 weeks for each team member
	M&E implementation support	M&E specialist	
	Procurement implementation support	Procurement specialist	
	FM implementation support	FM specialist	
	Environmental safeguards implementation support	Environmental safeguards specialist	
	Social safeguards implementation support	Social safeguards specialist	
Other			

Table 4.2. Skills Mix Required

Skills Needed	Number of Staff Weeks	Number of Trips	Comments
Task team leader Power engineer Procurement specialist FM specialist Environmental safeguards specialist Social safeguards specialist Financial analyst	Approximately 9–12 weeks for each team member	Two per year or as required	These estimates will be adjusted and will depend on the stage of the project cycle, implementation progress, and the required support by the client

Annex 5: Economic and Financial Analyses

1. This section contains the economic and financial analyses of the project, which includes (a) the project economic analysis; (b) the project financial analysis; and (c) the analysis and forecast of the UE's financial performance. The economic analysis of the project was done based on the incremental benefits and costs of the project. The financial viability of the project was assessed based on the incremental cash inflows and outflows from the UE perspective. The economic and financial analysis of the project covers only the investments in rehabilitation of the substations.

Project Economic Analysis

2. **Rationale for public sector financing.** Public sector financing of the project is justified because (a) private sector financing for such investments with relatively long payback periods is not available in the local financial market and (b) the UE is a tariff-regulated, state-owned company with limited ability for long-term borrowing on commercial terms and, thus, no discretionary income.

3. **Value added of the World Bank's support.** The World Bank has an established track record with similar power transmission line and substation rehabilitation projects in the region, including Uzbekistan. The project will draw on the experience and lessons learned from these projects to provide technical, fiduciary, and safeguards support to the UE during implementation of the project.

4. **Cost-benefit analyses.** The economic analysis was done based on the incremental benefits and costs of the project, and the project's economic viability was determined through the assessment of the expected economic return for the project, evaluated with regard to the NPV and EIRR. The economic costs and benefits of the project were calculated based on real economic prices and exclusive of taxes. No explicit or implicit subsidies affect the economic costs and prices.

5. **Key assumptions.** The key assumptions underlying the economic analysis of the project under the base case scenario are presented in Table 5.1.

6. **Economic benefits.** The main economic benefits of the project are the (a) reduction in the unserved energy in the areas served by the 22 substations to be rehabilitated under the proposed project, (b) reduction of technical losses at those substations, and (c) reduction of O&M costs at those substations.

7. **Reduction in the unserved energy and O&M costs**. The economic benefit of improved reliability of 22 substations was quantified as avoided unserved energy because of reduced incidence of equipment failures at the substations, which lead to unserved energy in the service areas dependent on those substations. The power system in Uzbekistan is designed to meet the N-1 redundancy criteria and has so far ensured uninterrupted supply of electricity to end users. However, given that the average age of substations is 47 years and that those substations had not undergone major rehabilitation in the past, it is reasonable to assume that the likelihood of simultaneous failure of two or more substation components, which may affect end users, will

increase in the future. The expected unserved demand due to such failures was estimated using the following linear relationship between CB failure rate and age of equipment.

[Expected number of failed CBs out of 100 CBs] = 0.038 x [Age] + 0.225

8. The linear relationship was found by regressing CB failure rate on the age of equipment based on the relevant historical data provided by the International Council on Large Electric Systems.[9] The intercept and the regression coefficient were adjusted by a factor of 0.08to permit calculations of the failure rate per 8 CBs, which would reflect the average number of 220 kV CBs in each of the 22 substations under the proposed project. By method of extrapolation, the avoided unserved energy due to reduced incidence of equipment failures at the substations was estimated at 6.2 GWh for the project life.

9. The cost of unserved energy was assumed at US$0.15 per kWh. It was computed using the cost of unserved energy estimate for Tajikistan, which is equal to US$0.07 per kWh,[10] adjusted for the difference in the standard of living between Uzbekistan and Tajikistan, as measured by GDP per capita on a purchasing power parity basis. The willing-to-pay and diesel-fired backup generation approaches, which require sufficient and reliable data on outages, are inapplicable in this particular case because of uninterrupted supply of electricity to end users in recent years.

10. Rehabilitation of the substations will also reduce the O&M costs at substations given the severe dilapidation of the equipment, which requires significant expenses each year to maintain it in operational condition.

11. **Reduction of technical losses at substations.** The rehabilitation of substations under the proposed project will also generate economic benefits in the form of reduction of technical losses at substations and are quantified as the avoided economic cost of meeting increasing electricity demand. Currently, all power-generating facilities in the country are operating at full capacity, and meeting the expected growth of electricity consumption at 4 percent to 5 percent per year will require adding new generation capacity. The cost of avoided additional kWh of electricity supply is assumed to be equal to the levelized cost of energy supplied by a 250 MW combined cycle gas turbine, calculated at export price of natural gas of US$183 per tcm in Uzbekistan as of December 2015 and estimated at US$0.097per kWh, including US$0.025 per kWh for transmission and distribution margin.

