OFFICIAL USE ONLY
IDA/R2017-0193/1

May 26, 2017

Closing Date: Thursday, June 15, 2017 at 6 p.m.

FROM: Vice President and Corporate Secretary

Mongolia - Second Energy Sector Project

Project Appraisal Document

Attached is the Project Appraisal Document regarding a proposed IDA credit and a proposed Strategic Climate Fund grant to Mongolia for a Second Energy Sector Project (IDA/R2017-0193), 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

FOR OFFICIAL USE ONLY

Report No: PAD1996

INTERNATIONAL DEVELOPMENT ASSOCIATION

PROJECT APPRAISAL DOCUMENT

ON A PROPOSED IDA CREDIT

IN THE AMOUNT OF SDR 30.70 MILLION
(US$42 MILLION EQUIVALENT)

AND

STRATEGIC CLIMATE FUND GRANT

IN THE AMOUNT OF US$12.4 MILLION

TO

MONGOLIA

FOR THE

SECOND ENERGY SECTOR PROJECT

MAY 24, 2017

Energy & Extractives Global Practice
East Asia and Pacific Region

CURRENCY EQUIVALENTS

(Exchange Rate Effective 04/30/2017)

Currency Unit	=	Mongolian Tugrik (MNT)
US$1	=	MNT 2,411
SDR1	=	US$1.371

FISCAL YEAR
January 1 – December 31

ABBREVIATIONS AND ACRONYMS

ABC	Aerial Bundled Cables
ADB	Asian Development Bank
AMI	Advanced Metering Infrastructure
AMP	Avian Monitoring Program
AMR	Advanced Meter Reading
ASTAE	Asia Sustainable and Alternative Energy Program
AuES	Altai-Uliastai Energy System
BSEDN	Baganuur-Southeastern Region Electricity Distribution Network
CEO	Chief Executive Officer
CES	Central Energy System
CHP	Combined Heat and Power
CO_2	Carbon dioxide
COGS	Cost of Goods Sold
CPS	Country Partnership Strategy
DA	Designated Account
DL	Disbursement Letter
DSA	Debt Sustainability Analysis
EA	Environmental Assessment
EAR	Environmental Assessment Report
EBEDN	Erdenet-Bulgan Electricity Distribution Network
EBRD	European Bank for Reconstruction and Development
ECOP	Environmental Codes of Practice
EES	Eastern Energy System
EIRR	Economic Internal Rate of Return
EMP	Environmental Management Plans
ENPV	Economic Net Present Value
EPC	Engineering Procurement and Construction
ERC	Energy Regulatory Commission
ESMAP	Energy Sector Management Assistance Program
ESMF	Environmental and Social Management Framework
ESP1	Energy Sector Project
FIRR	Financial Internal Rate of Return
FiT	Feed-in Tariff
FMM	Financial Management Manual
FMSB	Financial Management Sector Board
FNPV	Financial Net Present Value
GDP	Gross Domestic Product
GHG	Greenhouse gas
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GoM	Government of Mongolia
GRS	Grievance Redress Service
HDI	Human Development Index
IBRD	International Bank for Reconstruction and Development
ICB	International Competitive Bidding
IDA	International Development Association
IDC	International Development Credit

IFC	International Finance Corporation
IFR	Interim Financial Report
IP	Investment Plan
IPP	Independent Power Producer
IPSAS	International Public Sector Accounting Standards
KfW	Kreditanstalt für Wiederaufbau
LLC	Limited Liability Company
M&E	Monitoring and Evaluation
MEGDT	Ministry of Environment, Green Development and Tourism
mmBTU	Million British Thermal Units
MNT	Mongolian Tughrik
MoE	Ministry of Energy
MoF	Ministry of Finance
MW	Megawatt
MWp	Megawatt peak
NCBs	National Competitive Bidding
NDC	National Dispatch Center
NOx	Nitrogen Oxides
NPTG	National Power Transmission Grid
O&M	Operations and Maintenance
OHL	Overhead lines
PCB	Polychlorinated Biphenyls
PDO	Project Development Objective
PIU	Project Implementation Unit
PMO	Project Management Office
PP	Power Plant
PPA	Power Purchase Agreement
PPP	Purchasing Power Parity
PPP	Public Private Partnership
PPR	Procurement Post Review
PSC	Project Steering Committee
RE	Renewable Energy
REAP	Renewable Energy and Rural Electricity Access Project
RPF	Resettlement Policy Framework
SA	Sub-Account
SAIDI	System Average Interruption Duration Index
SBD	Standard Bidding Document
SCADA	Supervisory Control and Data Acquisition
SCD	Systematic Country Diagnostic
SDG	Sustainable Development Goals
SMEs	Small and Medium Enterprises
SO2	Sulfur Dioxide
SOE	Statement of Expenditure
SOE	State-Owned Enterprises
SOJSC	State-Owned Joint Stock Company
SREP	Scaling-Up Renewable Energy Program
SREP IP	Scaling-Up Renewable Energy Program Investment Plan
SRFP	Standard Request for Proposal
SS	Summary Sheet
STEP	Systematic Tracking of Exchanges in Procurement
TA	Technical Assistance
tCO2e	Tons of CO2 equivalent
TSP	Total Suspended Particulates
UNFCCC	United Nations Framework Convention on Climate Change
WA	Withdrawal Application
WACC	Weighted Average Cost of Capital
WB	World Bank
WBG	World Bank Group
WES	Western Energy System
WRES	Western Region Energy System
WTP	Willingness-to-pay

Regional Vice President:	Victoria Kwakwa
Country Director:	Bert Hofman
Senior Global Practice Director:	Riccardo Puliti
Practice Manager:	Jie Tang
Task Team Leader:	Peter Johansen

Mongolia
Second Energy Sector Project (P152343)

TABLE OF CONTENTS

PAD DATA SHEET

Mongolia

Second Energy Sector Project (P152343)

PROJECT APPRAISAL DOCUMENT

EAST ASIA AND PACIFIC

0000009534

Report No.: PAD1996

Basic Information			
Project ID P152343	EA Category B - Partial Assessment	Team Leader(s) Peter Johansen	
Lending Instrument Investment Project Financing	Fragile and/or Capacity Constraints [ ] Financial Intermediaries [ ] Series of Projects [ ]		
Project Implementation Start Date 15-Jun-2017	Project Implementation End Date 30-Sep-2022		
Expected Effectiveness Date 01-Sep-2017	Expected Closing Date 30-Sep-2022		
Joint IFC No			
Practice Manager/Manager Jie Tang	Senior Global Practice Director Riccardo Puliti	Country Director Bert Hofman	Regional Vice President Victoria Kwakwa

Borrower: Mongolia			
Responsible Agency: Ministry of Energy			
Contact:	Chimeddorj Demchigjav	Title:	Director General
Telephone No.:	n/a	Email:	chdorj@energy.gov.mn

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

Total Project Cost:	55.40	Total Bank Financing:	42.00
Financing Gap:	0.00		

Financing Source	Amount
BORROWER/RECIPIENT	1.00
International Development Association (IDA)	42.00
Strategic Climate Fund Grant	12.40
Total	55.40

Expected Disbursements (in USD Million)

Fiscal Year	2018	2019	2020	2021	2022	2023
Annual	2.00	13.00	13.00	13.00	12.00	2.40
Cumulative	2.00	15.00	28.00	41.00	53.00	55.40

Institutional Data

Practice Area (Lead)

Energy & Extractives

Contributing Practice Areas

Climate Change

Proposed Development Objective(s)

The development objective of the proposed project is to improve reliability and sustainability of electricity services in Mongolia.

Components

Component Name	Cost (USD Millions)
Rehabilitation of Distribution Networks	28.50
Solar Power	24.90
Capacity Building	2.00

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	Moderate
5. Institutional Capacity for Implementation and Sustainability	Low
6. Fiduciary	Moderate
7. Environment and Social	Moderate
8. Stakeholders	Low
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 [ ]	No [X]
Have these been approved by Bank management?	Yes [ ]	No [ ]
Is approval for any policy waiver sought from the Board?	Yes [ ]	No [X]
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
Project Steering Committee	**X**		CONTINUOUS

Description of Covenant

The Recipient shall maintain until the completion of the Project, a Project Steering Committee, to be responsible for providing overall strategic and policy guidance and facilitating coordination among different agencies on Project implementation, with a mandate, composition and terms of reference acceptable to the Association.

Name	Recurrent	Due Date	Frequency
Project Management Office	**X**		CONTINUOUS

Description of Covenant

The Recipient shall maintain, until the completion of the Project, a Project Management Office, to be responsible for Project coordination and supervision of technical and safeguards related aspects of Parts 1 and 2 of the Project, with a mandate, composition and terms of reference acceptable to the Association.

Name	Recurrent	Due Date	Frequency

Project Implementing Units	**X**		CONTINUOUS

Description of Covenant

The Recipient shall cause to be maintained, until the completion of the Project, three Project Implementing Units, each under BSEDN, EBEDN and WES, to be responsible for day-to-day management, implementation, monitoring and reporting of the Project, with a mandate, composition and terms of reference acceptable to the Association.

Name	**Recurrent**	**Due Date**	**Frequency**
Adequate funds and resources	**X**		CONTINUOUS

Description of Covenant

The Recipient shall ensure that each of the Project Steering Committee, the Project Management Office and Project Implementing Unit is provided at all times with adequate funds and other resources and staffed by qualified personnel in adequate numbers as shall be necessary to accomplish the objective of the Project.

Conditions

Source of Fund	**Name**	**Type**
IDA	Subsidiary Agreements	Effectiveness

Description of Condition

The Subsidiary Agreements have been executed on behalf of the Recipient and each of Baganuur-Southeastern Region Electricity Distribution Network (BSEDN), Erdenet-Bulgan Electricity Distribution Network (EBEDN), National Power Transmission Grid (NPTG) and Western Energy System (WES).

Source of Fund	**Name**	**Type**
Strategic Climate Fund	Sub-grant Agreement	Effectiveness

Description of Condition

The Sub-grant Agreements have been executed on behalf of the Recipient and WES.

Team Composition

Bank Staff

Name	**Role**	**Title**	**Specialization**	**Unit**
Peter Johansen	Team Leader (ADM Responsible)	Senior Energy Specialist	power sector	GEE09
Gerelgua Tserendagva	Procurement Specialist (ADM Responsible)	Procurement Specialist	procurement	GGO08
Dulguun Byambatsoo	Financial Management Specialist	Consultant	FM	GGO20
Alejandro Alcala Gerez	Team Member	Senior Counsel	legal	LEGES
Arailym Murat	Team Member	Team Assistant	team assistant	EACMF

Chau-Ching Shen	Team Member	Senior Finance Officer	disbursement	WFALN
Cristina Hernandez	Team Member	Program Assistant	Admin Support	GEE09
Ria Nuri Dharmawan	Team Member	Counsel	legal	LEGES
Roberto La Rocca	Team Member	Energy Specialist	finance	GEE09
Takayuki Doi	Team Member	Sr Power Engineer	power engineering	GEE09
Yun Wu	Team Member	Energy Specialist	economics	GEE09
Zhuo Yu	Team Member	Finance Officer	disbursement	WFALN

Extended Team

Name	Title	Office Phone	Location
Bernard Baratz	Environmental Safeguards	2024732333	
Chrisantha Ratnayake	Power Engineering Consultant		
Reisha Jones	Social Safeguard Specialist	1-7789900681	
Slavena Lyubomirova Georgieva	Energy Consultant		
Yan Li	Financial Analyst		

Locations

Country	First Administrative Division	Location	Planned	Actual	Comments

Consultants (Will be disclosed in the Monthly Operational Summary)

Consultants Required? Consultants will be required

I. STRATEGIC CONTEXT

A. Country Context

1. Mongolia is the 18th largest (around 1.6 million km^2) most sparsely populated country in the world, with a population density of around 1.9 inhabitants per $km^{2.}$. In 2015 Mongolia's population reached about 3 million with an annual growth rate of 2.3 percent. Ulaanbaatar, the capital and largest city, is home to about 46 percent of the country's population. Landlocked, and located in the heart of central Eurasia, it is sunny, arid and cold. Mongolia is among the coldest countries in the world with wintertime temperatures regularly dropping below -30 degrees Celsius.

2. The country hosts enormous mineral resource wealth, estimated at US$1-3 trillion, with coal, copper, and gold being the principal reserves. While the minerals sector provides a relatively small proportion of employment, it is the most significant sector of the economy in terms of production, accounting for 20 percent of total output, and commodities constitute 82 percent of total exports. China is Mongolia's main export destination. Due to a lack of diversification in export products and a heavy reliance on foreign capital inflows to meet its investment needs, Mongolia is susceptible to volatile mineral market cycles.

3. This dependence on extraction and export of natural resources has led to a pronounced cyclicality in economic activity. Between 2010 and 2014, when commodity prices were high, the country experienced strong economic growth and rapidly declining poverty—the poverty rate fell from 38.8 percent in 2010 to 21.6 percent in 2014. Between 2010 and 2014 Mongolia climbed up the Human Development Index (HDI) ranking from 100^{th} to 90^{th} place out of 188 countries and territories, which put the country in the high human development category.

4. With the economic slowdown in China, and falling commodity prices, since 2014 there has been a dramatic decline in Mongolia's growth. The country's Gross Domestic Product (GDP) growth rate dropped from 7.9 percent in 2014 to 2.4 percent in 2015 and slowed to 1.0 percent in 2016. GDP growth is expected to remain stagnant in 2017. In 2018 the mining sector is forecasted to start to pick up mainly driven by a stabilization of the commodity market. The World Bank currently forecasts Mongolia's GDP to bounce back to 1.8 percent in 2018 and to 8.1 percent in 2019. Annual household consumption fell by 8.8 percent in 2016 and the unemployment rate reached 8.6 percent. For these reasons, it is likely that poverty reduction decelerated or reversed in 2016.

B. Sectoral and Institutional Context

5. While more than 90 percent of Mongolian population is estimated to have access to electricity (grid and off-grid), the electricity service is not necessarily reliable or sustainable due to obsoleteness of the energy systems and lack of sufficient supply to meet growing demand. Although demand has been steadily increasing, driven by mining sector-led economic growth and urbanization, the energy production has remained subdued. With a negative reserve margin (estimated at -10 percent), the domestic electricity production and demand gap in Mongolia is met by increased imports contributing 4.7 percent of the total electricity consumption in 2010 but increasing to 20 percent in 2015. Moreover, the obsolete and inefficient

networks have led to significant distribution losses, in many networks exceeding 25 percent, and frequent interruptions, averaging 20 hours per year in some regions. Also, the power system is heavily reliant on coal, comprising 96 percent of the total domestic generation in 2016 with the remainder coming from wind and hydro.

6. The ***electric power network*** of Mongolia comprises five main energy systems. The Central Energy System (CES), is the largest and accounts for over 80 percent of total generation - mainly supplied by Combined Heat and Power (CHP) plants. The available generation capacity is 878 megawatt (MW) and with a total demand 965 gigawatt-hour (GWh) (2015) power imports are crucial to close the gap between domestic demand and supply. The Western Region Energy System (WES) covers three aimags: Bayan Ulgii, Khovd and Uvs and the peak demand is 32 MW but only 12 MW of domestic capacity is available (the Durgun hydropower). In 2015 WES imported 106 GWh of its total energy consumption of 130 GWh (81 percent) from Russia. The three other small energy systems are the Altai-Uliastai Energy System (15 MW installed), the Eastern Energy System (36 MW installed), and the Dalanzadgad Energy System in the South Gobi (24 MW installed).

7. Mongolia's electric power sector has been undergoing a series of reforms aiming to transform the sector into a market oriented system. In 2001, the power sector was unbundled and the Energy Regulatory Commission (ERC) was established to regulate generation, transmission, distribution, dispatch and supply of energy. ERC oversees a single-buyer model in which the National Dispatch Center (NDC) is managing a zero-balance account as it buys electricity at a regulated tariff from six generators and sells it to 12 distribution companies. Mongolia's electricity sector is owned and operated mainly by commercialized state-owned enterprises (SOEs). Independent power producers (IPPs) represent less than 1 percent of total generation capacity (about 1.01 GW) and just recently, in 2013, the first IPP, the Salkhit wind farm was commissioned. Only three of all electricity distribution companies have been privatized; however, recently the government has been considering further privatization of the remaining ones. Although National Power Transmission Grid (NPTG) is the single national transmission company, WES owns and operates its own transmission lines independent from NPTG.

8. To meet the increasing demand for electricity, reduce the country's heavy reliance on coal and improve energy security, ***renewable energy (RE) solutions*** have been explored. Mongolia has abundant solar[1] and wind power resources along with some hydropower opportunities and the Government of Mongolia (GoM) has set the target to increase the share of generation capacity of RE sources to 20 percent by 2023 and to 30 percent by 2030, up from the current 3 percent, and has established Feed-in Tariffs (FiTs) for wind, solar and hydropower. As a result of the generous FiTs[2], a substantial number of licenses with power purchase agreements (PPAs) have been granted to developers of solar power (with a total capacity of 200 MW) and wind power (with a total capacity of 450 MW). Unfortunately, these arrangements were made without proper consideration of the ability of the power grid to absorb this much variable power and without regard to the ability and willingness of electricity consumers to accept the necessary tariff increases.

[1] Mongolia's solar radiation is 1,200 to 1,600 kW/m^2 and the intensity is in the 4.3-4.7 kWh range.

[2] The present FiT for solar is between 15-18 US cents/kWh depending on the size of the installation. Wind FiT is 8-9.5 US cents/kWh. The existing thermal plants generate at around 4-5 US cents/kWh which is also the level of end-user tariffs.

For this reason, the licensed developers have run into difficulties in establishing their plants, leaving most licenses in limbo[3].

9. The government is now considering how to more effectively and efficiently incentivize RE investment. Recent reports of auctioned solar Photo Voltaic (PV) plants that produce power at prices as low as 5-6 US cents/kWh in countries with solar potential similar to Mongolia's have given rise to doubts about the existing FiT model. GoM has thus decided to explore alternative models and in particular to understand the cost implications of solar PV plants that are competitively procured. WES has been chosen as the testbed for the first public solar investment due to its unsustainable dependency on power imports (70 percent of supply), its urgent need for generation expansion and low likelihood to attract private investment due to its remoteness and low overall load. The Scaling up Renewable Energy Program (SREP) Investment Plan (IP) for Mongolia, which was approved in November 2015, includes a US$12.4 million allocation to be managed by the World Bank to support the establishment of a 10 MWp solar PV power plant in the Western Region. It will pave the way for the further expansion of the RE market in Mongolia by demonstrating viability of RE engagements and attracting private sector investments.

10. Across the country, ***distribution network investments*** are lagging behind. More than half of Mongolia's distribution lines were constructed more than 35 years ago and another third were constructed 15-30 years ago. The regional distribution systems have reached their capacity limit and are in critical need for upgrading and capacity expansion. Previously, the distribution networks in nine aimags were improved through rehabilitation and commercialization programs under the first Energy Sector Project (ESP1) financed by the World Bank during 2001-2013. Two companies that were not covered under ESP1, i.e. Baganuur-Southeastern Region Electricity Distribution Network (BSEDN) and Erdenet-Bulgan Electricity Distribution Network (EBEDN) urgently need upgrading and expansion of their power lines, substations and metering systems. Furthermore, the distribution networks and the transmission system operators lack capacity in the areas of system planning and operation modelling, which are essential for managing the system load and reducing system losses.

11. Coordinating with other donor activities and building on the achievements of the ESP1 and ongoing technical assistances, the proposed Project is designed to continue supporting GoM in addressing key bottlenecks in selected distribution companies through upgrades of aging assets, expansion of distribution capacity and the development of RE. Furthermore, it will support Mongolia's Climate Change initiatives toward a low carbon emissions development pathway by harnessing the country's abundant RE resources, contributing to the national long-term target of 30% RE by 2030. Meanwhile, the regulatory support with SREP grant and other trust funded activities linked to the proposed Project is expected to strengthen the regulatory framework to ultimately move towards a more sustainable energy sector development path.

C. Higher Level Objectives to which the Project Contributes

12. The Country Partnership Strategy (CPS) FY13-17 for Mongolia focuses on three areas: (1) Enhance Mongolia's Capacity to Manage the Mining Economy Sustainably and Transparently; (2) Build a Sustained and Diversified Basis for Economic Growth and Employment in Urban and Rural Areas; and (3) Address

[3] A 50 MW wind farm is already in operation and another 50 MW wind farm under construction. For solar only 10 MWp have been constructed.

Vulnerabilities through Improved Access to Services and Better Service Delivery, Safety Net Provision and Improved Disaster Risk Management. The proposed Project would support Area (2) by improving access to and quality of electricity supply to households and businesses to enable economic growth and create job opportunities in urban and rural areas. It also helps to support Area (3) by improving the quality and increasing access to electricity supply in the project area.

13. The Project is also aligned with the World Bank Group's (WBG) Energy Sector Directions Paper, approved in 2013, which pledges to support clients in delivering affordable, reliable, and sustainable energy needed to help achieve the Bank Group's twin goals of eliminating extreme poverty and promoting shared prosperity. This will be achieved through supply side efficiency gains, increased access, and financial performance improvement at distribution companies. Moreover, access to reliable and cost effective energy lies at the core of poverty reduction and shared prosperity. When electricity is affordable, easy to use and provides uninterrupted service, Small and Medium Size Enterprises (SMEs) improve their operational efficiency, earn higher profits and improve the quality of life of people in the community. This impact will be even more prominent in rural Mongolia, where poverty rates are high and infrastructure is obsolete.

14. In its commitment to United Nations Framework Convention on Climate Change (UNFCCC), Mongolia has outlined a series of mitigation policies and measures in the energy, industry, agriculture and waste sectors, and their expected impact will be a 14 percent reduction in total national Greenhouse Gas (GHG) emissions by 2030. The Project will support Mongolia's efforts in not only reaching this target but also meeting Sustainable Development Goal (SDG) 7: Ensure access to affordable, reliable, sustainable and modern energy for all. Expanding energy infrastructure and investing in clean energy sources such as solar in developing countries are crucial goals that both encourage growth and help reduce GHG emissions and mitigate the adverse impact of Climate Change.

15. The proposed project will also contribute to meeting the long-term national development goals for the period of 2016-2040, spelled out by the National Development Institute of Mongolia, in particular priority area 5 'Apply modern technologies and innovations in all sectors and create an adaptive capacity to react to climate change' as well as indirectly improve the efficient use of resources (priority area 1) and strengthen the quality of government institutions, policy and regulations (priority area 3). The Project is well aligned with the State Policy on Energy as it targets the same objectives of encouraging private participation and investment in the energy sector and reducing transmission and distribution losses.

II. PROJECT DEVELOPMENT OBJECTIVES

A. PDO

16. The development objective of the proposed Project is to improve reliability and sustainability of electricity services in Mongolia.

B. Project Beneficiaries

17. The main beneficiaries are grid-connected electricity consumers in the project areas that will be provided with access to reliable and sustainable energy services. The distribution companies, BSEDN and

EBEDN, will benefit from reduced system losses and improved financial performance. The WES is expected to benefit mainly from decreased dependence on imports as well as improved operational efficiency through loss reduction. Investment in solar power is expected to have long-term implications for the country's sustainable development, diversification of generation portfolio and energy security.

C. PDO Level Results Indicators

18. Key expected results from the proposed project are:
(a) Average interruption duration per year in the Project areas (BSEDN and EBEDN)
(b) Generation capacity of renewable energy (other than hydropower) constructed
(c) Generation capacity of renewable energy constructed-solar

19. Further details on the project results framework are provided in Annex 1.

III. PROJECT DESCRIPTION

A. Project Components

20. The Project has been structured to include two groups of subprojects. Group I has already been appraised and subprojects have completed feasibility studies and safeguards assessments. Group II consists of the remaining potential subprojects which will be appraised when the feasibility studies and needed safeguard documents have been prepared. Upon satisfactory appraisal, individual Group II subprojects can be included for financing under the respective components as long as there are sufficient remaining funds. This will ensure flexibility, allowing the easy use of cost savings or shifting of funds between subprojects thereby creating incentives for timely implementation. The proposed Project is comprised of the following three components:

21. **Component 1: Rehabilitation of Distribution Networks (estimated cost: US$28.5 million, of which IDA financing US$28 million and counterpart financing US$0.5 million)**: This component will have three sub-components: 1.1 Rehabilitation of the distribution grid in BSEDN to reduce system losses and improve reliability of and access to electricity services in selected areas of BSEDN; 1.2 Rehabilitation of the distribution grid in EBEDN to reduce system losses and improve reliability of and access to electricity services in selected areas of EBEDN; and 1.3 Provision of support to NPTG for the carrying out of investments in switchgears in the transmission network related to sub-components 1.1 and 1.2, and introduction and installation of planning and management software.

22. The purpose of sub-components 1.1 and 1.2 is to reduce system losses and improve reliability of and access to electricity services in selected parts of the distribution networks through strengthening of power infrastructure of two regional distribution company networks: BSEDN and EBEDN. Investments at primary substations will help increase the capacity for distribution while increasing system reliability. Investments at distribution substations and distribution lines will also help reduce technical losses and improve system reliability. The reduction of technical losses will lead to net GHG emission reductions. The investments in technically proven digital meters such as Advanced Metering Infrastructure (AMI) or Advanced Metering Reading (AMR) are aimed at reducing non-technical losses. The sub-components will

target the key investment needs in major areas of new development as well as areas where distribution overloads are already present or will happen in the very short term given continuous demand growth. Sub-component 1.3 will include investment in switchgears in the transmission network which is related to the subprojects in sub-components 1.1 and 1.2, and introduce planning and management software to the transmission company, NPTG. As such, this sub-component does not address transmission network investments but rather distribution-related investments such as new circuit breakers for the rehabilitated lines in sub-stations that are owned by NPTG.

23. The subprojects are selected based on key parameters, including: (i) technical and economic justification; and (ii) readiness for implementation in terms of environmental and social aspects. Annex 7 includes a list of the subprojects that have already been selected for inclusion in Group I and a list of potential subprojects that have been suggested by BSEDN or EBEDN but have not yet been selected for inclusion under the project.

24. **Component 2: Solar Power (estimated cost US$24.9 million, of which IDA financing US$12 million, SREP grant US$12.4 million and counterpart financing US$0.5 million):** The component will support investments on construction of grid-connected solar PV power generation capacity outside of the CES, including the detailed design, supply, construction, commissioning and operation and maintenance of a 10 megawatt-peak (MWp) solar PV power plant in WES. The purpose of the component is to support upscaling of rural RE by demonstrating the application of solar PV generation in remote areas.

25. Group I includes the investment in a 10 MWp grid connected solar PV power plant in the WES. The sub-component will finance detailed design, supply, construction, commissioning and operation & maintenance of the solar plant which will supply electricity directly to the WES transmission network. The solar PV arrays will be installed near the Myanagad substation in Hovd aimag and will be owned by WES. However, for the first couple of years the supplier will be required to operate and maintain the power plant thereby allowing WES to gain experience with solar power before they take over the operation.

26. Any Group II project will be selected from a list of potential solar PV plants outside the CES and will depend on the availability of funds after financing the 10 MWp Group I subproject. The location of the projects could be out of CES. The budget for the solar power support is likely to be able to finance around 13-17 MWp depending on the cost premium for the remote location and whether it is deemed that battery storage will be advisable in order to avoid curtailment and ensure voltage and frequency stability. Subprojects brought forward for financing will be appraised when feasibility studies and needed safeguard documents have been prepared. The subprojects will be selected based on key parameters, including: (i) remaining funds of the Component and proposed subproject investment cost; (ii) technical and economic justification; and (iii) readiness for implementation in terms of environmental and social aspects. The Group II subprojects will be agreed between the Bank and the GoM.

27. **Component 3: Capacity Building (estimated cost US$2 million, all IDA financing):** This component will provide technical and operational assistance to strengthen the institutional, organizational and technical capacity of the Ministry of Energy (MOE) and the Project Implementing Units (PIUs) under BSEDN, EBEDN and WES, to support day-to-day Project implementation and management, including provision of training and carrying out of studies. The component includes: (1) technical assistance for

project implementation and studies to support project management and implementation; (2) training programs to improve the project management capabilities; and (3) project management cost.

28. Further details on the project description are provided in Annex 2.

B. Project Financing

29. The total estimated project cost is US$55.4 million, of which US$12.4 million will be financed from a grant from SREP through the World Bank, US$42.0 million from an IDA credit and US$1.0 million from counterpart funds. Component 2, Solar Power, is co-financed between the SREP grant and IDA credit. The counterpart funds will be mainly for land acquisitions and salaries of MOE staff seconded to work on this project.

30. Project cost and financing requirements are presented in the table below.

Project Components	Project cost (US$ million)	IDA Financing (US$ million)	SREP Grant (US$ million)	Counterpart financing (US$ million)	Financing (%)
1. Component 1: Rehabilitation of Distribution Networks	28.5	28.0		0.5	98%
3. Component 2: Solar Power	24.9	12.0	12.4	0.5	98%
4. Component 3: Capacity Building	2.0	2.0			100%
Total Costs	**55.4**	**42.0**	**12.4**	**1.0**	
Total Project Costs	55.4	42.0			
Front-End Fees	00.0	00.0			
Total Financing Required	55.4	42.0			

C. Lessons Learned and Reflected in the Project Design

31. The Project has been designed to take into consideration the lessons learned from other relevant Bank projects in Mongolia, particularly through the experience of ESP1, Renewable Energy and Rural Electricity Access Project and Bank's international experience on solar power particularly in Nepal and India.

32. Early capacity building on procurement, disbursements, Monitoring and Evaluation (M&E), and support on environmental safeguards proved to be critical to the success of ESP1. The project management capacity of the local PIUs will need to be built up over time and the central project management should play a key role in monitoring and supervising project implementation and guiding the regional utilities.

33. The practice of providing intensive hand-holding technical trainings and Technical Assistance (TA) proved to be a key factor contributing to ESP1's success. It proved useful to integrate the TA sub-component into each project component and the same design has been built into ESP2. In addition to the technical staff to be employed in PIUs, international technical consultants will be hired to provide continued advisory support to the Project. In particular, for the procurement under the solar component, international experts will be hired for reviewing the draft bidding documents and providing training on solar farm projects.

34. International standard performance for electricity production is expected for solar farms under the Project. The energy output depends upon the Performance Ratio of the solar panels, which is the ratio of the performance under real operational conditions and under laboratory conditions, typically between 75 to 85 percent, and the efficiency of other elements for power conversion, mainly the convertors and transformers. It is difficult for a contractor to guarantee the annual energy outputs while the actual solar radiation and weather conditions for the candidate sites are not available at this stage. Based on international experience, reference data on solar radiation and weather condition will be provided in the bidding documents for all the bidders to offer guaranteed energy outputs for bid evaluation purposes; and contractual energy outputs guaranteed will be based on measured radiation and weather data and installation of instruments for measurements of the data is part of the scope of the Engineering Procurement and Construction (EPC) contract.

35. In addition, the project has been prepared to also include lessons learned from the Bank's global energy practice and experience. Such lessons include selecting investments based on expansion plans that integrate generation and transmission planning, integrating a wide spectrum of demand development scenarios, and selecting investments based on short term analysis to confirm the technical and economic robustness of the investments in the framework of a sector-wide plan. Consistent with international best practice the Project will support investments in additional infrastructure along with introduction of technologies to improve the use and reliability of existing and future assets; thus providing a proper balance between more and better investments.

IV. IMPLEMENTATION

A. Institutional and Implementation Arrangements

36. A Project Steering Committee (PSC) has been established to provide overall strategic and policy guidance and facilitate coordination among different agencies on project implementation. The PSC is chaired by MOE and comprises representatives from MOE, Ministry of Finance (MOF), Ministry of Environment, local government, etc.

37. A Project Management Office (PMO) has already been established within MOE headed by a Project Director – this position is expected to be filled by the Director General of the Energy Policy and Planning Department of MOE. Some of the PMO staff are familiar with Bank-funded projects and have developed internal capacity through the implementation of the ESP1. The PMO has dedicated teams of staff to work on environmental and social safeguards, procurement, financial management and disbursement.

Two technical units of the PMO are responsible for coordinating and supervising technical and safeguards related aspects of Component 1 and 2 (called Technical Unit 1 and 2 respectively) both supported by procurement and financial management staff common for the Project. In addition, separate PIU has been established inside each of the three Project beneficiary institutions (BSEDN, EBEDN, and WES). The PIUs have also assigned staff to be responsible for the social and environmental management for the project. Trainings on procurement, financial management and safeguards are being and will continue to be provided by the Bank to the PMO and PIUs staff throughout preparation and implementation of the Project.

B. Results Monitoring and Evaluation

38. Annex 1 lists the PDO and intermediate level results indicators. The PMO will monitor the overall project implementation against the performance indicators listed in the 'PDO Level Results Indicators' section every six months. The PMO is familiar with M&E procedures, given its experience with ESP1. Data and statistics on actual Project outputs and outcomes will be gathered, analyzed and included in the quarterly progress reports to be submitted to the Bank. The PMO collects inputs from PIUs at least twice a month to reflect implementation progress and outstanding issues. The M&E framework will be monitored and updated in a systematic manner and made available in progress reports and supervision documents by the PMO. Also, a mid-term review of implementation progress is included in the M&E to evaluate achievements and impediments to achieving desired outcomes.

C. Sustainability

39. By establishing a solar PV power plant to increase supply capacity in Mongolia and rehabilitation of regional networks to reduce technical and non-technical losses, the project will provide additional supply to the grid to sustainably meet existing and future demand. Moreover, the RE integrated to the grid for energy consumption will reduce GHG emission by replacing thermal sources, thereby increasing the green sustainability of the power system. The proposed Project is also designed for sustainability by incorporating lessons learned from ESP1 and integrating capacity building aspects. Capacity building support will be provided during the Project preparation and implementation through training, technical assistance, and Bank staff inputs. It is expected that the power system with new/better equipment in place and improvement in staff's operational performance will lead to a higher level of operational sustainability. Also, the proposed Project will improve the financial performance of EBEDN, BSEDN and WES to improve their financial sustainability through (i) reduced both technical and non-technical losses, and resulted reduction in power import; and (ii) increased revenue from power sales.

V. KEY RISKS

A. Overall Risk Rating and Explanation of Key Risks

40. The overall risk rating for the Project is Moderate. Project risks have been assessed during preparation. Mitigation measures during preparation has included training in Bank procedures for PMO and PIU staff and management, complemented by advisory support from external consultants. The risks rated as Significant are the political, governance and macroeconomic risks. The Political and Governance risks

are mitigated by frequent consultations and communication with technical counterparts, political decision makers, and other stakeholders. To mitigate the macroeconomic risk, the Bank together with other development partners provides continuous advice to the government on restoring stability of the economy and monitoring of the macroeconomic developments, thus assisting with mitigation efforts.

41. A description of the risks rated Moderate or higher is as follows:

(a) Political and Governance: The risk is rated Substantial. Changes in the Administration following the Parliamentary election in June 2016 and upcoming Presidential election in June 2017 can potentially cause delays in the project implementation in the near term. The WBG has timely informed the new Governments of previous analytical and advisory work and recommendations. Moreover, the WBG country team continues to engage in various good governance, transparency and oversight initiatives at the national level and support to the anti-corruption institutions, and in detailed anti-corruption action plans at the project level.

(b) Macroeconomic: The risk is rated Substantial. Mongolia's economic outlook is dependent on global macroeconomic factors, in particular commodity prices. It is in great need of a broad and strategic development plan within affordable fiscal planning, which is yet to be further developed. The WBG has been and will continue engaging with the authorities on proper economic policies to restore stability of the economy and establishing more efficient and fiscally sustainable investment planning system through economic reports and various technical assistance work.

(c) Sector Strategies and Policies: Inadequate tariff policy and chronic sector debt could affect the financial performance of distribution and transmission companies, preventing them from providing timely resources and in the long run affecting their financial capacity to manage or operate sustainably. Moderate risks still exist on the Government's commitment to undertake market-based reforms.

(d) Technical Design of Project or Program: Given the increased complexity of the systems operation, particularly related to the integration of the solar plant, the lack of basic tools and the limited capacity in WES, there is risk related to technical aspects of the operation's design. Nevertheless, Mongolia is not new to solar power plants. The domestic and international lessons and experiences will be applied to the Project. Also, a local technical expert who managed the first solar PV plant in Mongolia is hired to provide advisory support to the Project. Therefore, the risk of technical design is rated Moderate.

(e) Fiduciary: The new implementing units at the distribution companies that have no experience with Bank projects. Low capacity and lack of coordination across departments and inexperience with Bank projects within the two distribution companies can also cause delays. However, PMO is staffed with people who are familiar with Bank projects and have gained experience through implementation ESP1. They have started to provide hands-on capacity building to the PIU staff. To mitigate these risks, capacity building through customized training and technical assistance is a central element of this Project, and strong project supervision also

is important. Also, the PMO will continue to directly provide intensive support to the PIUs. Therefore, the risk is rated as Moderate.

(f) Environment and Social: The risk is rated Moderate. The Project is Category "B" and is not expected to have any significant social and environmental issues. For Component 1, there may be instances where land is purchased through the open market, voluntary donated or involuntarily acquired for small scale works. Although the land requirement is very low, some land will be required which could potentially cause implementation delays. Component 2 will require both land and water for the solar plants leading to potential environmental issues. All these potential issues are considered minor, of limited extent and duration and reversible. Furthermore, mitigation of these issues is simple, with minimal or no costs and included in the safeguard documents.

VI. APPRAISAL SUMMARY

A. Economic and Financial (if applicable) Analysis

Economic analysis

42. A cost-benefit analysis was carried out on the Project level for: (i) the distribution investments in the service areas of EBEDN and BSEDN; and (ii) a 10 MWp solar PV plant in the WES. The Project costs comprise of investments and on-going operations and maintenance (O&M).

43. The economic benefits of the distribution investments will be derived from: (i) reductions in technical losses, and (ii) improvement in system reliability in the service areas of EBEDN and BSEDN. Moreover, the investments will also generate global environmental benefit in terms of avoided GHG emissions.

44. With a discount rate of 6.0 percent[4], the Project distribution investments in the service areas of EBEDN and BSEDN in combination are expected to generate an economic net present value (ENPV) of US$13.3 million with an economic internal rate of return (EIRR) of 10.4%. For the EBEDN network, the investments are expected to generate an ENPV of US$5.2 million with an EIRR of 9.2%; for the BSEDN network, the investment is expected to generate an ENPV of US$8.1 million with an EIRR of 12.0%. Moreover, the Project investment in the 10 MWp solar PV plant in WES is expected to generate an ENPV of US$1.7 million with an estimated EIRR of 6.9%.

	Distribution component			**10 MWp Solar PV**
	EBEDN	BSEDN	Combined	
ENPV @ 6.0%	US$5.2 million	US$8.1 million	US$13.3 million	US$1.7 million
EIRR	9.2%	12.0%	10.4%	6.9%

[4] Source: Discounting Costs and Benefits in Economic Analysis of World Bank Projects, OPSPQ, 2016

Financial analysis

45. The financial benefits of the Project investments will be derived from (i) reduced both technical and non-technical losses, and resulted reduction in power import; and (ii) increased revenue from power sales.

46. With a Weighted Average Cost of Capital (WACC) of 2.5%, the Project distribution investments in the service in service areas of EBEDN and BSEDN in combination are expected to generate a financial net present value (FNPV) of US$103.8 million with a financial internal rate of return (FIRR) of 27.5%. For the EBEDN network, the investments are expected to generate an FNPV of US$38.0 million with an FIRR of 15.4%; for the BSEDN network, the investment is expected to generate an FNPV of US$65.8 million with an FIRR of 28.9%. Moreover, with a WACC of 1.25%, the Project investment in the 10 MWp solar PV plant in WES is expected to generate an FNPV of US$11.68 million with an estimated FIRR of 10.0%.

	Distribution component @ 2.5% WACC			**10 MWp**
	EBEDN	BSEDN	Combined	**Solar PV @ 1.25% WACC**
FNPV	US$38.0 million	US$65.8 million	US$103.8 million	US$11.68 million
FIRR	15.4%	28.9%	27.5%	10.0%

47. Sensitivity analysis suggests that (i) the economic viability of the investment in the solar PV component is sensitive to variations in costs due to the low cost of substituted power supply from neighboring country. The investment in the component will break even economically with a 10% cost overrun; (ii) thanks to the SREP grant, the financial viability of the solar component stands robust to withstand up to 92% cost overrun. Without the SREP grant, the FIRR of the component would decrease from 10.0% to 4.3%; the FNPV would decrease from US$11.68 million to US$4.28 million; and the levelized cost of supply at the end-user level would increase from 5.4 US cent/kWh to 8.6 US cent/kWh.

B. Technical

48. The Group I projects will include (i) rehabilitation of distribution networks in two BSEDN aimags (Baganuur and Govi-Sumber); (ii) rehabilitation of distribution networks in two EBEDN aimags (Bulgan and Arkhangai); (iii) expansion of a 35kv substation in Erdenent (EBEDN); (iv) installation of switchgear with vacuum and gas circuit breaker in selected NPTG 35 kV substation; (v) procurement of system planning software for BSEDN and EBEDN; and (vi) 10 MWp solar PV power plant in WES.

49. ***Distribution networks.*** BSEDN and EBEDN planning approaches and methodologies were reviewed during preparation and found acceptable. BSEDN and EBEDN are both experienced at implementing the type of investments included in the Project and familiar with the technologies employed. The proposed ***investments*** are technically justified with obsolete infrastructure being replaced by modern, yet proven technologies: Wooden poles will be replaced by concrete poles, exposed conductors will be replaced by tamper and weatherproof Aerial Bundled Cables (ABC) wires, unprecise mechanical meters will be replaced by technically proven digital meters with suitable functionality and advanced (two-way communication) metering infrastructure will be applied to areas where cost efficiency can be achieved. This approach is similar to the one successfully applied under ESP1.

50. ***Transmission company***. The vacuum and gas circuit breakers proposed by NPTG are conventional technologies and can be installed with little technical risk. The system planning software is an extension of software that NPTG already has installed and the software provision will come linked to an extensive training and capacity building program to ensure its proper use.

51. ***The Solar PV power generation*** technology proposed to be installed in WES is mature technology that is already widely used for utility scale solar projects worldwide. The use of off-the-shelf products is expected to generate sufficient competition among suppliers to obtain good quality at competitive costs. The evacuation plan of solar power through a short 110 kV cable was reviewed and found acceptable. Detailed designs, civil works, equipment supply and installations, and commissioning will be carried out by an international EPC Contractor.

C. Financial Management

52. The project implementing agency, MOE is responsible for the overall project oversight and a Project Steering Committee (PSC) has been established. The PMO has been established under the PSC to carry out day-to-day implementation of the Project. The Bank loan proceeds, including overseeing the Designated Accounts (DA), will be managed by the PMO. Therefore, the financial management (FM) capacity assessment was conducted by the Bank at the MOE and actions to strengthen its project financial management capacity have been identified. The FM assessment has concluded that with the implementation of these proposed actions, the FM arrangements will satisfy the Bank's requirements under OP/BP 10.00. Annex 4 of the Project Appraisal Document (PAD) provides additional information on FM.

D. Procurement

53. The Project implementing agency is the MOE and it was agreed that MOE will be carrying out procurement activities with the support of a PMO which has been established specifically for this Project. The PMO is a working unit without any independent legal status and reports to MOE. Consequently, the procurement documents and contracts is the responsibility of and signed by MOE. The PMO staff members are not considered as civil servants. They are hired as consultants by the government and financed by this Project. The PMO coordinate and execute the procurement activities of this Project, which include drafting bidding documents, request proposals, requests for expression of interest and bid evaluation reports, and monitoring and updating the procurement plans, among other procurement related works. The PMO relies on technical inputs from staff in different departments of MOE, technical units and the Project beneficiary institutions such as BSEDN, EBEDN and etc.

54. MOE has extensive experience in implementing various donor funded projects including World Bank financed projects. The same implementation arrangement has been adopted for carrying out procurement activities of those donor financed projects. A dedicated PMO has been setting up for undertaking the procurement following the different procedures established by the respective donor agencies. Procurement for the proposed Project would be carried out in accordance with the World Bank's "Guidelines: Procurement of Goods, Works, and Non-Consulting Services under International Bank for Reconstruction and Development (IBRD) Loans and IDA Credits & Grants by World Bank Borrowers"

dated July 2014 and "Guidelines: Selection and Employment of Consultants under IBRD Loans and IDA Credits & Grants by World Bank Borrowers" dated July 2014, and the provisions stipulated in the legal agreements.