12. In 2014, the total technical losses at 22 substations amounted to 210 GWh or about 0.71 percent of the total annual flow of electricity through those substations. The upgrade and rehabilitation of substations will allow technical losses to decrease to 0.25 percent out of the total annual electricity flow.

[9] Final Report of the 2004–2007 International Enquiry on Reliability of High Voltage Equipment, International Council on Large Electric Systems (CIGRE), October 2012.

[10] Daryl Fields, Artur Kochnakyan, Takhmina Mukhamedova, Gary Stuggins, and John-Besant Jones.2013. *Tajikistan's Winter Energy Crisis: Electricity Supply and Demand Alternatives*, Washington, DC: World Bank.

13. **Reduction of GHG emissions**. Over the economic life of the project, there is an increase in GHG emissions of 159,121 tCO_2e from the reduction in unserved energy and the change from oil CBs to sulphur hexafluoride breakers. This is offset by the reduction in GHG emissions from reduced technical losses resulting in net emissions reduction of 5.1 million tCO_2e. The net emissions reduction is equivalent to the avoided energy use of over 6 million homes in Uzbekistan in one year. The economic analysis uses an estimate of social value of carbon starting at US$30 in 2015 and increasing to US$80 in real terms by 2050.[11]

14. **Economic costs.** The economic costs of the project include the equipment supply and installation costs for rehabilitation of 22 substations.

15. **Results.** Economic NPV and EIRR of the project with and without the social value of carbon are presented in Table 5.1.

Table 5.1. Economic NPV and EIRR of the project

	NPV (US$, millions)	EIRR (%)
Without social value of carbon	65.8	14.7
With social value of carbon	104.5	16.8

16. **Sensitivity analysis**. A sensitivity analysis was conducted to assess the robustness of the estimated project economic returns to changes in the main evaluation variables. The sensitivity analysis covers the following cases that in turn stress test the economic returns to the project.

(a) 20 percent higher investment cost with the expected base-case values for all other variables.

(b) 20 percent less reduction in technical losses with the expected base-case values for all other variables.

(c) 20 percent lower-than-anticipated avoided unserved energy due to equipment failure with the expected base-case values for all other variables.

(d) Combination of the above three cases.

The results of the sensitivity analyses are presented in Table 5.2.

Table 5.2. Sensitivity Analysis for Economic Appraisal of Investments in the Power Transmission Substations

	NPV (US$, millions)	EIRR (%)
Without social value of carbon		
Base case	65.8	14.7
a. 20 percent higher investment cost	46.0	12.9
b. 20 percent less reduction in technical losses	33.6	12.6
c. 20 percent lower-than-anticipated avoided unserved energy due to equipment failure	65.8	14.7
d. Combination of a, b, and c	13.7	10.9

[11] Guidance note on Social Value of Carbon in Project Appraisal (July 2014)).

	NPV (US$, millions)	EIRR (%)
With social value of carbon		
Base case	104.5	16.8
a. 20 percent higher investment cost	84.7	14.8
b. 20 percent less reduction in technical losses	64.2	14.4
c. 20 percent lower-than-anticipated avoided unserved energy due to equipment failure	104.5	16.8
d. Combination of a, b, and c	44.3	12.7

17. The results of the sensitivity analysis suggest that the project is economically robust even in case of substantial variation of main variables that affect its economic viability.

Project Financial Analysis

18. The financial viability of the project was conducted from the perspective of the company that will be the implementing agency of the project (UE) and will assume the project assets and debt obligations on their balance sheets. The financial analysis adopts a number of inputs from the economic analysis, including project construction schedule and life time, investment costs, and O&M cost savings. Uzbekistan Som inflation is applied to the local prices and costs in the financial analysis, and equipment supply costs are indexed to Manufactures Unit Value (MUV) Index[12]. UE will be exempt from VAT and import duties. The on-lending rate expected to be set by the MoF under the Subsidiary Agreement with the UE is estimated at 3.02 percent, assuming 20 bps surcharge by MoF.

19. **Project financial benefits**. The financial benefits of the project for the UE are (a) the incremental revenue from the sale of electricity because of reduced incidence of equipment failures and reduced technical losses at 22 substations and (b) O&M cost savings because of the anticipated improved performance of the substation equipment after rehabilitation. The incremental revenue was computed using the forecast electricity tariff. The electricity tariff was forecast (a) using the level of tariff for the UE as of June 1, 2015 and (b) increasing it by the forecast inflation rate. The O&M cost savings were computed as the difference between the O&M costs under 'without project' and 'with project' scenarios.

20. **Project financial costs**. The financial costs of the project are the equipment supply and installation costs for rehabilitation of 22 substations.

21. **Results**. The financial analysis of the project from the UE's perspective yielded a financial NPV of US$1,067.6[13] million and FIRR of 16.6 percent.

(a) **Sensitivity analysis.** A sensitivity analysis was conducted to assess the robustness of the estimated project financial returns to changes in the main evaluation variables. The sensitivity analysis covers the following cases that in turn stress test the financial returns to the project. 20 percent higher investment cost with the expected base-case values for all other variables.

[12] Manufactures Unit Value (MUV) Index, July 4, 2014.
[13] Applied financial discount rate is 4.16 percent.

(b) 20 percent less reduction in technical losses with the expected base-case values for all other variables.

(c) 20 percent lower-than-anticipated avoided unserved energy due to equipment failure with the expected base-case values for all other variables.

(d) Combination of the above three cases.

The results of the sensitivity analyses are presented in Table 5.3.

Table 5.3. Sensitivity Analysis for Project Financial Appraisal from the UE's Perspective

	NPV (US$, millions)	FIRR (%)
Base case	**1,067.6**	**16.6**
a. 20 percent higher investment cost	1,042.8	15.3
b. 20 percent less reduction in technical losses	837.2	15.1
c. 20 percent lower-than-anticipated avoided unserved energy due to equipment failure	1,067.5	16.6
d. Combination of a, b, and c	812.2	13.9

22. The results of the sensitivity analysis suggest that the project is financially robust even in case of substantial variation of main variables that affect its viability.

Analysis and Forecast of Financial Performance of the UE

23. The assessment of the UE's financial performance is based on (a) the audited financial statements for 2013–2014; (b) information and data on tariffs, debts, and projected electricity generation provided by the UE; and (c) the information obtained during the discussions with the UE management and the World Bank staff.

24. **Analysis of the current financial performance of the UE.** In 2013–2014, overall measures of operating performance, profitability, and liquidity deteriorated in the UE (see Table 5.4).

25. In 2014, the profitability of the company suffered because of the narrowing gross margin from 17 percent in 2013 to 14 percent in 2014 driven by faster growth of cost of sales relative to that of revenues, as shown in Table 5.4. However, the UE achieved over 50 percent savings on general and administrative expenses, particularly contributions to the Coal Industry Development Fund, thereby averting commensurate worsening of bottom-line results; operating and net margins of the UE in 2014 declined by only 1 percentage point to 12 percent and 4 percent respectively.

26. The UE's ability to meet its current liabilities, as measured by the current ratio, has declined from 1.23 in 2013 to 1.12 in 2014, primarily because of increased short-term borrowings and larger debt service requirements on its long-term debt.

27. As of December 31, 2014, the UE's total debt amounted to UZS 3,555 billion (US$1,468 million), 22 percent higher than in 2013. Nearly 87 percent of the total debts are long-term loans from international financial institutions and the Republic of Uzbekistan's Reconstruction and

Development Fund. The UE's rising indebtedness and the low capacity to generate sufficient cash from operations have significantly affected the solvency of the company. The debt-to-equity ratio reached 3.64 in 2014 from 3.53 in 2013, and the ability to meet the required principal and interest payments, as measured in accordance with the financial covenant stipulated in the TTP Agreement, slid from 0.86 in 2013 to 0.50 in 2014.

28. The UE struggled with cash collections, which, as the analysis of the financial statements showed, averaged to about 91 percent of annual sales. By December 31, 2014, it had already accumulated receivables worth UZS 3,531 billion (US$1,458 million). According to audited financial statements for 2014, about 86 percent of receivables are past due and there are objective evidences of impairment of receivables from electricity sales in a total amount of UZS 1,052,835 million (or 30 percent of total amount due from debtors), which was not recognized by the UE. The number of days of sales outstanding is estimated at 300.

29. As a result, the company had to attract expensive short-term commercial debt to cover the emerging shortfall in cash. Indeed, as of the end of 2014 the short-term commercial borrowings of the Company to finance working capital needs more than tripled over 2013-2014 to reach UZS 231,223 million (US$95 million). Interest rates on those loans ranged from 14 percent to 16 percent. Recurring problems with cash collections combined with increased debt payments in the near future may substantially undermine the financial viability of the company.

30. **Projected financial performance of the UE.** The UE's financial performance was forecast using the percentage of sales method and based on the assumptions that applicable electricity purchase and sale tariffs for the UE will increase at the forecasted rate of inflation, as provided by the International Monetary Fund World Economic Outlook October 2015. The cash collection rate was assumed to remain at about 90 percent, because of the absence of any indication of planned or observable actions to improve it. Debt servicing expenses were estimated based on repayment schedules of existing international financing institution and commercial bank loans. Uzbekistan Som was assumed to depreciate at about 10 percent annually. Loan proceeds under the proposed Modernization and Upgrade of Transmission Substations Project are assumed to be invested through its 100 percent owned subsidiary, Energosotish State Joint Stock Company, and are reflected in the forecast financial statements as investments in subsidiaries. Under the proposed project, 88 percent of the total investment cost is to be financed with IBRD loans and IDA credits with the remaining 12 percent being covered by the UE. All the above-mentioned assumptions constitute the base case scenario.