55. An assessment of the capacity of MOE to implement procurement actions for the Project has been carried out in October 2016. A summary of the procurement capacity assessment, Project procurement arrangements and the procurement plan for the first 18 months of implementation are provided in Annex 3.

E. Social (including Safeguards)

56. The proposed Project has an Environmental and Social Management Framework (ESMF) covering social issues related to *Involuntary Resettlement OP/BP 4.12 and Physical Cultural Resources OP/BP 4.11*. OP/BP 4.12 is triggered in the event that improvements to the distribution system are installed on land that is not already within the established right of way, existing footprint or government land. As sites and any impacts on populations are yet to be finalized, a Resettlement Policy Framework (RPF) has been prepared by the Borrower. Public consultation on the RPF relative to Component 1 was conducted on the 19th and 23rd of September, 2016 together with the ESMF in Baganuur and Erdenet cities. Three possible sites for the Component 2 solar plant were identified, all on state land. Due diligence confirmed that no persons were living or using the land formally or informally at the selected site at Hovd Aimag, next to Mayangad soum centre. An RPF has also been prepared for Component 2, given the potential for solar plant development after appraisal. Public consultation for the RPF relative to Component 2 was conducted in Hovd Aimag together with the ESMF on December 2, 2016. The RPF as part of the ESMF was disclosed to the public and the Infoshop in Ulaanbaatar on February 1, 2017. The proposed Project triggers *Physical Cultural Resources OP/BP 4.11*, as there is a chance that these resources could be accidently uncovered during the course of civil works hence this policy is triggered. The proposed Project does not trigger *Indigenous Peoples OP/BP 4.10*. With the exception of the predominantly Muslim and linguistically differentiated Kazakhs in western Mongolia, and traditionally nomadic reindeer herding Tsaatan peoples in the north, Mongolia's ethnic groups are not considered to be economically, socially or legally marginalized or otherwise disadvantaged. The Project will not cover those areas populated by either the Kazakh or Tsaatan, nor will it include areas populated by the Uyghurs, Uzbeks, Urianhais and Hotons (and Tuvinians), and the Evenk who speak a Tungusic language. Further details on social aspects–including safeguards- are provided in Annex 4.

57. **Citizen Engagement:** The key mechanism for citizen engagement will be site-specific consultations. Public consultations have been held during Project preparation in various locations and with invitations extended to the community with special focus on women, vulnerable groups, schools and small business owners, in order to have broad discussions on energy issues in the community, the costs and benefits of the Project, opportunities for ensuring the Project provides benefits across the community; and potential social risks from the Project are avoided or mitigated.

58. **Gender:** The Project will provide more sustainable and reliable electricity service to consumers, including female households. It will also ensure the inclusion of women in any trainings and the number will be reported during project implementation. Therefore, the proposed Project will be gender informed through the analysis of relevant information such as the social assessment and consultations, and formulation and monitoring of appropriate actions.

F. Environment (including Safeguards)

59. The proposed Project is in compliance with environmental requirements of the GoM and World Bank environmental safeguard policies. Accordingly, the Project has been assigned Environmental Assessment (EA) Category "B" for both Components 1 and 2 since all subproject investments are anticipated to have impacts that are minor, of limited duration and areal extent and are reversible. Furthermore, mitigating measures for both component subprojects are standard, with minor or no costs, and readily implementable.

Component 1 (Rehabilitation of Distribution Networks)

60. For the different types of subproject investments identified prior to Project Board approval, a series of generic Environmental Codes of Practice (ECOPs), one for each type of subproject investment, were prepared by the Borrower. For subproject investments that will be identified during Project implementation an ESMF acceptable to the Bank covering environmental issues related to *Environmental Assessment OP/BP 4.01, and Natural Habitats OP/BP 4.04* has been prepared by the Borrower. The ESMF includes in Annex 4, the series of ECOPs which are to be used as necessary for subprojects subsequently identified during implementation.

61. The Project will involve rehabilitation and/or replacement of several substation transformers, or oil filled circuit breakers, some of which may contain or be contaminated with polychlorinated biphenyls (PCBs). PCBs are considered hazardous materials and require specialized analytical equipment to establish their presence as well as special techniques for their management and disposal. Extensive borrower analytic data of transformer and circuit breaker fluids reviewed by the Team indicated that the many existing pieces of equipment tested from both distribution companies did not contain PCBs at all or in quantities considered insignificant by both Mongolian and international standards. However, if it is determined that there is a significant presence of PCBs in some of the older electrical equipment that is to be replaced (e.g. transformers, circuit breakers etc.), management of this material will require special considerations which will be included in the site specific ECOPs related to those subproject investments. For subprojects to be identified during project implementation management of PCBs are included in the ESMF. The ECOPs and/or ESMF also includes requirements prohibiting all new electrical equipment (transformers, switches, capacitors etc.) from containing PCBs. The ECOPs and ESMF also includes specific guidance on the management (handling, transport, and disposal/recycle/reuse) of wooden poles treated with creosote that are to be removed or replaced; and on the waste management issue related to replacement of numerous electrical meters.

62. The proposed Project also triggers *Natural Habitats OP/BP 4.04* and due diligence measures are specified in the appropriate ECOP and ESMF to ensure that: (a) no investments are made which involve significant conversion of critical natural habitats; or (b) acceptable mitigation measures are in place for those investments likely to affect noncritical natural habitats. Environmental management measures would be included in the site specific ECOP for subproject investments likely to occur in these areas. Further details on environment including safeguards are provided in Annex 4.

63. Public consultations for the ECOPs and the ESMF were conducted by BSEDN and EBEDN on the 19th and 23rd of September, 2016 in Baganuur and Erdenet cities. The documents were discussed with provincial (aimag) and local (soum) government officials during the consultations. Mongolian language versions of both the ECOPs and the ESMF were publicly disclosed on February 1, 2017 via BSEDN and EBEDN offices and on their websites and offices. English language versions of the ECOPs and the ESMF were disclosed at the World Bank Office in Ulaanbaatar on February 1, 2017.

Component 2 (Solar Power)

64. An Environmental and Social Impact Assessment (ESIA) was prepared by the Borrower to evaluate three alternative sites for the proposed 10 MWp solar PV plant. The ESIA examined several environmental factors including: critical and natural habitats, forested areas, current and future land use, water availability, and proximity to infrastructure and cultural resources. As a result of this analysis, a site near the Myanagad substation in Hovd aimag was selected. The proposed site is not forested, but approval from the Ministry of Environment, Green Development and Tourism (MEGDT), Director of Forest Policy and Coordination would be required. Also, due diligence for this site will require clearance from the MEGDT Department of Environment and Natural Resources Management who will ensure that: (a) the investment will not involve significant conversion of critical natural habitats; and (b) acceptable mitigation measures are included for approval of the site to ensure no impacts on non-critical natural habitats.

65. The ESIA contained a detailed Environmental Management Plan (EMP) for the construction, operation and decommissioning phases of the Project. Key environmental and due diligence issues addressed in the EMP included, dust, noise, land clearance, water pollution, waste management, and worker safety during construction, water use, ecological impacts on migratory species (land and air) and ground nesting patterns of the Mongolian Ground Jay[5] during operation and waste disposal and land restoration during decommissioning.

66. For the selected site at Mayangad, officials in the governors' office asserted the abundance of groundwater resources in the area. However, no detailed data was obtained verifying these assertions. As an element of subproject design, the World Bank will conduct a due diligence effort to collect this data. If unsuccessful, the World Bank would take necessary measures and undertake a program to collect well yield data during Project design.

67. To minimize potential issues with the Mongolian Ground Jay and other species of avifauna, the project sponsor will engage a local bird expert during design/prior to construction to:

- survey proposed solar plant site prior to construction and as necessary recommend micro-modifications to site location to avoid/minimize nesting areas;
- identify nesting period of Mongolian Ground Jay and assist in designing a construction schedule to avoid this period;

[5] According to BirdLife International the Mongolian Ground Jay is categorized as "Least Concern". These species have a wide range of habitation: approximately 2, 310,000 square kilometers covering Mongolia, Kazakhstan, and China. The project would occupy approximately 40 ha or 40,000 square meters as an upper bound: a miniscule portion of this species range.

- assure that panel design elevation is sufficient to minimize disturbance to brush areas used for nesting by Mongolian Ground Jay;
- work with NGOs (e.g. IUCN, BirdLife International, Wildlife Science and Conservation Centre of Mongolia) to prepare an Avian Monitoring Program (AMP) for migratory birds and ground nesters during construction and operation phases;
- determine migratory bird patterns to aid in decision regarding placement of transmission line above ground (with avian diverters) or underground; and
- assure that solar panel tilt for maximum solar efficiency will be adequate to minimize bird collision risk.

68. For the remaining potential subprojects of investments on solar PV plants, an ESMF was prepared by the Borrower. The ESMF addresses site selection factors similar to those addressed in the ESIA, namely, critical and natural habitats, forested areas, current and future land use, water availability, and proximity to cultural resources and the generic EMP included in the solar ESMF addresses the same due diligence and environmental issues discussed in the ESIA.

69. Public consultations for the ESIA and the ESMF were conducted by WES on December 2, 2016 in Hovd Aimag, Mayangad soum centre. Discussions on the documents were held with local (soum) and provincial (aimag) government, and ministry officials at this time. The Mongolian language versions of ECOPs were publicly disclosed on February 1, 2017 on their websites and offices and English language versions through Infoshop on February 1, 2017. At the recommendation of Regional Safeguards Specialist, the ESMF for Component 1 was combined with the ESMF for Component 2 into a single Combined ESMF document.

G. World Bank Grievance Redress

70. Communities and individuals who believe that they are adversely affected by a 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 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

Country: Mongolia

Project Name: Second Energy Sector Project (P152343)

Results Framework

Project Development Objectives

PDO Statement

The development objective of the proposed Project is to improve reliability and sustainability of electricity services in Mongolia.

These results are at | Project Level

Project Development Objective Indicators

		Cumulative Target Values					
Indicator Name	Baseline	YR1	YR2	YR3	YR4	YR5	End Target
Average interruption duration per year in the Project area - BSEDN (Minutes)	809	809	809	755	701	647	647
Generation Capacity of Renewable Energy (other than hydropower) constructed (Megawatt) - (Core)	0	0	10	10	10	10	10
Generation Capacity of Renewable Energy Constructed-Solar (Megawatt - Sub-Type: Breakdown) - (Core)	0	0	10	10	10	10	10
Average interruption duration per year in the Project area - EBEDN (Minutes)	1,200	1,200	1,200	1,120	1,040	960	960

Intermediate Results Indicators

		Cumulative Target Values					
Indicator Name	Baseline	YR1	YR2	YR3	YR4	YR5	End Target
Length of distribution line rehabilitated and/or constructed - BSEDN (Kilometers)	0	0	95	190	290	290	290
Length of distribution line rehabilitated and/or constructed - EBEDN (Kilometers)	0	0	200	410	623	623	623
Estimated GHG emission reduction (Tones/year)	0	0	0	13,498	35,021	65,355	65,355
Number of single phase meters installed - BSEDN (Number)	0	0	8,000	16,000	24,215	24,215	24,215
Number of single phase meters installed - EBEDN (Number)	0	0	12,500	25,000	38,086	38,086	38,086
People provided with access to electricity under the Project by household connection (Number)	0	0	0	66,265	111,555	161,280	161,280
Additional electricity supplied in Project area - BSEDN (MWh/year)	0	0	0	9,014	27,943	57,760	57,760
Additional electricity supplied in Project area - EBEDN (MWh/year)	0	0	0	7,455	23,111	47,769	47,769
Generated solar energy under the Project (Gigawatt-hour (GWh))	0	0	0	14	28	42	42
Installation of the planning and management software (Text)	none	none	completed	completed	completed	completed	completed
Training man days (Days)	0	50	100	150	200	250	300
Training man days of women (Days - Sub-Type: Breakdown)	0	25	50	75	100	125	150

Distribution loss in the Project area - BSEDN (Percentage)	25.70	25.70	25.70	22.10	18.50	15.00	15.00
Distribution loss in the Project area - EBEDN (Percentage)	21.80	21.80	21.80	19.00	16.20	13.40	13.40

Indicator Description

Project Development Objective Indicators

Indicator Name	Description (indicator definition etc.)	Frequency	Data Source / Methodology	Responsibility for Data Collection
Average interruption duration per year in the Project area - BSEDN	System Average Interruption Duration Index (SAIDI) is the average outage duration for each customer served. SAIDI will be calculated by: the sum of all customers interruption duration (hours) divided by the total number of customers served. The baseline is the actual average outage duration for each customer served in the Project area at the beginning of the Project	semi annual	Utility statistics; progress report	BSEDN and PMO
Generation Capacity of Renewable Energy (other than hydropower) constructed	This measures the capacity of RE (other than hydropower) constructed under the Project. The Task Team Leader (TTL) should specify the type of RE (i) wind; (ii) geothermal; (iv) solar; or (iv) other. For hydropower refer to code Hydropower (LH). The baseline value for this indicator will be zero.	semi-annual	Utility statistics; progress report	PMO
Generation Capacity of Renewable Energy constructed-Solar	No description provided.	No description provided.	No description provided.	No description provided.
Average interruption duration per year in the Project area - EBEDN	SAIDI is the average outage duration for each customer served. SAIDI will be calculated by: the sum of all customers interruption duration (hours) divided by the total number of customers served. The baseline is the actual average outage duration for each customer served in the Project area at the beginning of the Project	semi annual	Utility statistics; progress report	EBEDN and PMO

Intermediate Results Indicators

Indicator Name	Description (indicator definition etc.)	Frequency	Data Source / Methodology	Responsibility for Data Collection
Length of distribution line rehabilitated and/or constructed - BSEDN	This indicator measures the length of distribution lines rehabilitated and/or constructed in the Project area serviced by BSEDN.	semi-annual	Utility statistics; progress report	BSEDN
Length of distribution line rehabilitated and/or constructed - EBEDN	This indicator measures the length of distribution lines rehabilitated and/or constructed in the Project area by EBEDN	semi-annual	Utility statistics; progress report	EBEDN, PMO
Estimated GHG emission reduction	This indicator measures metric tons of avoided Carbon dioxide (CO2) emissions by the rehabilitated distribution networks and constructed RE-Solar.	semi annual	Utility statistics; progress report	WES, PMO
Number of single phase meters installed - BSEDN	This indicator measures the number of single phase meters installed under this Project by BSEDN.	semi-annual	Utility statistics; progress report	BSEDN, PMO
Number of single phase meters installed - EBEDN	This indicator measures the number of single phase meters installed under this Project by EBEDN.	semi-annual	Utility statistics; progress report	EBEDN, PMO
People provided with new or improved electricity service	This indicator measures the number of grid-connected electricity consumers in the project areas with new or improved connection as a result of the constructed RE-Solar.	semi-annual	Utility statistics; progress report	PMO
Additional electricity supplied in Project area – BSEDN	This indicator measures the additional electricity (MWh) supplied to end-consumers by BSEDN.	semi-annual	Utility statistics; progress report	BSEDN, PMO
Additional electricity supplied in Project area – EBEDN	This indicator measures the additional electricity (MWh) supplied to end-consumers by EBEDN.	semi-annual	Utility statistics; progress report	EBEDN, PMO

Generated solar energy under the Project	Solar energy generated under the Project	Semi-annual	Utility statistics; progress report	PMO
Training man-days	This indicator measures the man days of training conducted under this Project related to capacity building component	semi-annual	Utility statistics; progress report	PMO
Training man-days of women	This indicator measures the man days of training provided to women under this Project related to capacity building component	semi-annual	Utility statistics; progress report	PMO
Distribution loss in the Project area - BSEDN	This indicator measures the system loss in electricity supplied by BSEDN.	semi-annual	Utility statistics; progress report	BSEDN, PMO
Distribution loss in the Project area - EBEDN	This indicator measures the system loss in electricity supplied by EBEDN.	semi-annual	Utility statistics; progress report	EBEDN, PMO

Annex 2: Detailed Project Description

Mongolia**:** *Second Energy Sector Project (P152343)*

1. The development objective of the proposed project is to improve reliability and sustainability of electricity services in Mongolia.

2. The proposed project is envisioned to consist of three components as described below A. Rehabilitation of Distribution Networks; B. Solar Power and C. Capacity Building.

3. **Component 1. Rehabilitation of Distribution Networks:** (1.1) Rehabilitation of the distribution grid in BSEDN to reduce system losses and improve reliability of and access to electricity services in selected areas of BSEDN. (1.2) Rehabilitation of the distribution grid in EBEDN to reduce system losses and improve reliability of and access to electricity services in selected areas of EBEDN. (1.3) Provision of support to NPTG for the carrying out of investments in switchgears in the transmission network related to Components 1 (1) and (2), and introduction and installation of planning and management software.

4. The purpose of sub-components 1.1 and 1.2 is to reduce system losses and improve reliability of and access to electricity services in selected parts of the distribution networks through strengthening of power infrastructure of two regional distribution company networks: BSEDN and EBEDN. Investments at primary substations will help increase the capacity while increasing system reliability. Investments at distribution substations and distribution lines will reduce technical losses and improve system reliability. The investments in technically proven digital meters (AMI or AMR) are aimed at reducing non-technical losses. The sub-components will target the key investment needs in major areas of new development as well as areas where distribution overloads are already present or will happen in the very short term given continuous demand growth. Sub-component 1.3) will also invest in switchgears in the transmission network which is related to the subprojects in sub-components 1.1 and 1.2, and introduce planning and management software to the transmission company, NPTG. As such, this sub-component does not address transmission network investments but rather distribution-related investments such as new circuit breakers for the rehabilitated lines in sub-stations that are owned by NPTG.

5. The subprojects are selected based on key parameters, including: (i) technical and economic justification; and (ii) readiness for implementation in terms of environmental and social aspects. Annex 7 includes a list of the subprojects that have already been selected for inclusion in Group I and a list of potential subprojects that have been suggested by BSEDN or EBEDN but have not yet been selected for inclusion under the project.

Energy System	Installed capacity	Sector	Company name
UB	915 MW	Energy generation	CHP2 State-Owned Joint Stock Company (SOJSC)
		Energy generation	CHP3 SOJSC
		Energy generation	CHP4 SOJSC
		Energy generation	Nalaikh HS SOJSC
		Power transmission and imports	NETransNetwork SOJSC
		Power distribution and sales	UB EDN SOJSC
		Power distribution and sales	Nolgo LLC
		Power distribution and sales	Erchim Suljee LLC
		Power distribution and sales	JV UB Railway
CES	76.8 MW	Energy generation	Darkhan CHP SOJSC
		Energy generation	Erdenet CHP SOJSC
		Energy generation	Baganuur HS SOJSC
		Power distribution and sales	Darkhan-Selenge EDN SC
		Power distribution and sales	Erdenet-Bulgan EDN SOJSC
		Power distribution and sales	Baganuur and South East Regional EDN SOJSC
		Power distribution and sales	Bayankhongor Erchim EDC LLC
		Power distribution and sales	Khuvsgul Erchim LLC
		Power distribution and sales	Erdenet-Amidral LLC
WES	32 MW	Power transmission and imports	Western Region Energy System (WRES) SOJSC
AuES	15 MW	Power distribution and sales	Altai Uliastai ES SOJSC
EES	63 MW	Energy generation	EES SOJSC
		Power distribution and sales	
Dalanzadgad	5 MW	Energy generation	Dalanzadgad SOJSC
		Power distribution and sales	

6. **Components 1.1 and 1.2.** More than half of Mongolia's distribution lines (35, 10 and 6 kV lines) have been built 35-50 years ago, another 36.4 percent are 15-30 years old and merely 16.6 percent have been upgraded or built between 2005 and 2010. The poor shape of the distribution infrastructure can be also seen in the aging substations where around one third of the 35/10-6, 6-10 kV transformers are 35-50 years old and another third was installed 15-30 years ago. Sub-components 1.1 and 1.2 will include the rehabilitation, upgrade and expansion of selected existing substations and associated lines, construction of new substations and distribution lines and installation of advanced metering infrastructure. Investments in distribution substations and distribution lines will reduce technical losses and improve system reliability.

7. BSEDN distributes and supplies electricity to a total of 46,568 customers in the Baganuur District close to Ulaanbaatar and the vast majority of the customers are residential households with a small portion of SMEs, industrial consumers and mines. The company is experiencing high system losses and capacity

constraints due to increased demand and failing equipment. Out of the 3,000 requests (mainly SMEs) for new connections in Year 2015 only 10 percent could be accommodated.

8. EBEDN faces similar challenges. The company serves 65,400 customers and the majority of residential customers live in ger (traditional tent) areas, where most residents are poor. The fast expansion of ger areas and increase in the unit household consumption are posing great challenges to the distribution company with aging equipment, limited system capacity and low staff capacity. In 2015, of all applicants for new connections (mainly newcomers settling into ger areas), only 5 percent were provided connection. The company managed to turn around from loss to profit in 2015 through implementing a number of loss reduction measures including cable upgrading and metering programs. However, there remains immediate need for investment in rehabilitation and grid expansion in order to meet the rapid demand growth and improve service reliability.

9. BSEDN and EBEDN have identified a list of investments needed for immediate rehabilitation and expansion to be financed under the proposed project. The Energy and Economics Research Institute, contracted by the distribution companies, completed prefeasibility studies and stocktaking reports of the prospective investments. Through these investments, the companies expect to expand their distribution capacity to be able to accommodate increasing demand. It has been estimated that these investments will lead to a reduction in losses in the range of 5-10 percent by 2020, increased capacity to accommodate unmet demand, and improved system reliability.

10. **Sub-component 1.3** will invest in switchgears in the transmission network which is related to the subprojects in Component 1.1 and 1.2. A software provision would further support the better corporate and operations management of the transmission company NPTG. This component has the objective to reduce transmission losses and improve the efficiency of the transmission network and capacity of NPTG in planning and operations. NPTG was one of the beneficiaries under ESP1 as well, from which it acquired system planning software to help improve its planning and management capacity. The company has already completed a rehabilitation plan and has started upgrading its aging equipment inventory including installation of switchgears with vacuum and gas circuit breakers, in order to expand its capacity. A main priority for NPTG will be to build capacity to better manage the system. It has been assessed that the vacuum and gas circuit breakers selected by NPTG are conventional technologies and can be installed with little technical risk.

11. **Component 2: Solar Power:** Construction of grid-connected solar PV power generation capacity outside of the central energy system, including the detailed design, supply, construction, commissioning and operation and maintenance of a 10 megawatt solar PV power plant in WES.

12. Group I includes the investment in a 10 MWp grid connected solar photovoltaic power plant in the Western Energy System (WES). The sub-component will finance detailed design, supply, construction, commissioning and operation & maintenance of the solar plant which will supply electricity directly to the WES transmission network. The solar PV arrays will be installed near the Myanagad substation in Hovd aimag and will be owned by WES. However, for the first 5 years the supplier will be required to operate and maintain the power plant thereby allowing WES to gain experience with solar power before they take over the operation.

13. Any Group II project will be selected from a list of potential solar PV plants outside the CES and will depend on the availability of funds after financing the 10 MWp Group I subproject. The location of the projects could be out of CES. The budget for the solar power support is likely to be able to finance around 13-17 MWp depending on the cost premium for the remote location and whether it is deemed that battery storage will be advisable in order to avoid curtailment and ensure voltage and frequency stability. Subprojects brought forward for financing will be appraised when feasibility studies and needed safeguard documents have been prepared. The subprojects will be selected based on key parameters, including: (i) remaining funds of the Component and proposed subproject investment cost; (ii) technical and economic justification; and (iii) readiness for implementation in terms of environmental and social aspects. The Group II subprojects will be agreed between the Bank and the GoM.

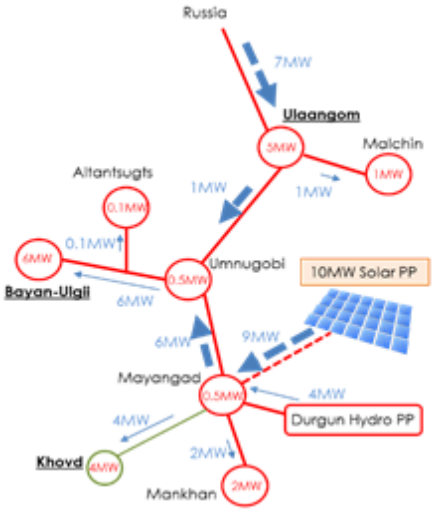
14. WES main grid is interconnected to the Russian Power System and is heavily dependent on imported electricity. In 2015, the peak demand was 32 MW, total energy consumption 143 GWh and a large part of it was imported from Russia (106 GWh). Apart from imports, the other main power source the region is Durgun Hydro Power Plant (PP) in Khovd province and in 2015 it generated 39 GWh electricity. In the past five years, the electrical energy demand has increased by approximately 11 percent annually. Since there has not been any increase in domestic generation, the share of imports from Russia has increased from 63 percent to 73 percent.

Figure 1. Western Energy System

15. Solar PV is also expected to bring employment opportunities. WES is the poorest region in Mongolia with 26 percent poverty headcount rate as of 2014[6]. Given that the region is characterized by high unemployment rate and the main livelihood of the local people is hunting and fishing, the construction and maintenance of a PV plant is expected to generate jobs and economic benefits for the local population. Making WES more independent of imported power is also a hedge against future tariff hikes if the present export price (which is around USc5/kWh and thereby low by international standards) were to increase.

[6] The World bank Group, Mongolia Economic Update, November 2015, p.45

Figure 2. Load flow after 10 MWp Solar integration



16. A site has been identified for the 10 MWp Group I solar PV power plant near the Myanagad substation in Hovd aimag, managed by WES. In order to make sure that the selection of subproject site was well informed regarding potential environmental impacts of the different options, a total of three sites shortlisted by WES in consultation with MOE were screened for environmental and social impacts. Among these three sites, the Myanagad site was considered to be preferable because: (i) it is the closest to the Durgun hydro power plant which will allow for a proper coordination in the process of electricity dispatching, (ii) this site makes it possible to interconnect the solar power plant to the existing Myanagad substation with short distance underground cables thereby eliminating bird collision risk caused by overhead transmission lines, and (iii) it has smaller potential impacts on local fauna than the alternative sites.

17. Visit to the the Mayangad substation (110 kV class) has confirmed that there is enough space for the interconnection facilities including switchyard. No critical hurdles regarding the subproject's interconnection to the Mayangad substation have been found. During project implementation WES will need to monitor the status of other generation projects planned for the WES system and prepare the dispatching coordination rules with the Durgun Hydro PP and such additional projects to prevent unnecessary water spill from the Durgun reservoir.

18. The budget for solar PV (US$ 24.4 million) will likely be sufficient to finance another solar PV plan outside the CES system. How much will be remaining after financing the Mayangad 10 MWp project is uncertain. Based on international grid connected PV projects in similar circumstances the project team estimates that the remaining allocation will be sufficient to finance another solar plant in the size of 3 to 7 MWp. The potential second sub-component under Component B will be included in Group 2 with final decision to be made between MOE and the Bank during project implementation.

Figure 3. The Mayangad substation and a main transformer in the substation

19. Several critical challenges would arise from integration of further renewable power into the WES grid, mainly related to the limited suitable interconnection points, high-voltage problems at several nodes and absence of SCADA or similar centralized control system. Because some of the 110 kV transmission

lines in WES consist of a single circuit and have limited transmission capacity, the technically suitable interconnection points could be limited. It may be necessary to upgrade the power grid and/or install battery storage in order to mitigate this constraint. Another issue is the need to curtail the solar PV production in situations where generation outstrips demand – for instance during the sunny weekends in the summer time.

20. WES does not have an integrated centralized control system such as SCADA which constrains the ability to monitor and control operations in real time. Currently, WES has only two power sources and manages dispatching by using a landline phone to communicate with the Russian system operator, Durgun Hydro PP and each substation.

21. **Component 3: Capacity Building:** Provision of technical and operational assistance to strengthen the institutional, organizational and technical capacity of the Ministry of Energy and the Project Implementing Units under BSEDN, EBEDN and WES, to support day-to-day Project implementation and management, including provision of training and carrying out of studies. The component includes: (1) technical assistance for project implementation and studies to support project management and implementation; (2) training programs to improve the project management capabilities; and (3) project management cost.

22. Sub-components (2) and (3) target some of the key issues that BNEDN, EBEDN and WES have been experiencing. In the past years, the distribution companies have been operationally inefficient mainly due to poor management and operation practices. A major obstacle is the lack of clear division in responsibilities between distribution and supply operations as well as in management roles as guidelines and communications procedures have not been developed. Both companies recognize the importance of developing standards to improve customer service and detailed procedures for sales operations that would improve efficiency.

23. Another critical hurdle has been continuous financial losses and cash flow unpredictability. High operating expenses and the unavailability of modern advanced payment forms for energy payment estimation are some of the reasons behind this problem. Moreover, the companies' internal control systems are weak and there is no established methodology for risk mitigation and internal auditing improvement. To address these challenges, the companies need to reduce personnel expense, accelerate collection efforts and conduct operational restructuring which involves close examination and optimization of the people, processes, and procedures. In this way, the financial management and operational restructuring can help cut costs, increase revenues and boost productivity.

24. To be able to conduct these reforms and to operate as commercial power companies, it is required to strengthen the technical, financial and management capacity of the companies. This can be achieved through intensive and continuous capacity building activities which proved to be a main success factor of ESP1. In this manner financial and operational management of the companies will be enhanced.

25. The proposed project will also support international and local consulting services, foreign and local training, and study tours to facilitate knowledge transfer from international and regional best practices and examples and promote learnings.

26. Previously, the World Bank Group has been supporting the GoM through a number of engagements focused on grid and off-grid power sector development. In addition to the above mentioned ESP1 the Bank supported a very successful government-led solar electrification program through the Renewable Energy and REAP, which achieved a significant increase of the herder population's access to reliable electricity services by disseminating solar home systems. IFC has supported the Salkhit wind farm through investments in the parent company. Going forward, a number of new technical assistance (TA) engagements are being planned: (i) the Scaling-up Renewable Energy in Low-income Countries Programme Investment Plan (SREP IP) includes US$1.2 million TA support to strengthen RE regulations and build capacity of key stakeholders, including Ministry of Energy (MOE), NDC and ERC, and (ii) the Energy Sector Management Assistance Program (ESMAP) is considering funding TA to assess the feasibility of large-scale RE integration and support to efficient heating solutions for Ulaanbaatar.

27. There are other donors/partners actively engaged in Mongolia's energy sector, including the European Bank for Reconstruction and Development (EBRD), the Asian Development Bank (ADB), Kreditanstalt für Wiederaufbau (KfW), and the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ). In particular, ADB is working with the government to prepare for the other RE plants as identified in the SREP IP (a 10 MWp solar PV plant, a 5 MW wind farm and a 1 MW hydropower plant). EBRD was involved in the financing of the 50 MW wind farm in Salkhit and is also financing a second 50 MW wind farm in Tsetsii. KfW is considering a loan to upgrade Mongolia's transmission network and GIZ is providing technical assistance to ERC and NDC. The team is in close coordination with these development partners to seek synergies and avoid overlapping.

Annex 3: Procurement Plan (IDA)

Date: March 20, 2017

I. GENERAL

Project information: Mongolia, Second Energy Sector Project (P152343)

Project Implementation agency: Ministry of Energy

1. **Bank's approval Date of the procurement Plan:** TBD
2. **Date of General Procurement Notice**: TBD
3. **Period covered by this procurement plan**: July 2017 - December 2018
4. **All figures in USD**

I. Goods and Works and non-consulting services.

1. Prior Review Threshold:

Procurement Methods		Threshold	Prior Review Threshold
Goods	International Competitive Bidding (ICB)	>US$1000,000	All contracts awarded on ICB basis, first 2 NCB contracts irrespective of value and all contracts >=US$500,000 are subject to prior review. All other contracts are subject to post review.
	National Competitive Bidding (NCB)	>US$100,000	
	Shopping	<US$100,000	
Works	International Competitive Bidding (ICB)	>US$5000,000	All contracts awarded on ICB basis, first 2 NCB works contracts irrespective of value and all contracts >= US$500,000 are subject to prior review. All other contracts are subject to post review.
	National Competitive Bidding (NCB)	<US$5000,000	
	Shopping	>US$200,000	

2. Pre-qualification: Applicable

3. Proposed Procedures for CDD Components: Not applicable

4. **Reference to (if any) Project Operational/Procurement Manual:** Guidelines: Procurement under IBRD Loans and IDA credits by World Bank, January 2011;

5. **Any Other Special Procurement Arrangements**: Not applicable

6. **Procurement Packages with Methods and Time Schedule**

1	2	3	4	5	6	7	8	9	10	11
Ref. No.	**Contract (Description)**	**Estimated Cost (USD 000)**	**Procurement Method**	**Pre-qualification (yes/no)**	**Domestic Preference (yes/no)**	**Review by Bank (Prior / Post)**	**Expected Bid-Opening Date**	**Contract award**	**Contract completion**	**Source of fund**
A. **Rehabilitation of Distribution Networks**										
A-1	Rehabilitation of 137.8 km 0.4 kV overhead lines (OHLs) in Bulgan aimag center	2,000	NCB	No	No	Prior	Jul 2017		Dec 2019	IDA
A-2	Rehabilitation of 90.5 km 0.4 kV and 0.847 km 10kV OHLs in Arkhangai aimag center	1,600	NCB	No	No	Prior	Jul 2017		Dec 2019	IDA
A-3	Rehabilitation of 35/6-10 kV Substations "Umnud" in Erdenet city	1,700	NCB	No	No	Prior	Jul 2017		Dec 2019	IDA
A-4	Rehabilitation of 45.3 km 0.4 kV OHLs and 34.8 km 0.4-10 kV cable lines in Baganuur district, 3 new substations 6-10/0.4 kV	1,800	NCB	No	No	Prior	Jul 2017		Dec 2019	IDA
A-5	Rehabilitation of 25.1 km 0.4 kV OHLs and 6.0 km 0.4-10kV cable lines in Sumber soum of Gobisumber aimag center, 4 new substations 6-10/0.4 kV	1,800	NCB	No	No	Prior	Jul 2017			IDA
A-6	Installation of 14 switchgears with	200	NCB	No	No	Post	Aug 2017			IDA

	vacuum circuit breaker in "Baganuur" branch									
A-7	Installation of 29 switchgears with vacuum circuit breaker in "Khangai" branch. 4 of them are 35 kV switchgears, 25 of them 6/10 kV switchgears	400	NCB	No	No	Post	Aug 2017			IDA
A-8	Software development for power system analysis and planning	200		No	No	Post	Jul 2017			IDA
A-9	Single and three phase smart meters, and connect it to existing automated billing system	5,700	ICB	No	No	Prior	Sep 2017			IDA
B. Solar Plant										
B-1	10 MWp solar power plant, Mayangad	16,300	ICB	No	No	Prior	Oct 2017			SREP
C. Capacity Building										
C-1	PIU office equipment	50	Shopping	No	No	Post	Aug 2017			IDA
C-2	Vehicle for PIU	50	Shopping	No	No	Post	Aug 2017			IDA

II. Selection of Consultants

1. **Prior Review Threshold**: Selection decisions subject to Prior Review by Bank as stated in Appendix 1 to the Guidelines Selection and Employment of Consultants:

Consulting services	**Quality- and Cost- Based Selection (QCBS)**	US$ 300,000	First contract for each selection method and all contracts >=USD 100,000 for consultant services provided by firms are subject to prior review.
	Quality-Based Selection (QBS)	Assignments meeting the requirements of Article 3.2 of the Consultant Guidelines	
	Selection Based on Consultants' Qualifications (CQS)	<US$300,000	

	Single-Source Selection (SSS)	Assignments meeting the requirements of Article 3.8 of the Consultant Guidelines	All contracts >= US$ 20,000 awarded on SSS basis are subject to prior review.
	Least-Cost Selection (LCS)	Assignments meeting the requirements of Article 3.6 of Consultant Guidelines	
	Selection of Individual Consultants (IC)	Assignments meeting the requirements of Articles 5.1 and 5.6 of the Bank Guidelines	

2. **Short list comprising entirely of national consultants**: Short list of consultants for services, estimated to cost less than $ 100.000 equivalent per contract may comprise entirely of national consultants in accordance with the provisions of paragraph 2.7 of the Consultant Guidelines.
3. **Any Other Special Selection Arrangements:** Not applicable
4. **Consultancy Assignments with Selection Methods and Time Schedule**

1	2	3	4	5	6	7	8	9
Ref. No.	**Description of Assignment**	**Estimated Cost**	**Selection Method**	**Review by Bank (Prior / Post)**	**Expected Proposals Submission date**	**Comments/ contract award**	**Contract completion**	**Source of fund**
A. Consulting service								
C-1	Building capacity on procurement, financial management and safeguards	200	CQS	Prior	Nov 2017			IDA
C-2	Project management	400	IC	Prior	Aug 2017			IDA
C-3	Technical assistance on drawings	400	CQS	Prior	Aug 2017			IDA
	Total	**1,000**						

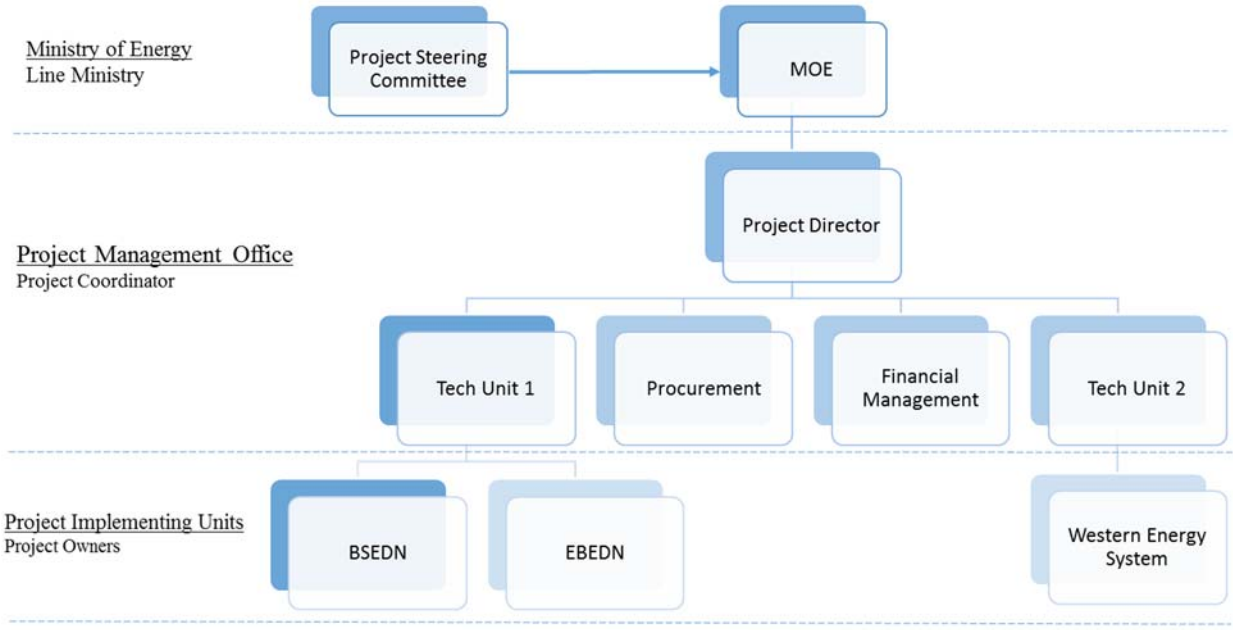
Annex 4: Implementation Arrangements

Mongolia**:** *Second Energy Sector Project (P152343)*

Project Institutional and Implementation Arrangements

1. A PSC has been established to provide overall strategic and policy guidance and facilitate coordination among different agencies on project implementation. It will be chaired by MOE and will comprise representatives from MOE, MOF, Ministry of Environment, local government, etc.

2. A PMO has been established within MOE headed by a Project Director – this position has been filled by the Director General of the Energy Policy and Planning Department of MOE. Some of the PMO staff are familiar with Bank-funded projects and have developed internal capacity through the implementation of the ESP1. The PMO has dedicated teams of staff to work on environmental and social safeguards, procurement, financial management and disbursement. Two technical units of the PMO are responsible for coordinating and supervising technical and safeguards related aspects of Component 1 and 2 (called Technical Unit 1 and 2 respectively) both supported by procurement and financial management staff common for the project. In addition, separate Project Implementation Units (PIU) have been established inside each of the three Project beneficiary institutions (BSEDN, EBEDN, and WES) including staff responsible for the social and environmental management for the project. Training on procurement, financial management and safeguards will be provided by the Bank to the PMO and PIUs staff throughout preparation and implementation. All fiduciary responsibilities rest with the PMO.



3. Notwithstanding the familiarity with Bank-funded projects, the PMO is expected to hire technical consultants to assist with drawings for distribution investments under Component 1, as well as environmental and social safeguards consultants to assist with conducting due safeguards assessment and consultations, and preparing safeguards instruments.

Financial Management and Disbursements

Introduction/Summary

4. The FM team has conducted an assessment of the adequacy of the project financial management system for the ESP2. The assessment, based on guidelines issued by the Financial Management Sector Board (FMSB) on March 1, 2010, concluded that the Project will meet the Bank financial management requirements, as stipulated in BP/OP 10.00. In the FM team's opinion, the Project will have financial management arrangements acceptable to the Bank and, as part of the overall arrangements that the Borrower will put in place for implementing the operation, provide reasonable assurance that the proceeds of the credit from the IDA and the grant from the SREP will be used for the purposes for which the credit and grant are provided.

5. Financial management risk is the risk that the credit and grant proceeds will not be used for the purposes intended and is a combination of country, sector, and project-specific risk factors. However, the FM capacity assessment did not identify major risks associated with the proposed implementation arrangements as the implementing agency, MOE, has extensive knowledge and experience with regards to managing the Bank funded project. The PMO will be newly established with qualified staff, including financial staff that shall be appointed early enough to benefit from the Bank's financial management and disbursement policies and practices training and participate in the preparation of the Financial Management Manual (FMM).

6. Overall, the residual FM risk for the Project is assessed as **Moderate.**

Weaknesses and Action Plan

7. The following plan of actions has been identified to address FM weaknesses:

Significant weaknesses	Actions	Responsible Person	Completion Date
Project FM officer lack experience and knowledge of Bank operations.	- An FMM should be prepared to lay out details of the project financial management procedures e.g. chart of accounts, including account description and Interim Financial Reports (IFRs) formats. - The appointed finance officer will attend the Bank's disbursement training.	MOE/PMO	Prior to project effectiveness Prior to project effectiveness
Readiness of the project's accounting system	- Design manual accounting registers to manually record project transactions during the initial months;	MOE/PMO	Prior to project effectiveness

	- Select, implement and test an accounting and financial reporting system.		Within three months after the project effectiveness
Readiness of the project's financial reporting arrangements	IFRs formats need to be agreed.	MOE/PMO	Prior to project effectiveness

Disbursement and Funds Flow Arrangements

8. Four disbursement methods: advance, reimbursement, direct payment, and special commitment, will be available for the project. The primary methods of disbursement for the project will be advance and reimbursement. Supporting documents for the Bank disbursements will be the withdrawal applications (WAs), statements of expenditures (SOEs) or records like contracts and invoices. The detailed requirements will be laid out in the project Disbursement Letters (DLs) to be issued by the Bank.

9. Segregated US$ DAs will be opened by the PMO for the credit and the grant at a commercial bank, on terms and conditions satisfactory to the Bank, including appropriate protection against set off, seizure and attachments. The PMO will be directly responsible for the management, maintenance and reconciliation of the DAs activities of the project. The ceiling of the DAs will be discussed and agreed between the Bank and the recipient and will be specified in the DLs.