31. In the forecast period of 2015–2020, the major threats to the financial viability of the company will be the unfavorable development of the foreign exchange rate and the persistence of the low cash collection rate. The financial deficit of the company due to a suboptimal collection rate of 90 percent is forecast to grow to about US$315 million by 2020 to be covered by expensive short-term commercial loans. This will further worsen the liquidity and solvency of the company. The current ratio will sink below the current level of 1.12. The UE will have continued difficulties servicing its debt without improvement in the DSCR. The total annual required principal and interest payments on debt are forecast to increase from about US$282 million in 2015 to US$416 million in 2020.

Table 5.4. Financial Ratios of UE (Base case)

	2013	2014	2015f	2016f	2017f	2018f	2019f	2020f
Operating margin (%)	13	12	12	12	12	12	12	12
Net margin (%)	5	4	0	3	3	4	5	6
Current ratio	1.23	1.12	1.05	1.05	1.06	1.07	1.09	1.12
Quick ratio	1.23	1.12	1.05	1.05	1.06	1.07	1.09	1.12
Debt-to-equity ratio	3.53	3.64	4.01	3.87	3.74	3.55	3.24	2.87
DSCR	0.74	0.45	0.46	0.43	0.44	0.45	0.46	0.46
Days receivable outstanding	332	301	301	301	301	301	301	301
Days payable outstanding	262	226	226	226	226	226	226	226

32. A scenario analysis was conducted with respect to the foreign exchange rate and the collection rate. Convergence with the current black market rate of about UZS 5,950 per U.S. dollar[14] by 2020, which implies a higher rate of currency depreciation, will cause significant deterioration in net profitability and other return measures, such as return on assets and return on equity. Between 2015 and 2017, the company will incur net losses because of increasing financial expenses, which will cause erosion of its equity. The debt-to-equity ratio will reach 5.07 with the DSCR decreasing to 0.39 by 2020. Cash deficit in 2020 will be up by about US$9 million (or by 37 percent in local currency terms) relative to the base case.

33. A substantial turnaround in the financial situation at the UE can be expected from improvement of collections. Assuming that the payables turnover remains constant over the forecast period, a gradual increase of the collection rate, up to 98 percent by 2020, will eliminate the cash deficit in 2018, when the DSCR will have exceeded 1.0.

[14] "Five countries being squeezed by currency pegs", Bloomberg, February 15, 2016: http://www.bloomberg.com/news/articles/2016-02-14/black-market-dollars-at-136-mark-up-show-true-pain-of-the-pegs

Table 5.5. Detailed Assumptions Underlying Economic and Financial Analysis

		2015	2016	2017	2018	2019	2020	2021	2026	2031	2036	2041	2046	2050	Source
Detailed Assumptions															
Economic discount rate	%	10													World Bank team
Financial discount rate	%	4.16													World Bank team
Physical contingency, % of investment cost	%	5													World Bank team
Cost of unserved energy	US$/kWh	0.15													World Bank team
Electricity tariff (excluding VAT)	UZS/kWh	113													UE
Rate of annual tariff increase	%	10	Assumed to increase at forecast inflation rate												World Bank team
Evaluation period	Years	30	Years from the commissioning date of the rehabilitated substations												World Bank team
Applicable corporate tax rate [a]	%	15.4													World Bank team
Value added tax	%	0													MoF
Total supply cost	US$, millions	110.0													World Bank team
Total installation cost	US$, millions	20.3													World Bank team
Physical contingencies	US$, millions	6.5													World Bank team
Disbursement schedule	%	—	3%	14%	41%	21%	21%								World Bank team
Manufactures Unit Value Index	%	0.30	1.45	1.41	1.47	1.51	1.55	1.58	1.64	1.64	1.64	1.64	1.64	1.64	World Bank
Uzbekistan consumer price index, percentage change	%	9.75	9.22	10.47	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	IMF
US$/UZS exchange rate	%	2,667	3,055	3,360	3,696	4,066	4,472	4,472	4,472	4,472	4,472	4,472	4,472	4,472	IMF
Social value of carbon	US$/$tCO_2e$	30	31	32	33	34	35	37	44	52	59	67	74	80	World Bank team
Net CO_2 emission	tCO_2e	—	—	—	1,072	2,368	3,811	(81,089)	(102,332)	(128,820)	(161,845)	(203,024)	(254,367)	(304,428)	World Bank team
Electricity demand	KWh, millions	57,274	59,650	62,300	65,400	68,700	71,800	75,040	93,569	116,673	145,481	181,404	226,196	269,871	UE, World Bank team
Electricity flows through 22 substations	KWh, millions	31,386	32,688	34,141	35,839	37,648	39,347	41,122	51,276	63,937	79,724	99,410	123,956	147,890	UE, World Bank team
Growth of electricity demand, % [b]	%	5.6	4.1	4.4	5.0	5.0	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	UE, World

		2015	2016	2017	2018	2019	2020	2021	2026	2031	2036	2041	2046	2050	Source
															Bank team
Unserved energy without project	kWh	43,233	46,828	50,690	54,837	59,288	64,064	69,186	100,864	145,376	207,474	293,558	412,222	538,222	World Bank team
Unserved energy with project	kWh	43,233	46,828	50,690	54,837	59,288	64,064	1,262	4,047	9,557	19,319	35,529	61,320	91,762	World Bank team
Technical losses without project	%	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	World Bank team
Technical losses with project	%	0.71	0.71	0.71	0.71	0.71	0.71	0.25	0.25	0.25	0.25	0.25	0.25	0.25	World Bank team
Technical losses without project	million kWh	221	231	241	253	266	278	290	362	451	562	701	874	1,043	World Bank team
Technical losses with project	million kWh	221	231	241	253	266	278	103	128	160	199	249	310	370	World Bank team
Repair costs without project	US$, million	—	0.13	0.33	0.13	0.34	0.96	0.38	0.13	0.34	0.25	0.44	0.13	0.13	UE (Pre-FS)
Repair costs with project	US$, million	—	0.13	0.33	0.13	0.34	0.96	0.09	0.09	0.09	0.09	0.09	0.09	0.12	UE (Pre-FS)
Cost of oil used without project	US$, million	—	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	UE (Pre-FS)
Cost of oil used with project	US$, million	—	0.45	0.45	0.45	0.45	0.45	0.10	0.10	0.10	0.10	0.10	0.10	0.10	UE (Pre-FS)

Note: IMF = International Monetary Fund.

[a] Tax rate applicable to the Company is comprised of (a) 8 percent corporate income tax and (b) 8 percent infrastructure development tax, calculated on statutory accounting pretax net income less corporate income tax for the period.

[b] Based on power generation and demand forecast for 2015–2020 provided by the UE; for the remaining duration of the analyzed period electricity demand is assumed to grow at a constant rate of 4.5 percent.

Table 5.6. Calculation of UE's Cost of Capital

Name	Rate	Explanation
Risk free rate (RFR)	2.74%	30-year US treasury yield as of March 14, 2016
Beta	1.0	
Equity risk premium (ERP)	5.72%	Implied equity risk premium estimate for mature equity markets by Aswath Damodaran on March 1, 2016, http://pages.stern.nyu.edu/~adamodar/
Country risk premium (CRP)	8.50%	Estimated as rating-based default spread adjusted for additional equity market volatility; as Uzbekistan has not yet received sovereign credit rating, the long-term credit rating of B2 of the largest state-owned commercial bank in Uzbekistan, National Bank of Uzbekistan, first issued in 2009 [a] and recently confirmed [b] by Moody's, is used as a proxy.
Target debt-to-equity ratio	70:30	The observed average debt-to-equity ratio of 70/30 for utilities in emerging markets in 2015 is used as a proxy.

Tax rate	15.36%	Tax rate applicable to the company is comprised of (a) 8% corporate income tax and (b) 8% infrastructure development tax, calculated on statutory accounting pretax net income less corporate income tax for the period.
Cost of equity	16.96%	RFR + beta * [ERP + CRP]
Cost of debt	12.61%	Weighted average interest rate on foreign currency denominated loans of the UE from local commercial banks as of December 31, 2014
Weighted average cost of capital	**12.56%**	**Cost of capital for UE**

Note:
[a] *Source:* Moody's (https://www.moodys.com/credit-ratings/National-Bank-of-Uzbekistan-credit-rating-806952299)
[b] *Source:* UzReport Information Agency (http://news.uzreport.uz/news_5_e_130519.html)

Table 5.7. Calculation of the Project's Financial Discount Rate

	IBRD (IFL[a] with fixed spread) (%)[b]	**IDA Blend (%)[b]**	**IDA hard-term fixed (%)[b]**	**UE (%)**
Share of project financing	54	23	11	12
Cost of financing	3.10	3.04	2.59	12.56
Financial discount rate	**4.16%**			

Note: [a] IFL =IBRD Flexible Loan. [b] Rates include on-lending surcharge of 20bps by MOF.