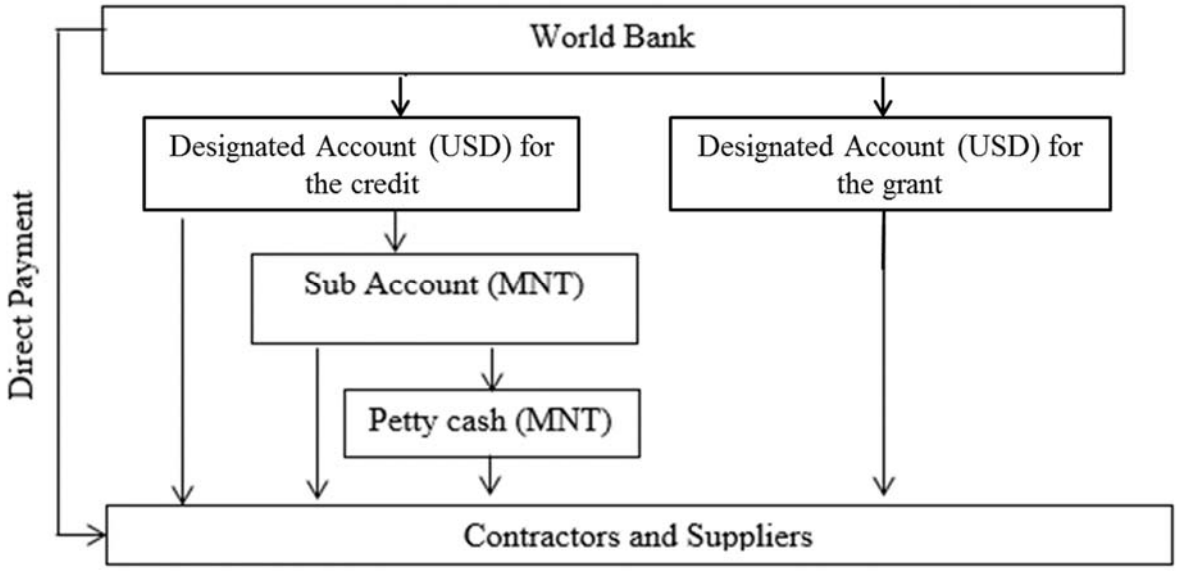
10. The credit and grant proceeds will flow from the Bank to the DAs and will be disbursed against eligible project expenditures upon appropriate approvals from the authorized representatives from MOF and MOE/PMO, respectively. Counterpart funds of US$1 million will be mainly for land acquisitions and salaries of MOE staff seconded to work on this project.

11. Further advances will be made from the DA for the credit to a sub-account (SA) which will be maintained in Mongolian Tugug at the same commercial bank as the DAs. The SA will be opened and managed by the PMO and the ceiling of the SA will also be stipulated in the Disbursement Letter. The SA will be used to pay small expenditures relating to the PMO incremental operating costs only. These small expenditures will include, *inter alia*, utilities, communications, vehicle repairs, salaries of PMO staff and local training costs. Payments from the SA are usually approved by the authorized representative from the MOE/PMO. Specific Project payment approval policies will be documented in the FMM. The ceiling of the SA will be discussed and agreed between the Bank and the recipient and will be specified in the DL for the credit.

12. The PMO can manage a petty cash up to the ceiling to be approved under the project's internal control procedures. The PMO will be responsible for conducting regular reconciliation of the DA for the credit, SA and petty cash balances.

13. The Bank-financed projects may be transferred into the Treasury single account system within the Government Financial Management Information System. If/when such arrangement is confirmed, the DAs' arrangements described in the DLs will be revised accordingly.

14. The following chart shows the general flow of funds for the project as previously described:



15. The PMO will be directly responsible for the management, maintenance, reconciliations of the DAs, SA and cash transactions and will prepare the withdrawal applications. The withdrawal applications submitted to the Bank will be signed off by the authorized representatives from the MOE/PMO and MOF.

16. Supporting documents mentioned above shall be made available for review by the Bank's supervision missions, external auditors, public internal auditors, and other relevant local inspections. If the auditors or the Bank find disbursements that are not justified by supporting documentation or made for ineligible expenditures, the Bank may take actions in line with related policies.

17. The project proceeds will be disbursed against eligible expenditures according to the following table: Part 2 of the Project is jointly financed by IDA Credit and SCR-SREP Grant at 100%, inclusive of taxes. However, specific financing percentage for Part 2 by IDA Credit and SCR-SREP Grant in a given time period of the Project will be agreed to between the Recipient and the Association.

Category	Amount of Credit (USD)	Amount of Grant (USD)	Percentage of Expenditures to be Financed (inclusive of Taxes)
(1) Goods, works, non-consulting services, consultants' services, Training and Incremental Operating Costs for Parts 1 and 3 of the Project	30,000,000		100%
(2) Goods, works, non-consulting services, and consultants' services for Part 2 of the Project	12,000,000		100%

(3) Goods, works, non-consulting services, and consultants' services for Part 2 of the Project		12,400,000	100%
TOTAL AMOUNT	42,000,000	12,400,000	

Budgeting

18. The PMO will prepare a project annual and quarterly budget/disbursement. The annual budget/disbursement plan will be discussed and approved by the PSC and the Bank and reflected in the appropriate part of the state budget.

19. The PMO will conduct regular variance analyses and report the results in the IFRs during project implementation to explain reasons for significant differences between planned and actual expenditures, and aid management in taking the necessary corrective actions.

Accounting and Financial Reporting

20. The project accounting will follow the Government's accounting framework which is based on International Public Sector Accounting Standards (IPSAS). IPSAS was adopted by Mongolia in 2003. The government is still in the process of implementing full IPSAS.

21. The PMO will set up the project accounting and reporting using a commercially available computerized accounting software package. Prior to the purchase and implementation of the accounting software, the project will maintain manual accounting records and financial reporting using MS Excel. Implementation of the accounting software is expected within three months after effectiveness. The FM team will plan a supervision mission shortly after the implementation to ensure its readiness to be used by the Project. Manual accounting and financial reporting during the startup phase of the project are deemed reasonable as the project disbursement is expected to start gradually.

22. The project financial statements shall include the following in addition to the local reporting requirements:

- Statement of Cash Receipts and Payments by the Project Category
- Statement of Sources and Uses of Funds by Project Components;
- Statement of Implementation of Credit and Grants Proceeds;
- Statements of Designated Accounts for the Credit and Grant; and
- Notes to the financial statements

23. The PMO will prepare IFRs, inclusive of the above reports, on a quarterly basis, directly from the accounting software and submit the reports to the Bank for review within 45 days after the end of each calendar quarter.

24. The annual financial statements will be audited and consolidated into the consolidated financial statements of the energy sector.

25. The Bank task team will monitor the project's accounting and financial reporting processes during the project implementation to ensure complete and accurate financial information is available to the relevant project stakeholders in a timely manner.

Internal Control

26. To facilitate adequate internal control practices, an FMM will be developed that lays out procedures related to proper authorization for payment requests, segregation of duties, and other internal control procedures and practices relating to Project financial management. The procedures identified in the FMM will have to be closely followed by all the parties involved in the project implementation. In addition, regular oversight by the PSC, periodic supervision missions by the Bank's task team, annual financial audits by independent external auditors, and reports of public internal auditors will serve as mechanisms for ensuring the project financial management systems function effectively.

Audit Arrangements

27. The Bank requires the project financial statements to be audited in accordance with auditing standards acceptable to the Bank. Accordingly, similar to other Bank-financed projects in Mongolia, the Mongolian National Audit Office will appoint an independent external auditor acceptable to the Bank to conduct an annual audit of the project accounts in accordance with International Standards on Auditing and under terms of reference satisfactory to the Bank. The annual project audits will be financed from the credit and grant proceeds.

28. The auditors will: (a) express an opinion on the project financial statements; (b) determine whether the DAs have (i) been correctly accounted for, and (ii) been used in accordance with the legal agreement; and (c) determine adequacy of the supporting documents and controls surrounding the use of SOEs as the basis for disbursement. The auditors will also furnish a separate Management Letter, which will: (a) identify significant weaknesses in accounting and internal control as well as asset management; (b) report on the degree of compliance with financial covenants of the Financing Agreement, and (c) communicate matters that have come to the attention of the auditors which might have a significant impact on the implementation of the project.

29. The MOE will submit the annual audit report on the project financial statements to the Association within 6 months after the end of the reporting date (June 30 of each calendar year). This requirement is stipulated in the Financing Agreement.

Risk Assessment and Mitigation

30. The following risks with the corresponding mitigating measures have been identified during the assessment:

Risk	Risk Rating	Risk Mitigating Measures Incorporated into Project Design	Risk Rating After Mitigating Measures	Completion Date
Inherent Risk				

• Country Level Potential changes to take effect in the financial management arrangements for Bank-financed operations in the country: Moving the project accounts into the Treasury Single Account within the Government Financial Management Information System in accordance with the Integrated Budget Law.	High	*The Bank's FM team will work closely with the relevant departments at MOF regarding the potential transfer of project funds into the Treasury and will be consulted on the related implications of the transfer on the projects' financial management arrangements.*	High	
• Entity Level Readiness of the entity implementing the project: Although the MOE implemented a previous Bank-funded project through the dedicated PSC and PMO, their operations discontinued upon completion of the project in 2013.	Substantial	MOE will be responsible for overall project implementation and management through the PSC which has been established.	Moderate	
• Project Level Readiness of the project's financial management arrangements:	Substantial	PMO has been established with key staff under the MOE to effectively carry out daily activities of the project. A qualified Project financial officer has been recruited and will take roles in the FM readiness matters including preparation of the FMM.	Moderate	
Control Risk				
• Budgeting Poor budgeting: The project funds not used for the intended purposes due to poor budgeting and budget controls. The project funds may not be spent in	Substantial	*A budget covering the entire implementation period of the project with annual and quarterly breakdowns will be prepared and approved by the relevant project authorities.*	Moderate	

accordance with the project budget.		*The PMO shall conduct variances between actual vs. planned expenses of the project regularly and communicate the issues with large discrepancies with the task team for action taking.*		
• Accounting Reliability of the accounting system: There is a risk associating with selection of the software and its suitability and reliability for the project accounting.	Substantial	*The PMO will work closely with potential software vendors and the Bank on identifying the most appropriate accounting software the project and making sure to meet specific requirements of the project.* *Prior to purchasing and functioning of the accounting software, manual accounting records, as a temporary arrangement, will be maintained in the beginning of the project.*	Moderate	
• Internal Control Weak internal controls: There are not yet established financial management policies and procedures appropriate for the project.	High	The FMM will be prepared by the MOE/PMO and agreed with the Bank. The internal control procedures will be designed for the project and documented in the project FMM which will include but not be limited to the following: - Proper authorization and approval procedures for payments; - Appropriate segregation of duties and job description for each PMO staff; - Bank's no objection for significant project activities; - Control mechanism for accounting and reporting;	Substantial	Prior to project effectiveness

		-Regular bank reconciliation and periodic cash count; -Suitable filing documentation procedures for relevant documents;		
• Funds Flow Delays and bottlenecks in the project's funds flow.	Substantial	*Straightforward disbursement and funds flow arrangements will be applied to the grant. Designated accounts for the project will be opened with a bank acceptable to the Bank.* The project's finance officer will attend the Bank's disbursement training.	Moderate	. Prior to project effectiveness
• Financial Reporting Reliability and timeliness of financial reporting: The format of the financial reports does not include the project specific lines.	Substantial	The project will adopt financial reports which satisfy the Bank's reporting requirement. *IFRs will be prepared and submitted to the Bank for review on a quarterly basis as specified in the legal agreement.* *The IFRs will be generated from the software to be purchased.*	Moderate	Prior to project effectiveness
• Auditing Audit quality: The unqualified auditors may audit the project implementation. Poor follow-up on audit findings: PMO does not address audit findings noted by the auditors.	Substantial	*An independent external audit firm, acceptable to the Bank, will be appointed by the Mongolian National Audit Office to conduct the project's annual audit under agreed terms of reference.* *The Bank's FM team will monitor the PMO's implementation of the annual audit findings.*	Moderate	
Overall:	**Substantial**		**Moderate**	

31. Based on the assessment, the overall residual FM risk-rating assigned to this project is ***Moderate***. Proposed mitigating measures highlighted in *italics* in the risk assessment table are not expected to be carried out before effectiveness of the project. Therefore, they are for future reference and are not taken into account in determining the project's residual risk rating at this stage. The FM team will closely monitor the project FM risk during the entire project implementation.

Supervision Plan

32. The FM supervision plan for this project will based on its FM risk rating, which will be evaluated on a regular basis by the Bank's FM team in line with the FMSB's FM Manual and in consultation with the task team leader. During the project preparation and early implementation, the FM team supervision will focus on the following areas:

- Appointment of the project financial staff;
- Appropriateness of procedures and policies identified in the FMM;
- The project's adherence to the agreed FMM;
- Timeliness and accuracy of the manual accounting and financial reporting of the project; and
- Implementation of the accounting software.

Procurement Capacity

33. **Capacity assessment**: The assessment reviewed MOE's organizational structure and functions, past experience, staff skills, quality and adequacy of supporting and control systems, legal and regulatory procurement framework. The assessment displayed that MOE has extensive experience in implementing various high value donor funded projects including World Bank financed project. During 2010-2014 when the state budget capital investment was quite large Ministry's officials faced challenges in handling simultaneously many high value procurement. During the past 3 years the state budget investment fell down dramatically. For example in 2016 the Ministry's total investment went down to MNT 3.3 billion from MNT 138.3 billion in 2014 (40 times reduction). The investment for 2017 is MNT 16.6 billion. Therefore, with much less procurement workload we expect that MOE would be able to handle smoothly the project procurement activities. Specifics of this project preparation is early preparation of the procurement packages involving the technical team. Many key contracts bidding documents are in an advanced stage of preparation. Most of the draft bidding documents will be ready by Board approval date. Turnkey-single responsibility standard bidding documents are expected to be used for procurement of the key contracts.

34. In view of the MOE's past experience and the positive evaluation of MOE's procurement performance by the Ministry of Finance of Mongolia the procurement risk for this project is assessed as MODERATE.

35. The key risks for the project are:

(i) Inadequate planning and scheduling to ensure that the project activities commence and be completed as planned;
(ii) Inadequate procurement oversight mechanism; and
(iii) Possible elite capture and political interference in procurement and/or preference for specific service providers/suppliers/consultants.

(iv) Lack of familiarity with the Banks' Standard Bidding Document for design, supply and installation.

36. An action plan has been proposed, which includes the following:

(i) PMO and PIUs to be operational with clearly defined roles and responsibilities before start of implementation. Terms of reference and qualification requirements of the procurement staff will be subject to Bank review;

(ii) Procurement training for the PMO staff provided by the Bank's Ulaanbaatar Office before project kicks off, and during the project's life as needed. In addition, a specific workshop on single responsibility type of contracts will also be conducted for the PMO and selected MOE staff;

(iii) A user friendly procurement manual that describes accountability and responsibility of all parties and all steps of the procurement process is developed and agreed prior to start of implementation;

(iv) Involving technical staff and users in preparation of specifications, terms of references etc.;

(v) Ensuring that procurement planning is realistic and that all parties concerned keep to the agreed schedule; and

(vi) MOE will provide just-in-time advice and implementation support to the relevant beneficiaries.

37. **Applicable Guidelines**. Procurement for the proposed project would 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 & Grants by World Bank Borrowers" dated July 2014 and "Guidelines: Selection and Employment of Consultants under IBRD Loans and IDA Credits & Grants by World Bank Borrowers" dated July 2014, and the provisions stipulated in the legal agreements.

Procurement Arrangements

38. **Works and Supply & Installation.** Within this project 2 types of Supply & Installation and works contracts will be performed. One is a number of Supply & Installation and works contracts for Rehabilitation of Substations, Rehabilitation of Overhead Lines as well as for Establishment of Substations. The second type of works is construction of Solar Photovoltaic Power Plant and Maintenance. It will support design, supply, construction, commissioning and operation and maintenance

39. The Bank's Works or Supply and Installation standard bidding documents (SBD) shall be used for all international competitive bidding (ICB) procurement. For all national competitive biddings (NCBs) bidding documents agreed and approved by the Bank shall be used.

40. **Goods and non-consulting services procurement.** Goods to be procured under the project will include electrical smart meters, switchgears with vacuum circuit breakers and some other necessary equipment for beneficiary institutions. The Bank's SBD shall be used for all ICBs (Supply of Goods). Sample bidding documents agreed with the Bank shall be used for all NCB.

41. **Selection of Consultants.** The project will finance several consulting services for each component of the project. The World Bank's Standard Request for Proposal (SRFP) shall be used for selecting consulting firms. Selection of individual contracts will follow paras 5.1 to 5.6 of the Guidelines – Selection and Employment of Consultants and will be used for hiring of the PMO staff.

42. Whilst at this point in time it is not foreseen that there would be any need for either Direct Contracting and/or Single/Sole Source selection. Nevertheless, in case such a need arises procurement will be carried out in accordance with para 3.7 of the Procurement Guidelines and paras 3.8 to 3.11 (for firms) and para 5.6 (in the case of an individual) of the Consultants Guidelines, as appropriate and if a need is identified during appraisal or project implementation.

43. **Training and Workshops.** The MOE shall prepare training plans as part of annual work plans for Bank review and technical no objection. The plan shall include details of the learning event including description, learning objectives, indicators, type (e.g. workshop, conference, meeting, focus group discussions, and study tour), target group, number of participants' details of trainers, location, dates, cost breakdown and other details as the Bank may request. Any modification to the plan requires Bank's review and no objection.

44. **Procurement Plan**. The MOE is preparing a procurement plan for contracts to be procured during the first 18-months of project implementation. The procurement plan will be agreed with the Bank by negotiations. It will be made available in the projects Database and on the World Bank's external website. The procurement plan will be updated annually or as required to reflect implementation needs and improvements in institutional capacity. The draft procurement plan is in Annex 3.

45. **STEP**: The Bank's on-line tool for systematic tracking of exchanges in procurement (STEP) will be used for monitoring and updating the procurement plan and assessing the Bank's and client's performance in the execution of the procurement activities under this project. All requests for no-objection, procurement comments and clearances will be processed through STEP. The PMO and MOE staff will be trained in use of STEP.

46. **Thresholds for Procurement Methods and Prior Review**. The procurement plan for the contracts to be procured by MOE shall set forth those contracts which are subject to prior review by the Bank. The prior-review thresholds in the table below are indicative.

Table 1. Procurement Thresholds

	Prior Review Thresholds (US$ million)	**Procurement/Selection Method Thresholds (US$ million)**						
		ICB	NCB	Shopping	QCBS	QBS	CQS	SSS
Goods	≥0.5	≥1	<1	<0.1				
Works	First NCB works contracts irrespective of value and all contracts ≥0.5	≥5	<5	<0.2				
Consulting Services	First contract for each selection method and all contracts ≥0.2 provided by firm, ≥0.02 for SSS (firms)				--	--	<0.3	--

	and Individual Consultants Only in exceptional cases							

Note: (a) "- -" refers to No Threshold. (b) All Direct contracting subject to prior review.

47. **Frequency of Procurement Supervision**. Procurement Supervision by the Bank will be carried out once a year. Procurement post review (PPR) for contracts procured by MOE will be carried out once a year. The sampling ratio will be at least 1 in 5 contracts.

Environmental and Social (including safeguards)

Social (including Safeguards)

48. The proposed project triggers *Involuntary Resettlement OP/BP 4.12*. Component 1 improvements to the distribution system will require installation of some physical infrastructure. Improvements will be within the existing infrastructure footprint, within the established right of way, or on government land. This safeguard is triggered in the event that improvements are installed on land that is not already within the established right of way, existing footprint or government land. As sites and any impacts on populations are yet to be finalized, a Resettlement Policy Framework (RPF) has been prepared by the Borrower and included in the Component 1 ESMF. The three possible sites identified for the Component 2 solar plant, all on state land. Due diligence confirmed that no persons were living or using the land formally or informally at the selected site at Hovd Aimag, next to Mayangad soum centre. An RPF has also been prepared for Component 2, given the potential for solar plant development after appraisal. Solar plant development is anticipated to take place on state land and avoid involuntary resettlement. However, given the site is not yet known, an RPF has been prepared in the eventuality that land needs to be involuntarily acquired. The RPF, disclosed to the public in Mongolia on February 1, 2017 lays out the steps to be taken when any land is involuntarily acquired or purchased under negotiated settlement for project activities.

49. The project will contribute to social and economic development, which is currently energy constrained. A social assessment has been prepared for the Project (Component 1) in Q4 of 2016, this provides an overview of the beneficiary population profile, confirms direct and indirect benefits and contributes socioeconomic information for incorporation into subproject planning. An ESIA, has been prepared for Component 2, which includes mitigations for minor social impacts managed through the EMP.

50. The proposed project does not trigger *Indigenous Peoples OP/BP 4.10*. Mongolia has an estimated 24 ethnic groups, which are either descendants of Mongolian nomadic tribes, or are groups of Turkic origin who have become Mongolised over time. The majority are the Khalkh who comprise over 90% of the population. Except for the Kazakh minority group residing in western Mongolia, all ethnic groups speak Mongolian dialects which are comprehensible to speakers of Khalkh and to each other. Only the Kazakhs rely upon a distinct spoken language. The majority of Mongolia's ethnic minority groups share similar customs, traditions and systems of production as the Khalkh. With the exception of the predominantly Muslim and linguistically differentiated Kazakhs in western Mongolia, and traditionally nomadic reindeer herding Tsaatan peoples in the north, Mongolia's ethnic groups are not considered to be economically, socially or legally marginalized or otherwise disadvantaged in a manner which would restrict their ability to participate in the project. The project will not cover those areas populated by either the Kazakh or Tsaatan

nor will it include areas populated by the Uyghurs, Uzbeks, Urianhais and Hotons (and Tuvinians), and the Evenk who speak a Tungusic language.

51. The proposed project triggers *Physical Cultural Resources OP/BP 4.11*. While known physical cultural resources can be avoided by sub-project design, there is a chance that these resources could be uncovered during the course of civil works hence this policy is triggered. Requirements for chance finds are included in the combined ESMF of Components 1 and 2 to cover these eventualities.

52. Citizen engagement will be assessed during project preparation and tracked by a dedicated indicator in the results framework during implementation. The proposed project will also be gender informed through the analysis of relevant information, and formulation and monitoring of appropriate actions.

Environmental (including Safeguards)

Component 1

53. Extensive borrower analytic data of transformer and circuit breaker fluids reviewed by the Team indicated that the many existing pieces of equipment tested from both distribution companies did not contain PCBs at all or in quantities considered insignificant. However, if it is determined that there is a significant presence of polychlorinated biphenyls (PCBs) in some of the older electrical equipment that is to be replaced (e.g. transformers, circuit breakers etc.), management of this material will require special considerations which will be included in the site specific ECOPs related to those subproject investments. For subprojects to be identified during project implementation management of PCBs are included in the Environmental and Social Management Framework (ESMF). The ECOPs and/or ESMF also includes requirements prohibiting all new electrical equipment (transformers, switches, capacitors etc.) from containing PCBs.