Table 5.8. Economic Analysis of the Project

		2015	2016	2017	2018	2019	2020	2021	2026	2031	2036	2041	2046	2050
Economic costs														
Equipment supply costs	US$, million		4.02	16.07	48.21	24.11	24.11							
Installation cost	US$, million		0.70	2.80	8.40	4.20	4.20							
Total economic costs	**US$, million**		**4.72**	**18.87**	**56.61**	**28.31**	**28.31**							
Economic benefits														
Savings from reduction of O&M costs	US$, million		—	—	—	—	—	0.63	0.39	0.60	0.50	0.70	0.39	0.36
Avoided cost of unserved energy	US$, million		—	—	—	—	—	0.0103	0.0146	0.0205	0.0284	0.0390	0.0530	0.0674
Technical loss reduction	US$, million		—	—	—	—	—	18.16	22.65	28.24	35.22	43.91	54.76	65.33
Net GHG emissions	US$, million		—	—	(0.04)	(0.08)	(0.13)	2.96	4.50	6.63	9.55	13.50	18.82	24.35
Total economic benefits without net emissions	**US$, million**		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**18.80**	**23.05**	**28.86**	**35.75**	**44.65**	**55.20**	**65.75**
Total economic benefits with net emissions	**US$, million**		**0.00**	**0.00**	**(0.04)**	**(0.08)**	**(0.13)**	**21.76**	**27.56**	**35.49**	**45.29**	**58.15**	**74.02**	**90.11**
Net economic benefits without net emissions	**US$, million**		**(4.72)**	**(18.87)**	**(56.61)**	**(28.31)**	**(28.31)**	**18.80**	**23.05**	**28.86**	**35.75**	**44.65**	**55.20**	**65.75**
Net economic benefits with net emissions	**US$, million**		**(4.72)**	**(18.87)**	**(56.65)**	**(28.39)**	**(28.44)**	**21.76**	**27.56**	**35.49**	**45.29**	**58.15**	**74.02**	**90.11**
NPV without net emissions	**US$, million**		**65.8**											
NPV with net emissions	**US$, million**		**104.5**											
EIRR without net emissions	**%**		**14.7**											
EIRR with net emissions	**%**		**16.8**											

Table 5.9. Financial Analysis of the Project

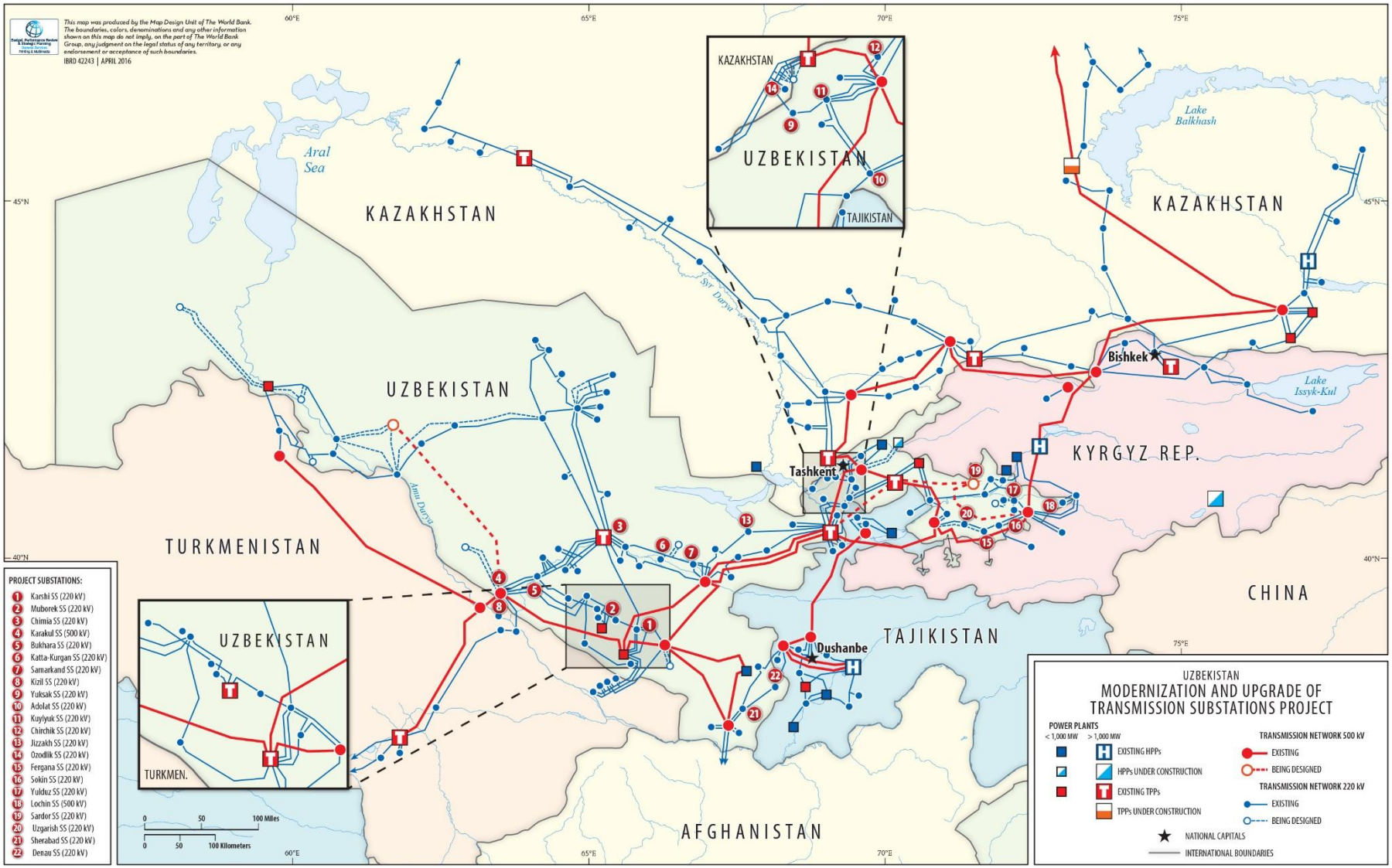
		2015	2016	2017	2018	2019	2020	2021	2026	2031	2036	2041	2046	2050
Financial costs														
Equipment supply costs	US$, million		4.08	16.53	50.33	25.55	25.94							
Installation cost	US$, million		0.70	2.80	8.40	4.20	4.20							
Total financial costs	**US$, million**		**4.78**	**19.33**	**58.73**	**29.75**	**30.14**							
Financial benefits														
Savings from reduction of O&M costs	US$, million		—	—	—	—	—	0.66	0.66	1.63	2.20	4.93	4.42	5.98
Incremental revenue for electricity sales	US$, million		—	—	—	—	—	8.33	16.73	33.59	67.46	135.48	272.08	475.29
Total financial benefits	**US$, million**		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**8.99**	**17.38**	**35.22**	**69.66**	**140.42**	**276.51**	**481.27**
Net financial benefits	**US$, million**		**(4.78)**	**(19.33)**	**(58.73)**	**(29.75)**	**(30.14)**	**8.99**	**17.38**	**35.22**	**69.66**	**140.42**	**276.51**	**481.27**
NPV	**US$, million**		**1,067.6**											
FIRR	**%**		**16.6**											