54. The project will also involve removal and replacement of numerous wooden poles supporting existing power distribution lines. In general, wooden poles of the distribution companies are treated with creosote as a wood preservative. By their very nature, creosote impregnated wooden poles may be considered hazardous which would make them unsuitable for subsequent use as fuel. The ECOPs and ESMF includes specific guidance on the management (handling, transport, and disposal/recycle/reuse) of these poles. The project may also involve replacement of numerous electrical meters. Although these meters are not expected to contain hazardous materials, their disposal still represents a potentially significant waste management issue that is addressed in the EMP and the ESMF.

55. This project component project triggers *Natural Habitats OP/BP 4.04*. However, it will not support or lead to the conversion of natural habitats. Most anticipated investments will be rehabilitation or replacement of existing equipment (substations, overhead lines (OHL) support structures-wooden poles etc.). There may be investments in expanding existing substations or constructing new substations. Screening criteria are included in both the relevant ECOPs and ESMF to determine if: (a) there will be any subproject investments which involve the significant conversion of critical natural habitats; and/or (b) subproject investments likely to affect non-critical natural habitats. Due diligence requirements included in both the ECOPs and ESMF require subproject investments be reviewed by MEGDT, Director General for

Environment and Natural Resource Management for approval to insure the proposed investment does not involve conversion of critical natural habitats. If, non-critical habitats are involved, this policy would be triggered and mitigating measures would be incorporated into the ECOP for specific subproject investments and in the ESMF for subproject investments not specifically identified but likely to occur in these areas.

Component 2

56. The proposed project component at the Hovd Aimag site, next to Mayangad soum triggers *Environmental Assessment OP/BP 4.01*. In addition to traditional construction related impacts associated with the movement of men, machines and materials (e.g. dust, noise, engine exhausts etc.), the component will involve alteration of runoff patterns from land clearing and modification to land surface contours which can alter runoff patterns and introduce localized flooding, land preparation which may involve removal/storage of topsoil, and clearance and removal of existing vegetation. There may also be issues related to non-hazardous wastes from packaging, inert construction materials and possibly domestic wastes from worker camps require proper management and hazardous wastes such as: used oils, lubricants, excess paints and or coating materials, and adhesives which would require special handling and treatment. Wastewaters generated from cleaning equipment and possibly domestic wastewaters from sanitary facilities and worker camps will require proper management. Construction activities will expose workers to hazardous conditions and materials that may affect their safety and health. During operation, reflection of sunlight off solar modules can affect drivers' visions and disrupt migratory bird flight patterns and groundwater availability may be an issue because there may be significant drawdown of groundwaters for panel washing which could lower the groundwater table thereby affecting water availability to other users. Wastewaters from panel washing may contain pollutants which could contaminate receiving waters. If groundwater resources are determined to be limited, the solar panel design may be switched to the dry self-cleaning alternative. This would reduce/eliminate the need for groundwater resources and any associated wastewater pollutant discharges. The selected site for both the solar photovoltaic panels and the route of the transmission line may interfere with routes of migratory birds, nesting patterns of the Mongolian Ground Jay and migration patterns of land based wildlife or grazing areas for domesticated livestock. If the transmission line routing presents a significant risk to migratory bird flight patterns, burial of the cable would be considered as an alternative.

57. To address all avian issues during construction and operation phases, the project sponsor will engage the services of a local bird expert who will:

- survey proposed solar plant site prior to construction and as necessary recommend micro-modifications to site location to avoid/minimize nesting areas;
- identify nesting period of Mongolian Ground Jay and assist in designing construction schedule to avoid this period;
- assure panel design elevation is sufficient to minimize disturbance to brush areas used for nesting by Mongolian Ground Jay;
- work with NGOs (e.g. IUCN, BirdLife International, Wildlife Science and Conservation Centre of Mongolia) to prepare an Avian Monitoring Program (AMP) for migratory birds and ground nesters during construction and operation phases;
- determine migratory bird patterns to aid in decision regarding placement of transmission line above ground (with avian diverters) or underground; and

- assure solar panel tilt to approximately 45^{o} for maximum solar efficiency and minimize bird collision risk.

58. The ESIA prepared for the investment includes a detailed EMP to address these potential issues. For potential subsequent investments in solar power facilities, a separate ESMF was prepared to address these issues as well as any other site-specific issues that may develop.

59. Site selection criteria for the Hovd Aimag plant site excluded locations within or near critical natural habitats. In addition, due diligence for this site will require clearance from the MEGDT Department of Environment and Natural Resources Management who will ensure that: (a) the investment will not involve significant conversion of critical natural habitats; and (b) acceptable mitigation measures are included for approval of the site to ensure no impacts on non-critical natural habitats. The ESMF includes similar due diligence requirements for potential investments in solar photovoltaic power facilities.

60. The proposed site is not forested, but approval from MEGDT, Director of Forest Policy and Coordination would be required. The ESMF includes similar approval requirements from MEGDT Department of Forest Policy and Coordination as part of the siting criteria for potential investments in solar photovoltaic power facilities.

Implementation Arrangements

61. The PMO sitting under the Ministry of Energy is familiar with Bank-funded projects and has developed internal capacity through its most recent implementation of the Energy Sector Project. Also, the PMO will hire environmental and social (E&S) safeguards consultants to assist with conducting E&S assessment, consultation, and preparing safeguards instruments. During implementation, the PMO will continue to use their in-house dedicated Environment and Social Specialist.

62. For distribution components A and C the Team determined that there is limited capacity for management of environmental safeguards within the distribution companies. However, there was a strong willingness among distribution company technical staff currently responsible for issues of safety to acquire the necessary capacity for environmental safeguards management. The distribution companies have selected technical staff (one from each company) to receive environmental management training from World Bank safeguard specialists. Similarly, staff resources exist within the distribution companies (research and studies officer) who have expressed a strong willingness to develop technical capacity for managing social safeguards and have therefore been selected to fill this role (one from each company). As such, 4 staff members from the distribution companies will receive safeguard training, along with the additional capacity building for the PMO environment and social specialist who will work in collaboration with the distribution companies on safeguard matters.

63. For the solar component, WES has agreed to appoint two safeguards officers (environment & social) Candidates will be selected, based on existing skills, interest and willingness to learn. They will be trained along with the distribution companies' staff and PMO Safeguard staff. The PMO will also include a safeguards staff member, with existing environmental expertise who will be dedicated to safeguards related matters for the solar investments.

Monitoring & Evaluation

64. The PMO will monitor overall project implementation against the performance indicators every six months. The PMO is well-versed with M&E procedures, given its experience with ESP1 (P040907). Data and statistics on actual project outputs and outcomes will be gathered, analyzed and included in the quarterly progress reports to be submitted to the Bank. The PMO collect inputs from PIUs at least twice a month to reflect implementation progress and outstanding issues. The M&E framework will be monitored and updated in a systematic manner and made available in progress reports and supervision documents by the PMO. Also, a mid-term review of implementation progress is included in the M&E to evaluate achievements and impediments to achieving desired outcomes.

Annex 5: Implementation Support Plan

Mongolia**:** *Second Energy Sector Project (P152343)*

Strategy and Approach for Implementation Support

1. Implementation is expected to begin in 2017 following Board approval and implementation support will begin as early as possible to prepare the Government and the implementing agencies ahead of the first disbursement.

Implementation Support Plan

2. Bank team members for procurement, financial management and safeguards will be based in Washington DC, United States, and Ulaanbaatar, Mongolia, and coordinate to ensure timely support to the client. Formal supervision and field visits will be carried out at least twice a year.

Financial Management

3. Entity and project financial audit reports will be submitted on an annual basis. Implementation support is expected to entail two missions per year during the first two years of operation, and thereafter frequency will depend on the updated project financial management risk assessment and progress to build financial management capacity within the PMO.

Procurement Support

4. The Bank is expected to support procurement implementation through two missions per year. Later on, the frequency of implementation support for procurement will depend on the progress of capacity building in the PMO. Procurement post-reviews will be conducted at least annually by the Bank or by its consultants or audit agencies acceptable by the Bank.

Implementation Support Plan for First Two Years

Time	***Focus***	***Skills Needed***	***Resource Estimate***
First twelve months	- Build capacity for project management - Build capacity for procurement, financial management, and safeguards	- Project management - Energy expert - Procurement - Financial management - Social and environment safeguards	$200,000, including $40,000 of travels
12-48 months	- Build capacity for project management - Build capacity for procurement, financial management, and safeguards	- Project management - Energy expert - Procurement - Financial management - Social and environment safeguards	$200,000, including $40,000 of travels (yearly)

Skills Mix Required

Skills Needed	***Number of Staff Weeks***	***Number of Trips***	***Comments***
Overall Supervision	4	2	None
TTL	4	2	None
Energy Expert	8	2	None
Financial Management	4	2	None
Procurement	4	2	None
Environmental Safeguards	4	2	None
Social Safeguards	4	2	None

Annex 6: Economic and Financial Analysis

1. This section comprises three sections: (i) an analysis to assess the economic viability of the project investment; (ii) an analysis to assess the financial viability of the project investments; and (iii) a financial assessment of the financial performance of the Project utilities.

2. Economic analysis was carried out separately for two groups of the investments in Group 1 based on their nature: (i) distribution investments in the service areas of EBEDN and BSEDN, respectively; (ii) a 10 MWp solar PV plant in the service area of the Western Energy System (WES).

A. Distribution component

3. The distribution component will investment in (i) rehabilitation of distribution lines and substations; (ii) installation of new commercial and household meters; and (iii) new AMI in the service areas of EBEDN and BSEDN.

4. ***Costs***. The investment costs of the distribution component amount to US$27.1 million in total, including transfer costs, physical and price contingencies, and financial charges. The economic cost after subtracting price contingencies, taxes and duties is US$25.9 million at 2016 price. For the EBEDN sub-component, the economic and financial costs of the investment stood at US$14.6 million and US$15.3 million, respectively. For the BSEDN sub-component, the economic and financial costs of the investment stood at US$11.3 million and US$11.8 million, respectively. The O&M costs are assumed at 2.0% of the investment.

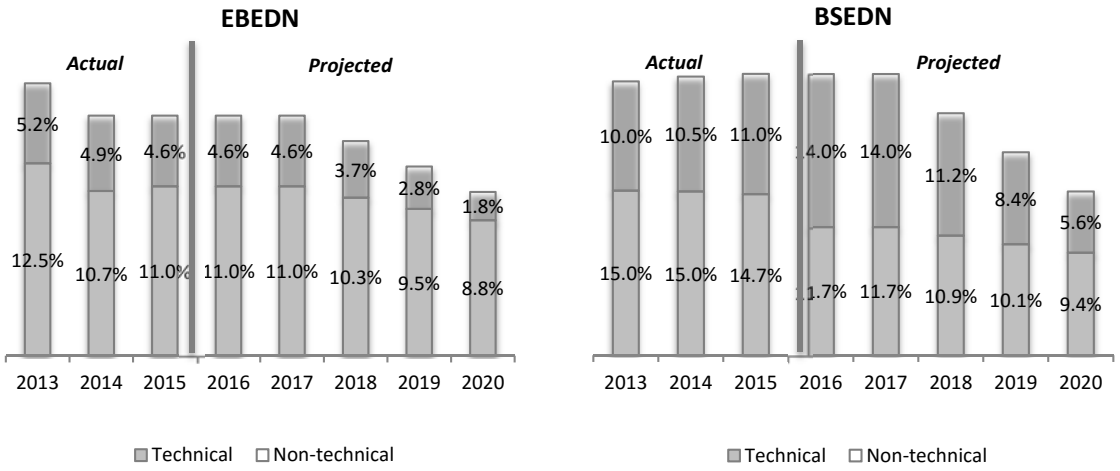
Table 1. Investment costs

	Economic costs (at 2016 price)		**Financial cost**	
	MNT	USD	MNT	USD
EBEDN	MNT 35.9 billion	$14.6 million	MNT37.6 billion	$15.3 million
BSEDN	MNT 27.6 billion	$11.3million	MNT 28.9 billion	$11.8 million
Total	**MNT 63.5 billion**	**$25.9 million**	**MNT 66.5 billion**	**$27.1 million**

5. ***Benefits.*** The proposed investments will have two quantifiable benefits:

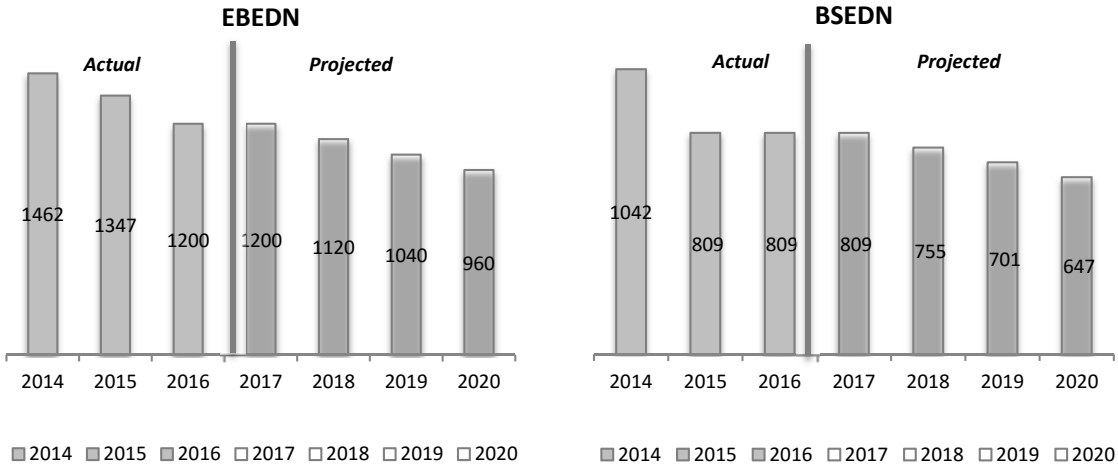
- *Reduction in distribution losses*. Most of the distribution network equipment in the BSEDN and EBEDN systems is more than 30 years old. The current distribution networks in BSEDN and EBEDN experience high level of distribution losses with technical losses around 12% and non-technical losses between 4% and 14% (see figure below.) Through network rehabilitation and upgrades, the project investments are expected to reduce technical loss by around 20%. Through replacing approximately 60% of existing meters, the project investments are expected to reduce non-technical losses by approximately similar percentage. (see Figure 1). The economic benefit only accounts for the reduction in technical losses as reduction in non-technical loss is a form of transfer among domestic stakeholders.

Figure 1. Distribution-loss (excluding large customers)



- *Improved system reliability.* Due to the aging and dilapidated state of the network, both EBEDN and BSEDN experience poor system reliability. Power outages are rampant. With project investments in system rehabilitation and upgrades, the project investments are expected to reduce the incidence and duration of power outages by around 20%. (see figure below)

Figure 2. SAIDI (minutes)



6. *Willingness-to-pay (WTP)* for the avoided power outages is valued at the cost of diesel-based generation estimated at US$0.28 per kWh in 2020, the year of the Project completion. Key assumptions for this estimate include: (i) a diesel cost of US$23.1/mmBTU in 2020[7]; (ii) an efficiency of 30% for a small-size diesel generator; (iii) a capacity factor of 70%; and (iv) a capital cost of US$1,013/kW. (see table 2) WTP for the reduced technical losses that will, in turn, help ease supply constrain and serve to meet the rising demand is assumed to be valued at a half of the cost of diesel-based generation, at US$0.14 per kWh in 2020.

[7] http://www.eia.gov/forecasts/aeo/pdf/0383(2016).pdf

Table 2

	Willingness to pay: self-generation		2020
			Small
1	size	[MW]	0.1
2		[kW]	100
3	Fuel		Diesel
4	capital cost	[US$/kW]	1,013
5	life	[years]	20
6	annual cost	[$/kW]	88.3
7	capacity factor	[ ]	0.7
8	generation	[hours/year]	6132
9	capital cost	[$/kWh]	0.014
10	Efficiency	[%]	30%
11		[MNT/kWh]	38.3
12	fuel consumption	[mBTU/kWh]	11.37
13	fuel cost	[$/mmBTU]	23.1
14	fuel cost	[$/kWh]	0.26
15	fuel cost/kWh	[MNT/kWh]	698
16	total cost - WTP for outages	[MNT/kWh]	736
17	total cost - WTP for outages	[$/kWh]	0.28

Outcome of the economic analysis

7. Based on the above assumptions, at a discount rate of 6.0 percent[8], over a project lifetime of 25 years, exclusive of a 3-year construction period, the Project distribution investments are expected to generate an economic net present value (ENPV) of US$13.3 million and yield an economic internal rate of return (EIRR) of 10.4%. Thus, the investments are economically justified.

8. For the EBEDN network, the investments are expected to generate an ENPV of US$5.2 million with an EIRR of 9.2% exceeding the social discount rate of 6.0%. Thus, the investments are economically justified.

	Economic analysis				EBEDN										
	capmult	*1.0*			0.20	0.40	0.20	0.10							
				2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	
								1	2	3	4	5	6	7	
1	***No project***														
2	Energy in (excl. mining)		[GWh]	229.6	241.1	253.1	265.8	279.1	293.0	307.7	323.1	339.2	356.2	374.0	392.7
3	Technical loss		[GWh]	25.3	26.5	27.8	29.2	30.7	32.2	33.8	35.5	37.3	39.2	41.1	43.2
4	Outages		[GWh]	0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.8	0.8	0.9	0.9
5	energy served at retail		[GWh]	193.8	203.5	213.6	224.3	235.5	247.3	259.7	272.7	286.3	300.6	315.7	331.4
6															
7	***With Project***														
8	Energy in (excl. mining)		[GWh]	230	241	253	266	279	293	308	323	339	356	374	393
9	Technical loss		[GWh]	25.3	26.5	27.8	27.3	26.6	25.8	27.1	28.4	29.9	31.3	32.9	34.6
10	Outages		[GWh]	0.6	0.6	0.6	0.6	0.6	0.5	0.6	0.6	0.6	0.7	0.7	0.7
11	energy served at retail		[GWh]	193.8	203.5	213.6	228.7	244.8	261.9	274.9	288.7	303.1	318.3	334.2	350.9
12															
13	***Subproject costs***														
14	investment cost	*14.6*	[million USD]			2.9	5.9	2.9	1.5						
15	O&M cost		[million USD]						0.3	0.3	0.3	0.3	0.3	0.3	0.3
16	total costs, with project		[million USD]			2.9	5.9	2.9	1.8	0.3	0.3	0.3	0.3	0.3	0.3
17															
18	Technical loss reduction		[GWh]	-	-	-	1.9	4.1	6.4	6.8	7.1	7.5	7.8	8.2	8.6
19	Avoided outages		[GWh]	-	-	-	0.0	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2
20	Additional power served	*0.14*	[million USD]			-	0.3	0.6	0.9	0.9	1.0	1.0	1.1	1.1	1.2
21	Avoided GHG emissions		[million USD]			-	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2
22	Avoided outages	*0.28*	[million USD]			-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23	Net benefits		[million USD]		**5.2**	(2.9)	(5.5)	(2.3)	(0.7)	0.8	0.9	0.9	1.0	1.0	1.1
24	EIRR		[ ]		**9.2%**										

[8] Source: Discounting Costs and Benefits in Economic Analysis of World Bank Projects, OPSPQ, 2016

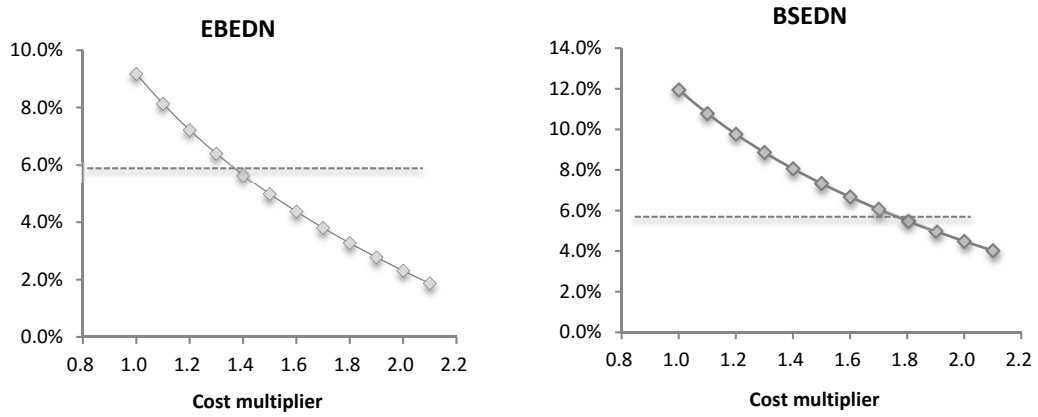
9. For the BSEDN network, the investments are expected to generate an ENPV of US$8.1 million with an EIRR of 12.0% exceeding the social discount rate of 6.0%. Thus, the investments are economically justified.

	Economic analysis				BSEDN										
	capmult	*1.0*				0.20	0.40	0.20	0.10						
					2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
									1	2	3	4	5	6	7
1	***No project***														
2	Energy in (excl. mining)		[GWh]	217.5	228.4	239.8	251.8	264.4	277.6	291.5	306.0	321.3	337.4	354.3	372.0
3	Technical loss		[GWh]	25.4	26.7	28.1	29.5	30.9	32.5	34.1	35.8	37.6	39.5	41.5	43.5
4	Outages		[GWh]	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.6
5	energy served at retail		[GWh]	161.6	169.7	178.2	187.1	196.4	206.2	216.6	227.4	238.8	250.7	263.2	276.4
6															
7	***With Project***														
8	Energy in (excl. mining)		[GWh]	217	228	240	252	264	278	291	306	321	337	354	372
9	Technical loss		[GWh]	25.4	26.7	28.1	27.5	26.8	26.0	27.3	28.6	30.1	31.6	33.2	34.8
10	Outages		[GWh]	0.3	0.4	0.4	0.4	0.4	0.3	0.4	0.4	0.4	0.4	0.4	0.5
11	energy served at retail		[GWh]	161.6	169.7	178.2	196.1	215.4	236.1	247.9	260.3	273.3	286.9	301.3	316.3
12															
13	***Subproject costs***														
14	investment cost	*11.3*	[million USD]			2.3	4.5	2.3	1.1						
15	O&M cost		[million USD]						0.2	0.2	0.2	0.2	0.2	0.2	0.2
16	total costs, with project		[million USD]			2.3	4.5	2.3	1.4	0.2	0.2	0.2	0.2	0.2	0.2
17															
18	Technical loss reduction		[GWh]	-	-	-	2.0	4.1	6.5	6.8	7.2	7.5	7.9	8.3	8.7
19	Avoided outages		[GWh]	-	-	-	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
20	Additional power served	*0.14*	[million USD]			-	0.3	0.6	0.9	0.9	1.0	1.0	1.1	1.1	1.2
21	Avoided GHG emissions		[million USD]			-	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2
22	Avoided outages	*0.28*	[million USD]			-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23	Net benefits		[million USD]		**8.1**	(2.3)	(4.2)	(1.6)	(0.4)	0.8	0.9	0.9	1.0	1.1	1.2
24	EIRR		[ ]		**12.0%**										

Sensitivity analysis

10. Sensitivity analysis suggests that EIRR is sensitive to investment cost. For EBEDN, a 35% cost over-run will render the investment economically not viable. For BSEDN, a 71% cost over-run would render the investment economically not viable.