Table 5.10. UE's Income Statement, 2013–2020 (Base case) UZS million

	2013	2014	2015f	2016f	2017f	2018f	2019f	2020f
Revenue	3,546,861	4,279,368	4,898,628	5,631,231	6,545,298	7,615,122	8,869,816	10,275,537
Cost of sales	(2,947,767)	(3,742,200)	(4,206,805)	(4,833,981)	(5,618,734)	(6,537,493)	(7,614,296)	(8,819,705)
Gross profit	**599,094**	**537,168**	**691,822**	**797,250**	**926,564**	**1,077,629**	**1,255,520**	**1,455,832**
Dividend income	27,723	16,284	—	—	—	—	—	—
Other operating income	30,147	42,956	—	—	—	—	—	—
General and administrative expensive	(207,794)	(94,668)	(104,203)	(115,482)	(129,556)	(146,027)	(165,346)	(186,989)
Operating profit	**449,170**	**501,740**	**587,620**	**681,767**	**797,008**	**931,602**	**1,090,174**	**1,268,843**
Financial income	—	19,443	—	—	—	—	—	—
Financial costs	(220,314)	(284,657)	(615,478)	(472,909)	(531,388)	(547,195)	(556,881)	(551,377)
Profit before income tax	**228,856**	**236,526**	**(27,859)**	**208,858**	**265,619**	**384,407**	**533,294**	**717,466**
Income tax expense	(62,022)	(49,679)	4,279	(32,081)	(40,799)	(59,045)	(81,914)	(110,203)
Net profit	**166,834**	**186,847**	**(23,580)**	**176,777**	**224,820**	**325,362**	**451,380**	**607,263**

Table 5.11. UE's Balance Sheet, 2013–2020 (Base case)

	2013	2014	2015f	2016f	2017f	2018f	2019f	2020f
Assets								
Non-current assets								
Plant, Property and Equipment	397	339	339	339	339	339	339	339
Investments in subsidiaries	2,722,457	3,090,300	3,090,300	3,104,889	3,169,854	3,386,925	3,507,860	3,642,658
Investments in associates	2,594	3,621	3,621	3,621	3,621	3,621	3,621	3,621
Available-for-sale instruments	11,278	13,104	13,104	13,104	13,104	13,104	13,104	13,104
Prepayments to suppliers/contractors	731,487	969,921	969,921	969,921	969,921	969,921	969,921	969,921
Deferred tax asset	34,350	43,860	43,860	43,860	43,860	43,860	43,860	43,860
Trade and other receivable	23,805	124,395	124,395	124,395	124,395	124,395	124,395	124,395
Total non-current assets	**3,526,368**	**4,245,540**	**4,245,540**	**4,260,129**	**4,325,094**	**4,542,165**	**4,663,100**	**4,797,898**
Current assets								
Trade and other receivable	3,228,910	3,531,432	4,042,459	4,647,020	5,401,329	6,284,172	7,319,574	8,479,607
Cash and cash equivalents	3,459	3,018	2,304	7,222	5,672	9,696	20,643	5,266
Restricted cash	116,268	67,211	67,211	67,211	67,211	67,211	67,211	67,211
Prepayments to suppliers	246	1,584	1,584	1,584	1,584	1,584	1,584	1,584
Total current assets	**3,348,883**	**3,603,245**	**4,113,558**	**4,723,037**	**5,475,796**	**6,362,663**	**7,409,012**	**8,553,668**
Total Assets	**6,875,251**	**7,848,785**	**8,359,098**	**8,983,166**	**9,800,890**	**10,904,828**	**12,072,112**	**13,351,566**
Shareholder equity								
Charter capital	413,820	1,250,694	1,250,694	1,250,694	1,250,694	1,250,694	1,250,694	1,250,694
Reserve capital	58,610	58,610	58,610	58,610	58,610	58,610	58,610	58,610
Other reserves	109,177	44,567	44,567	44,567	44,567	44,567	44,567	44,567
Retained earnings	936,341	337,242	313,662	490,440	715,260	1,040,622	1,492,002	2,099,265
Total equity	**1,517,948**	**1,691,113**	**1,667,533**	**1,844,311**	**2,069,131**	**2,394,493**	**2,845,873**	**3,453,136**
Non-current liabilities								
Borrowings	2,640,666	2,945,936	2,762,394	2,630,884	2,542,710	2,557,245	2,414,562	2,260,922
Total non-current liabilities	**2,640,666**	**2,945,936**	**2,762,394**	**2,630,884**	**2,542,710**	**2,557,245**	**2,414,562**	**2,260,922**
Current liabilities								
Borrowings	265,165	609,632	1,039,599	1,230,343	1,425,866	1,621,438	1,813,768	1,893,768
Trade and other payables	2,119,954	2,315,434	2,602,902	2,990,958	3,476,513	4,044,982	4,711,239	5,457,069
Taxes on operable income	105,302	97,158	97,158	97,158	97,158	97,158	97,158	97,158
Other taxes payable	226,216	189,512	189,512	189,512	189,512	189,512	189,512	189,512
Total current liabilities	**2,716,637**	**3,211,736**	**3,929,171**	**4,507,972**	**5,189,049**	**5,953,090**	**6,811,677**	**7,637,507**
Total liabilities	**5,357,303**	**6,157,672**	**6,691,565**	**7,138,855**	**7,731,759**	**8,510,335**	**9,226,239**	**9,898,430**
Total equity and liabilities	**6,875,251**	**7,848,785**	**8,359,098**	**8,983,166**	**9,800,890**	**10,904,828**	**12,072,112**	**13,351,566**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KAZAKHSTAN
UZBEKISTAN
TURKMENISTAN
TAJIKISTAN
KYRGYZ REP.
CHINA
AFGHANISTAN
Aral Sea
Lake Balkhash
Lake Issyk-Kul
Syr Darya
Amu Darya
Tashkent
Bishkek
Dushanbe
TURKMEN.
PROJECT SUBSTATIONS:
1 Karshi SS (220 kV)
2 Muborek SS (220 kV)
3 Chimia SS (220 kV)
4 Karakul SS (500 kV)
5 Bukhara SS (220 kV)
6 Katta-Kurgan SS (220 kV)
7 Samarkand SS (220 kV)
8 Kizil SS (220 kV)
9 Yuksak SS (220 kV)
10 Adolat SS (220 kV)
11 Kuylyuk SS (220 kV)
12 Chirchik SS (220 kV)
13 Jizzakh SS (220 kV)
14 Ozodlik SS (220 kV)
15 Fergana SS (220 kV)
16 Sokin SS (220 kV)
17 Yulduz SS (220 kV)
18 Lochin SS (500 kV)
19 Sardor SS (220 kV)
20 Uzgarish SS (220 kV)
21 Sherabad SS (220 kV)
22 Denau SS (220 kV)
0 50 100 Miles
0 50 100 Kilometers
UZBEKISTAN
MODERNIZATION AND UPGRADE OF TRANSMISSION SUBSTATIONS PROJECT
POWER PLANTS
< 1,000 MW
> 1,000 MW
EXISTING HPPs
HPPs UNDER CONSTRUCTION
EXISTING TPPs
TPPs UNDER CONSTRUCTION
TRANSMISSION NETWORK 500 kV
EXISTING
BEING DESIGNED
TRANSMISSION NETWORK 220 kV
EXISTING
BEING DESIGNED
NATIONAL CAPITALS
INTERNATIONAL BOUNDARIES