Figure 3
EIRR sensitivity to investment cost



Financial analysis

11. The investments will be fully financed by debt following IBRD terms with an interest rate of 2.5% per annum. Power purchase and retail tariff are assumed at the current levels. In the EBEDN network, the average power purchase and sale prices stood at MNT 129/kWh (5.3 US cent/kWh) and MNT 152/kWh (5.7 US cent/kWh) respective in 2015. In the BSEDN network, the average power purchase and sale prices stood at MNT 127/kWh (5.2 US cents/kWh) and MNT 140/kWh (5.7 US cent/kWh), respectively in 2015.

Outcome of the financial analysis

12. Based on the above assumptions, at a WACC of 2.5 percent, over a project lifetime of 25 years, exclusive of a 3-year construction period, the Project distribution investments are expected to generate a financial net present value (FNPV) of US$103.8 million with an estimated financial internal rate of return (FIRR) of 27.5% well exceeding the WACC. Thus, the investments are financially justified.

13. For the EBEDN network, the investments are expected to generate an FNPV of US$38.0 million billion with an FIRR of 15.4% well exceeding the WACC of 2.5%. Thus, the investments are financially justified.

Financial analysis ["project financial return"]			**EBEDN**										
			NPV	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
							1	2	3	4	5	6	7
1	***No project***												
2	Energy purchase	[GWh]		253.1	265.8	279.1	293.0	307.7	323.1	339.2	356.2	374.0	392.7
3	Energy sold	[GWh]		213.6	224.3	235.5	247.3	259.7	272.7	286.3	300.6	315.7	331.4
2	Energy purchase *0.053*	[GWh]		13.3	14.0	14.7	15.4	16.2	17.0	17.9	18.8	19.7	20.7
3	Energy sold *0.062*	[GWh]		13.3	13.9	14.6	15.4	16.1	16.9	17.8	18.7	19.6	20.6
4													
5	***With Project***												
6	Energy purchase	[GWh]		241.1	253.1	265.8	279.1	293.0	307.7	323.1	339.2	356.2	374.0
7	Energy sold	[GWh]		213.6	228.7	244.8	261.9	274.9	288.7	303.1	318.3	334.2	350.9
2	Energy purchase *0.053*	[GWh]		12.7	13.3	14.0	14.7	15.4	16.2	17.0	17.9	18.8	19.7
3	Energy sold *0.062*	[GWh]		13.3	14.2	15.2	16.3	17.1	17.9	18.8	19.8	20.8	21.8
8													
9	**Subproject costs**	[million USD]											
10	Investment cost *15.3*	[million USD]		3.1	6.1	3.1	1.5						
11	O&M costs	[million USD]					0.3	0.3	0.3	0.3	0.3	0.3	0.3
12	incremental costs	[million USD]		3.1	6.1	3.1	1.8	0.3	0.3	0.3	0.3	0.3	0.3
	reduced power purchase	[million USD]		0.6	0.7	0.7	0.7	0.8	0.8	0.9	0.9	0.9	1.0
	increased revenue	[million USD]		-	0.3	0.6	0.9	0.9	1.0	1.0	1.1	1.2	1.2
13	incremental benefits	[million USD]		0.6	0.9	1.3	1.6	1.7	1.8	1.9	2.0	2.1	2.2
14	Net financial flows	[million USD]	**38.0**	(2.4)	(5.2)	(1.8)	(0.2)	1.4	1.5	1.6	1.7	1.8	1.9
15	FIRR	[ ]	**15.4%**										

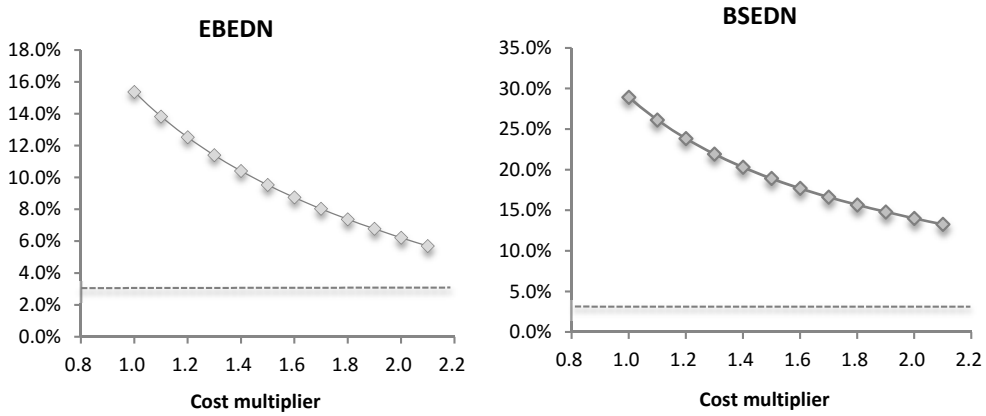
14. For the BSEDN network, the investments are expected to generate an FNPV of US$65.8 million with an FIRR of 28.9% well exceeding the WACC of 2.5%. Thus, the investments are financially justified.

Financial analysis ["project financial return"]			**BSEDN**										
			NPV	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
							1	2	3	4	5	6	7
1	***No project***												
2	Energy purchase	[GWh]		239.8	251.8	264.4	277.6	291.5	306.0	321.3	337.4	354.3	372.0
3	Energy sold	[GWh]		178.2	187.1	196.4	206.2	216.6	227.4	238.8	250.7	263.2	276.4
2	Energy purchase *0.052*	[GWh]		12.4	13.0	13.7	14.4	15.1	15.8	16.6	17.5	18.3	19.2
3	Energy sold *0.057*	[GWh]		10.2	10.7	11.2	11.8	12.4	13.0	13.6	14.3	15.0	15.8
4													
5	***With Project***												
6	Energy purchase	[GWh]		228.4	239.8	251.8	264.4	277.6	291.5	306.0	321.3	337.4	354.3
7	Energy sold	[GWh]		178.2	196.1	215.4	236.1	247.9	260.3	273.3	286.9	301.3	316.3
2	Energy purchase *0.052*	[GWh]		11.8	12.4	13.0	13.7	14.4	15.1	15.8	16.6	17.5	18.3
3	Energy sold *0.057*	[GWh]		10.2	11.2	12.3	13.5	14.2	14.9	15.6	16.4	17.2	18.1
8													
9	**Subproject costs**	[million USD]											
10	Investment cost *11.8*	[million USD]		2.4	4.7	2.4	1.2						
11	O&M costs	[million USD]					0.2	0.2	0.2	0.2	0.2	0.2	0.2
12	incremental costs	[million USD]		2.4	4.7	2.4	1.4	0.2	0.2	0.2	0.2	0.2	0.2
	reduced power purchase	[million USD]		0.6	0.6	0.7	0.7	0.7	0.8	0.8	0.8	0.9	0.9
	increased revenue	[million USD]		-	0.5	1.1	1.7	1.8	1.9	2.0	2.1	2.2	2.3
13	incremental benefits	[million USD]		0.6	1.1	1.7	2.4	2.5	2.6	2.8	2.9	3.0	3.2
14	Net financial flows	[million USD]	**65.8**	(1.8)	(3.6)	(0.6)	1.0	2.3	2.4	2.5	2.7	2.8	3.0
15	FIRR	[ ]	**28.9%**										

Sensitivity analysis

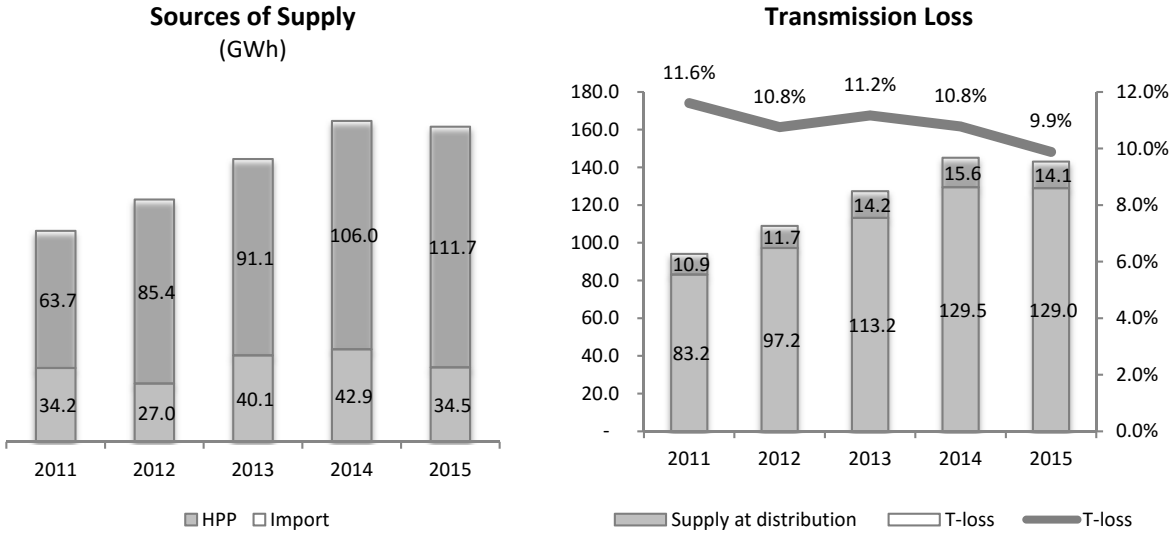
15. Sensitivity analysis suggests that although FIRR is sensitive to investment cost, the financial viability of the investment is robust enough to withstand any cost over-run within reasonable range.

Figure 4
FIRR sensitivity to investment cost



B. 10 MWp solar PV investment

16. ***Western Energy System***. In 2015, the system purchased a total of 143GWh, three quarters of which through imports from Russia, and the remaining from hydropower plants within the system. Due to the extensive geographical span, the system experiences high levels of transmission losses.

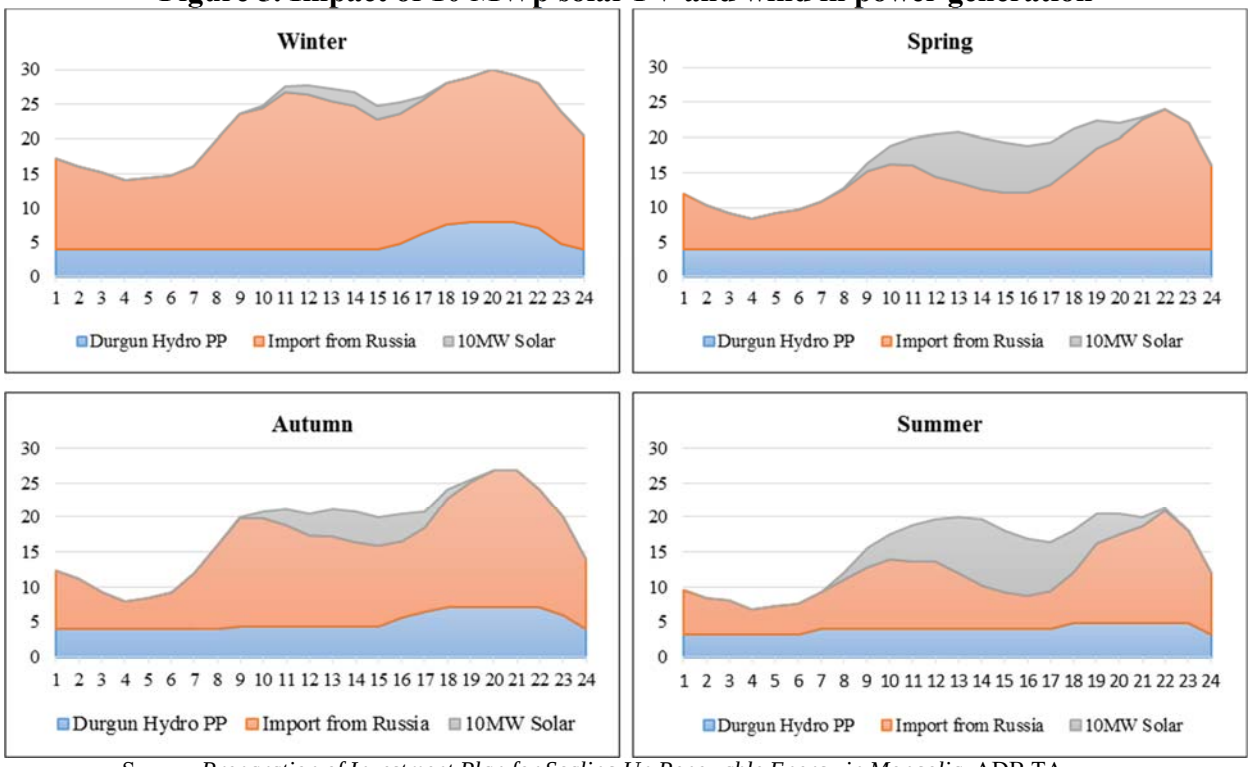


17. **Costs.** The investment cost of utility-scale solar PV plant is estimated at US$1.5 million per MW. Annual O&M cost is around 2.0% of the total investment.

18. **Benefits**. Utility-scale solar PV generation presents a clean and reliable source of power generation at costs comparable to traditional energy sources. For WES, the solar power supply will primarily substitute power import from Russia, thus enhancing the energy security of the system. Moreover, by moving power supply closer to the load center, utility-scale solar can also help reduce transmission loss, and reduce future investments in the transmission networks. As a clean source of power supply, solar PV generation will also help reduce GHG emissions compared with generation using fossil fuels.

19. *Power supply.* At an estimated efficiency of 16%, a 10 MWp solar PV plant will generate about 14.0 GWh a year. As the first solar PV plant to be constructed in the system, its power supply will serve as a perfect substitute of import from Russia (see Figure 5), thus effectively reducing the corresponding quantity of the power import.

Figure 5. Impact of 10 MWp solar PV and wind in power generation



Source: *Preparation of Investment Plan for Scaling Up Renewable Energy in Mongolia*, ADB TA no. 8757, joint study by ADB, World Bank/IFC, and the European Bank

20. *T-loss reduction.* By moving the supply center closer to the load center, a renewable energy (RE) portfolio of approximately 25MW installed capacity in WES was estimated to reduce transmission loss of the network by 2.0-2.6%.[9] Thus, the first 10 MWp solar PV plant to be constructed is assumed to result in a T-loss reduction of 1.0%. Demand growth is assumed at 8% annually.[10]

21. The value of substituted power import through power generation and t-loss reduction to Mongolia is at the import tariff, currently at 3.33 ruble or 5.1 US cent per kWh, assumed at growing 3.0% annually.

22. *Avoided GHG emissions.* As a clean source of power supply, solar PV generation will also help reduce GHG emissions by substituting power generation from the Russian grid. The average grid emission factor of the Russian grid is estimated at 0.443 kg/kWh. The social cost of carbon is assumed to follow a

[9] Source: Preparation of Investment Plan for Scaling Up Renewable Energy in Mongolia, ADB TA no. 8757, joint study by ADB, World Bank/IFC, and the European Bank

[10] Demand grew rapidly averaging around 15% a year over the period 2011-14 before dropping sharply to stagnation since 2014. The average growth rate for the period of 2011-15 was around 10% annually. To be conservative, an average annual growth of 8% was assumed, corresponding to the average demand growth among retail customers in the same period.

curve proposed by *The Guidance Note on Social Value of Carbon* (2014) increasing from US$32 per ton of CO2 in 2017 to US$69.5 ton of CO2 in 2043.

Outcome of the economic analysis

23. At a discount rate of 6.0 percent, over a project lifetime of 25 years, exclusive of a 2-year construction period, the investments in the 10 MWp solar PV plant is expected to generate an ENPV of US$1.7 million with an estimated EIRR of 6.9%, exceeding the social discount rate of 6.0%. Thus, the investment is economically justified.

ECONOMIC ANALYSIS			10MW Solar PV								
			-1	0	1	2	3	4	5	6	7
		PV	2017	2018	2019	2020	2021	2022	2023	2024	2025
Power generation	*GWh*	159.46	-	-	14.02	14.02	14.02	14.02	14.02	14.02	14.02
T-loss reduction	*GWh*	37.93	-	-	1.43	1.55	1.67	1.80	1.95	2.10	2.27
Unit value of electricity	*USD/kWh*		5.10	5.25	5.41	5.57	5.74	5.91	6.09	6.27	6.46
Value of electricity	*USD million*	14.60	-	-	0.84	0.87	0.90	0.94	0.97	1.01	1.05
Avoided GHG emissions	*USD million*	4.22	-	-	0.23	0.24	0.25	0.27	0.28	0.29	0.31
Investment	*USD million*	13.75	7.50	7.50							
O&M	*USD million*	3.41	-	-	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Net benefit	***USD million***	**1.7**	(7.50)	(7.50)	0.77	0.81	0.85	0.90	0.95	1.00	1.06
EIRR		**6.9%**									

Financial analysis

24. The investment will be financed 50% by SREP grant and 50% by loan on-lend in IBRD terms with 2.5%[11] interest and a grace period matching the period of construction. Thus, the weighted average cost of capital (WACC) is at 2.5%.

25. **Financial costs**. The total financial cost of the project to WES including a half of the investment cost after the SREP grant contribution and ongoing O&M.

26. **Financial benefits**. As result of the project investment, WES utility will purchase less power from Russia. The amount of power import saved amounts to the sum of the power generation from the solar PV plant and the reduced t-loss to the network. The financial value of the reduced power purchase is at the current import tariff of 3.33 ruble or 5.1 US cent per kWh, growing at an assumed annual rate of 3.0%.

27. **Outcome of the financial analysis.** With a WACC of 2.5%, the project investment will yield an estimated FNPV of US$11.68 million and a financial internal rate of return (FIRR) of 10.0% well exceeding the project WACC. The project is thus financially justified.

[11] The exact on-lending terms are still in the process to be confirmed.

	FINANCIAL ANALYSIS			10MW Solar PV								
1				-1	0	1	2	3	4	5	6	7
2			**PV**	2017	2018	2019	2020	2021	2022	2023	2024	2025
3	Power generation	*GWh*	246	-	-	14.02	14.02	14.02	14.02	14.02	14.02	14.02
4	T-loss reduction	*GWh*	67	-	-	1.43	1.55	1.67	1.80	1.95	2.10	2.27
5	Savings in power purchase	*USD million*	24.35	-	-	0.84	0.87	0.90	0.94	0.97	1.01	1.05
6												
7	Investment	*USD million*	7.41	3.84	3.84							
8	O&M	*USD million*	5.26	-	-	0.30	0.30	0.30	0.30	0.30	0.30	0.30
9												
10	**Net benefit**	***USD million***	**11.68**	(3.84)	(3.84)	0.54	0.57	0.60	0.64	0.67	0.71	0.75
11	**FIRR**		**10.0%**									

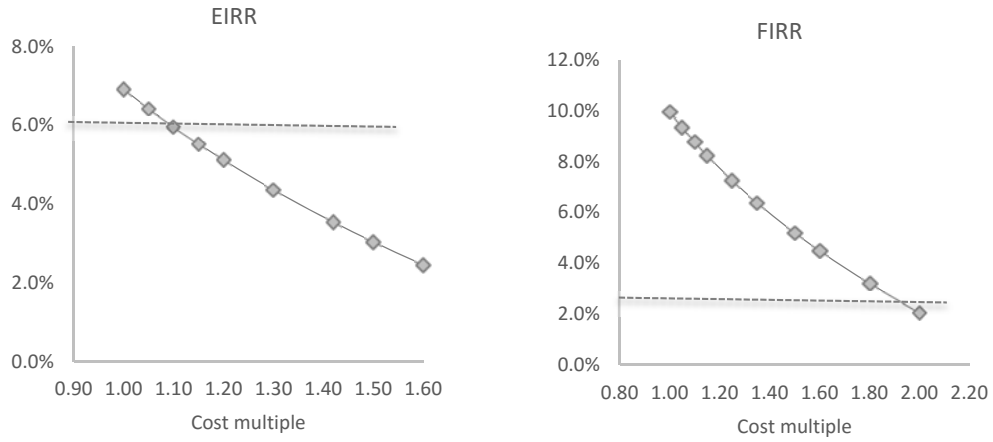
Sensitivity analysis

28. Sensitivity analysis suggests that

- The economic viability of the investment is highly sensitive to variations in costs due to the low cost of substituted power supply from Russia. The project will break even with a 10% cost overrun.

- Thanks to the SREP grant, the project's financial viability stands robust to withstand up to 92% cost overrun. Without the SREP grant, the FIRR will decrease from 10.0% to 4.3%; the FNPV will decrease from US$ 11.68 million to US$4.28 million; and the levelized cost of supply at the end-user level will increase from 5.4 US cent/kWh to 8.6 US cent/kWh.

Figure 6. 10 MWp solar PV sensitivity analysis



Analysis of Financial Viability of Project Entities

29. **Operational and Corporate Lay-Out of EBEDN.** EBEDN is state-owned company and was established as a joint stock company in 2011. The company is owned by the Ministry of Energy, State Property Committee and the Ministry of Finance, each of them having 41, 39 and 20 percent, respectively. EBEDN is licensed by ERC and functions as electricity distributor and regulated supplier of electricity. The company's mission is to supply reliable and quality electricity power for customer with minimum loss, and collect revenue of power energy sales in the shortest time. The company performs distribution and supply

operations to 4 provincial center and their 65,400 customers and more than 3,900 industries. A single customer, the "Erdenet Copper" mine is purchasing more than 82.6 percent of EBEDN's electricity sales, while the commercial and residential customers purchase 8.2 percent and 8 percent, respectively. In 2015, EBEDN purchased 1,023.4 million kWh electricity, supplied 986.2 million kWh to customers and 3.6 percent were lost in distribution (14.2 percent without mining).

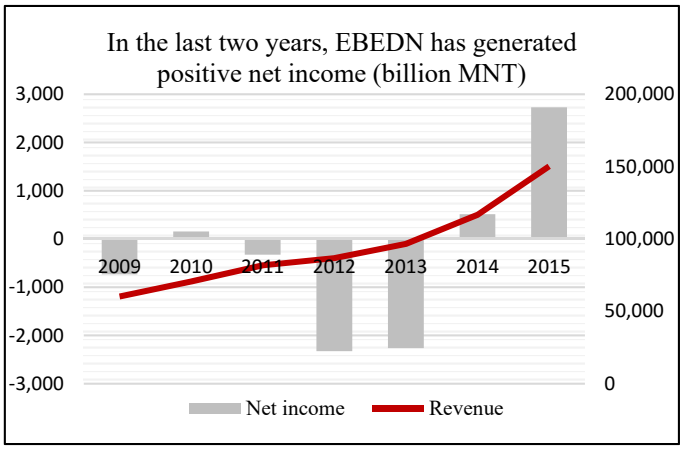
30. EBEDN has a vertical management system and all strategic decisions are made by the top management. A board of directors, comprised of 6 appointed and 3 independent members, determines the company's development policy, approves operational and investment plans, changes in the company's organizational structure, selects and appoint executive management, monitors and evaluate on the company's operating results. EBEDN is managed by a Chief Executive Officer (CEO) appointed by the board of directors who is supported by 2 deputy directors.

31. The central part of the company is organized in 10 divisions, 4 regional branches for each geographic area and 2 customer service center for Erdenet city. The company has 694 staff, out of them 207 work (34%) at the central branch and another 487 are based in the regional branches. The distribution and supply activities are managed separately only at the headquarters but not at the regional branches which creates unclear division of responsibilities. The lack of guidelines regulating the roles and responsibilities at each management level exacerbates even more this challenge. In practice, middle and junior management have no financial or decision-making autonomy and they only implement the top management decisions.

32. EBEDN's corporate structure should be made leaner that would allow the company to better attain its operational objectives and to achieve sustainable economic and financial results. Giving more responsibilities about the day-to-day operations to low and middle management, the operations will be improved to produce best possible value for customers.

33. **EBEDN's financial condition.** Despite the constant increase in sales revenues, net income has been fluctuating and only in the last two years the company has generated positive net income, amounting to 2,730.2 billion MNT in 2015.

34. In the 2009-2013 period, the total sales revenue was in the range of 60.3 billion MNT and 150.2 billion MNT. The main driver for the low or negative net income until 2013 was the rising operating expenses. This increase in operating expenses was driven by high salaries expense representing 40 percent of total costs which in the five-year period increased 2 to 3 times. In 2014, however, the financial situation of the company improved. This was mainly due to the reduction in distribution loss, decrease in the tariff of purchased electricity and increase in the sale price to customers.



Income statement

	2009	2010	2011	2012	2013
Sales	60,287,114	70,620,223	81,881,703	86,818,124	96,693,806
Cost of goods sold	54,496,054	63,609,627	73,832,575	79,075,206	87,633,590
Gross profit	5,791,060	7,010,596	8,049,128	7,742,918	9,060,216
Operating expenses	6,454,927	7,299,263	8,459,061	10,151,779	11,823,055
EBIT	-663,867	-288,667	-409,933	-2,408,860	-2,762,840
Profit before tax	-735,762	172,180	-325,983	-2,324,710	-2,264,299
Net income	-735,762	154,962	-327,119	-2,325,739	-2,264,299

35. As a result of the high cost of goods sold, the gross profit margin ratio during the period was low and in 2013 it reached 0.094. The rising operating expenses and high efficiency losses have caused the decreasing operating profit margin, which went negative in 2013 to -0.023. This trend was also apparent in company's ability to generate earnings after tax and other expenses, as the net income over the period was zero or negative (0 and -0.03).

36. During the same period, EBEDN's liquidity is low and the company has limited ability to pay short-term obligations. This trend can be seen by the low current ratio, demonstrating that the company has insufficient working capital. The ratio ranged between 0.45 and 1.13 and reached its lowest value in 2013, driven mainly by the negative net current assets.

Financial ratios

	2009	2010	2011	2012	2013
Gross profit margin	0,096	0,099	0,098	0,089	0,094
Operating profit margin	-0,012	0,002	-0,004	-0,027	-0,023
Net profit margin	- 0,01	0,00	- 0,00	-0,03	- 0,02
Current ratio	0,68	0,72	1,13	0,53	0,45
Working capital	-1,839,734	-1,598,299	437,924	-2,189,298	-3,383,840
Days of sales outstanding	49,10	28,54	24,85	21,97	14,55
Fixed asset turnover	2,16	2,35	2,43	2,46	2,15
Total asset turnover	2,38	2,62	2,86	3,08	2,67

37. The company is providing services more efficiently than the industry average, as shown by the operating performance ratios. A fixed-asset turnover ratio of 2.15 and asset turnover ratio of 2.67 indicate that the company's sales performance is relatively strong and the company is using assets well to generate sales. Days of sales outstanding has been decreasing to 14.55 in 2013, which means that the company is locking up less of its funds in accounts receivable, and so it has more cash flow for other purposes.

38. **Operational and Corporate Lay-Out of BSEDN.** BSEDN was established in 2001 as a state-owned joint stock company with the ownership distributed among the Ministry of Energy (41%), the State Property Committee (39%), and the Ministry of Finance (20%). BSEDN operates under an ERC license for electricity distribution and suppliers, servicing users in soums and relatively dispersed areas. It serves around 43,700 customers in 57 soums of 4 provinces. In 2015, around 296.4 million kWh of electricity per year were bought by NPTG, and BSEDN sold 268.3 million kWh to end-users and 9.48 percent were lost in distribution (including mining industry). The losses excluding the mining industry accounted for 25.7

percent. The consumed electricity was split between the mining sector (48%), commercial clients (24%), residential clients (21%) and state owned enterprises (7%).

39. The company's mission is to lead the development of the eastern region, with respect to community clients. BSEDN has vertical management system, where all strategic decisions are made by the top management. The company is governed by a board of directors, consisting of 6 appointed and 3 independent members, that determines the company's development policy, approves operational and investment plans, makes changes in the company's organizational structure, selects and appoints executive management, monitors and evaluates operations results. A Chief Executive Officer (CEO) is appointed by the board of directors, and three deputy directors (technical, finance and procurement, and common services) support his work.

40. The company has 5 regional branches, 10 departments and three divisions in the headquarters. In its central branch the company has 67 people staff and another 435 work in the regional branches, adding up to 602 staff. 58% of the regional branches staff is responsible for distribution activities, 27% for supply activities and the rest 15% for common services. Although distribution and supply activities are separated in the organizational structure, the rest of the corporate structure is characterized by unclear division of responsibilities given that there are no guidelines regulating the responsibilities of each management level. In practice, middle and junior management have no financial or decision-making autonomy and they only implement the top management decisions.

41. To better attain its operational objectives and to achieve sustainable economic and financial results, BSEDN's corporate structure should be made leaner. By allowing low and middle management to have more responsibilities for everyday operations, the operations will better produce value for customers.

42. **BSEDN's financial condition.** In 2015 the company distributed and supplied 268.3 million kWh electricity to end-users and generated 40.7 billion MNT total sales revenue, 12.5% out of which represented the operating expense, 86.7 % the cost of goods sold (COGS). Net income amounted to 227.1 million MNT.

Income statement

	2009	2010	2011	2012	2013	2014	2015
Sales	13,319,799	18,316,429	22,775,801	25,122,197	26,383,540	33,253,100	40,701,700
Cost of goods sold	8,383,865	11,692,842	14,937,236	17,044,995	18,455,458	33,695,800	35,320,700
Gross profit	4,935,934	6,623,587	7,838,565	8,077,202	7,928,082	-442,700	5,381,000
Operating expenses	4,502,911	5,961,570	7,341,957	7,866,771	9,048,406	882,000	5,068,600
EBIT	433,023	662,016	496,608	210,431	-1,120,323		
Profit before tax	662,526	745,375	587,879	301,432	-1,071,722	-1,324,700	312,300
Net income	590,513	636,577	517,748	238,896	-1,072,639	-1,325,800	227,100

43. In the period between 2009 and 2015 net sales were in the range of 13.3 billion and 40.7 billion MNT. Until 2013, COGS were high and steadily increasing and in 2015 the figure nearly doubled. Driven by the increasing salaries expenses, in the period 2009-2013, operating expenses rose and in 2013 they reached a level twice as high as the base year value. Until 2013 the company generated no revenue from its core operations. During the past two years, however, the operating expenses in 2014 consisting of

management cost and non-production cost were sharply contracted. The 2014 decline in operating expenses and the increase in revenues in both years drove financial recovery and positive net income in 2015.

44. Despite the relatively high gross profit margin, ranging between 0.3 and 0.37, operating profit margin decreased every year and in 2013 it plunged below zero. This trend was driven by high efficiency losses, rising operating expenses and declining activity level. Similarly, net profit margin, measuring company's ability to generate earnings after tax and other expenses, was marginally positive and negative in 2013.

45. Between 2009 and 2012, BSEDN had a good liquidity position with a current ratio between 2.51 and 7.69. In 2013, however, due to a sharp drop in working capital, the current assets were not enough to cover short term obligations, as also shown by current ratio value of 0.89.

Financial ratios

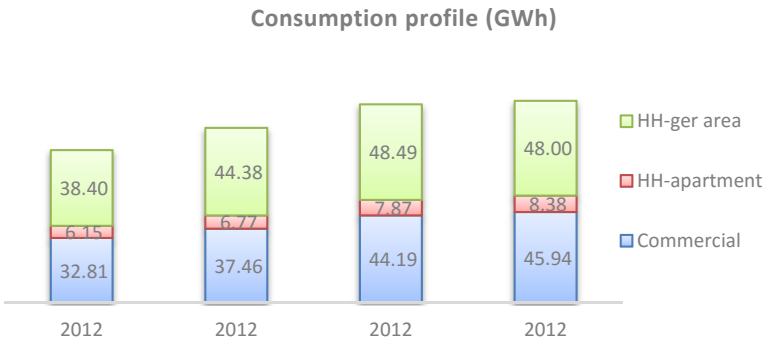
	2009	2010	2011	2012	2013
Gross profit margin	0,37	0,36	0,34	0,32	0,30
Operating profit margin	0,05	0,04	0,03	0,01	-0,04
Net profit margin	0,04	0,03	0,02	0,01	- 0,04
Current ratio	2,51	5,49	5,28	7,69	0,89
Working capital	1,037,381	1,611,116	1,770,566	963,828	-432,891
Days of sales outstandir	12,86	9,57	7,70	2,29	18,67
Fixed asset turnover	0,36	0,49	0,54	0,58	0,74
Total asset turnover	0,48	0,65	0,71	0,79	0,68

46. The company is facing difficulties in providing services efficiently, reflected in the deteriorating operating performance ratios. The days of sales outstanding has been increasing and reaching 18.67 in 2013. This demonstrates that over the period, the company has been having less funds available for investment in other purposes. Moreover, the fluctuation of fixed asset turnover and total asset turnover below 1 shows that the company has been inefficient in using its assets to generate sales.

47. **WRES's financial condition.** The Western region comprises three amaigs, namely Uvs, Khovd and Bayan-Olgii with a combined population around 267,000. The region borders with Russia in the north, and China in the east and south. WES SOJSC, the local state-owned electric utility company, serves this isolated region with most of its power supplied from Russian.

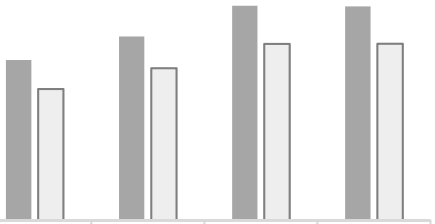
48. *Costs of supply*. In 2015, WRES SOJSC purchased a total of 143 GWh, of which 75% was imported, and 25% supplied by Durgun hydropower plant. Power imports are predominantly from Russia, currently priced at 3.33 RUB per kWh (5.1 USc/kWh). The power purchase tariff from Durgun established by the ERC is subsided at 37.55 MNT/kWh (1.5 USc/kWh) in 2015, about 33% lower than the actual cost of supply estimated at around 55.4 MNT/kWh (2.3 USc/kWh). The weighted average power purchase price is around 110 MNT/kWh (4.5 USc /kWh). Due to the expansive geographical span of the network, transmission loss in WES is as high as 10%, on top which the distribution system sees another 17.5% loss. After a system loss of approximately 26%, the weighted average cost of supply around 148 MNT (6.0 USc) per kWh sold to end users.

49. *Tariff*. In 2016, tariff is at 86.8 MNT/kWh (3.5 USc/kWh) for residential and 124.2 MNT/kWh (5.1 USc/kWh) for non-residential customers.[12] Residential customers account for approximately 55% of the total consumption. With residential customers accounting for approximately 55% of the consumption, the weighted average tariff is around MNT 104 MNT/kWh (4.2 USc/kWh), about 30% below the cost of goods sold. After accounting for O&M costs, operative losses were close to 50%. State support and other occasional non-operative gains reduced the losses, but were not able to recover significant part of the costs.



50. As a result, WRES SOJSC is in poor financial standing and operating at a heavy loss. The gap is filled by government subsidies. With demand growing rapidly in the period 2012-14, its operating losses has been mounting to very high levels resulting in an ever-increasing fiscal burden to the central government.

Supply and demand in WES (GWh)



	2012	2013	2014	2015
Power purchase	94.5	108.4	126.5	126.2
Demand	77.4	89.6	104.1	104.1

51. On the cash flow side, cash flow from operating activities had been negative, leaving little room for serious investments. In the past, strong financial cash flow was achieved with state financing, helping to bring the total net cash flow to the positive side.

[12]ERC Resolution 201 of 2015 http://en.erc.mn/index.php?newsid=26

	2010	2011	2012
Total Sales, million MNT	3,315	4,239	4,990
Total Sales, 1,000 USD	2,368	3,028	3,564
Profitability			
Operating profit margin	-142.8 %	-147.7 %	-153.6 %
Net profit margin	-23.7 %	-33.3 %	-17.8 %
Return On Rate Base	-6.4 %	-8.2 %	-9.7 %
ROE	na	-4.5 %	-2.7 %
Liquidity			
Current ratio	169.8 %	155.4 %	464.0 %
Quick ratio	139.8 %	139.3 %	348.3 %
Cash ratio	49.8 %	69.1 %	179.2 %
Defensive interval ratio	120	149	127
Days in receivables	na	160	148
Days in Accounts Payables	na	3	3
Days in inventory	na	20	30
Solvency			
Long-Term Debt to Equity ratio	144.3 %	140.1 %	124.1 %
Debt to Capital	60.1 %	60.0 %	56.1 %
Debt Service Coverage	na	na	na
Times Interest Earned	na	na	na
Self-financing ratio	na	na	na

52. By reducing WRES's cost of supply and transmission loss, the Project investment will improve the utility's financial bottom line, which, in turn, will also reduce its subsidy requirement going forward.

Annex 7: ESP2 Subprojects

1. Subprojects selected for inclusion in ESP2 (Group 1)

	Project Description	Beneficiary	Construction period		FS Status	Cost (US$ Million)			
			From	To		Total	WB	Grant	CF*
1	**Rehabilitation of Distribution Networks**					**15.2**	**15.0**	**0.0**	**0.2**
	Rehabilitation of 137.8 km 0.4 kV OHLs in Bulgan aimag center	EBEDN	6/17	12/18	Approved	2.0	2.0		
	Rehabilitation of 90.5 km 0.4 kV and 0.847 km 10kV OHLs in Arkhangai aimag center	EBEDN	6/17	12/18	Approved	1.6	1.6		
	Rehabilitation of 35/6-10 kV Substations "Umnud" in Erdenet city	EBEDN	6/17	12/18	Approved	1.7	1.5		0.2
	Rehabilitation of 45.3 km 0.4 kV OHLs and 34.8 km 0.4-10 kV cable lines in Baganuur district, 3 new substations 6-10/0.4 kV	BSEDN	6/17	12/18	Approved	1.8	1.8		
	Rehabilitation of 25.1 km 0.4 kV OHLs and 6.0 km 0.4-10kV cable lines in Sumber soum of Gobisumber aimag center, 4 new substations 6-10/0.4 kV	BSEDN	6/17	12/18	Approved	1.8	1.8		
	Installation of 14 switchgears with vacuum circuit breaker in "Baganuur" branch	NPTG	6/17	12/18	Approved	0.2	0.2		
	Installation of 29 switchgears with vacuum circuit breaker in "Khangai" branch. 4 of them are 35 kV switchgears, 25 of them 6/10 kV switchgears	NPTG	6/17	12/18	Approved	0.4	0.4		
	Software development for power system analysis and planning	NPTG	6/17	12/18	Approved	0.2	0.2		
	Single and three phase smart meters, AMI and AMR, and connect it to existing automated billing system	EBEDN, BSEDN	6/17	12/18	Approved	5.7	5.7		
2	**Solar Plant**					**16.3**	**8.0**	**8.0**	**0.3**
	10 MWp solar power plant, Mayangad	WES	6/17	12/18	Approved	16.3	8.0	8.0	0.3
3	**Capacity Building**					**1.0**	**1.0**	**0.0**	**0.0**
	Building capacity on procurement, financial management and safeguards	PMO and PIUs				0.2	0.2		
	Project management	PMO and PIUs				0.4	0.4		
	Technical assistance on drawings	PMO and PIUs				0.4	0.4		

Total Cost	**32.5**	**24.0**	**8.0**	**0.5**

*CF: counterpart financing

2. Subprojects under Consideration (Pipeline, Group 2)

	Project Description	Beneficiary	Construction period		FS Status	Cost (US$ Million)			
			From	To		Total	WB	Grant	CF
1	**Rehabilitation of Distribution Networks**					**13.3**	**13.0**	**0.0**	**0.3**
	Rehabilitation of 395.1 km 0.4 kV and 0.953 km 6-10 kV OHLs in Erdenet City, Kharkhorin soum and 2 other aimag centers, 5 new substations 6-10/0.4kV	EBEDN	1/19	12/20		3.1	3.0		0.1
	Rehabilitation of 219.65 km 0.4 kV and 77.9 km 6-10 kv OHL and 5.2 km 0.4-10 kV cable lines; 26 new substations 6-10/0.4 kV	BSEDN	1/19	12/20		2.9	2.8		0.1
	Transfer of 35/6 kV Substation "Uvur Shand" in Dornogobi aimag to 35/10 kV voltage level and increase capacity, rehabilitation of 2 times 6kV Switching Station in Baganuur district	BSEDN	1/19	12/20		1.3	1.2		0.1
	Single and three phase smart meters, AMI and AMR to be connected to existing automated billing system	EBEDN, BSEDN	1/19	12/20		6.0	6.0		
2	**Solar Plant**					**8.6**	**4.0**	**4.4**	**0.2**
	Additional solar power plant	WES	1/19	12/20		8.6	4.0	4.4	
3	**Capacity Building**					**1.0**	**1.0**	**0.0**	**0.0**
	Commercial projects for supply service	PMO and PIUs				0.2	0.2		
	Software and hardware supply	PMO and PIUs				0.8	0.8		
Total Cost						**22.9**	**18.0**	**4.4**	**0.5**

Annex 8: Scaling-Up Renewable Energy Program (SREP)

Results Framework

Indicator	SREP/IDA Project	Scaled-up Phase by 2023 (Government RE Target)
Additional RE Installed capacity (MW)	10	580
Annual electricity output from RE (GWh)	14.02	812.93
Number of women and men, businesses and community services benefiting from improved access to electricity and fuels Notes: *Mongolia's overall population is about 3 million people, average household size is 3.6, power supply net of 26% T&D loss is 10.37 GWh, average household consumption is 124 kWh per household*	25,000	1,455,000
Financing leveraged through SREP funding [$ million]	$12.5 million total, including: - $12 million IDA $0.5 million from the Government of Mongolia	$870 million total, including: - $696 million from the private sector - $87 million from MDB financing - $87 from the Government of Mongolia
SREP leverage ratio [1:X]	1:1	1:70
Tons of GHG emissions reduced or avoided -Tons per year [tCO_{2eq}/yr] -Tons over lifetime of the project [tCO_{2eq}] Note: Based on 25 years of project lifetime	6,200 tCO2e/yr 155,000 tCO2e	434,900 tCO2e/yr 10.8 MtCO2e
Co-benefits	- Increased energy security - Increased employment opportunities in rural areas - Improved economics for solar in Mongolia - Positive environmental impact on local air pollution	

A. Introduction

Country and Sector Context

1. Mongolia is the 18th largest (1,564,116 km^2) and the most sparsely populated country in the world. In 2015 Mongolia's population reached 2,959,134 with an annual growth rate of 2.3 percent. Ulaanbaatar, the capital and largest city, is home to about 64.4 percent of the country's population. The country hosts enormous mineral resource wealth estimated at US$1-3 trillion, with coal, copper, and gold being the principal reserves. Mining is the most significant sector of the economy, accounting for 20 percent of total output, and commodities constitute 82 percent of total exports. Mongolia's main export destination is China, which absorbs 88.9 percent of total exports.

2. Mongolia's power sector has been facing the challenge of reliably meeting fast growing demand. Although demand has been steadily increasing, driven by mining sector-led economic growth and urbanization, the energy production has remained subdued. This supply-demand gap has triggered more frequent and longer outages and forced distribution companies to reject a large share of new connection requests. Unless energy supply is expanded and is made more reliable through infrastructure investments and upgrades, hundreds of households and SMEs will be deprived of access to modern energy.

3. To meet the increasing demand for electricity, reduce heavy reliance on coal and improve energy security, RE solutions have been explored. Mongolia has abundant solar and wind power resources along with some hydropower opportunities and GoM has set the target to increase the installed capacity of RE sources to 20 percent by 2023 and to 30 percent by 2030, up from the current 3 percent; and have established FiTs for wind, solar and hydropower. As a result of the generous FiTs[13], a substantial number of licenses with PPAs have been granted to developers of solar power (with a total capacity of 200 MW) and wind power (with a total capacity of 450MW). Unfortunately these arrangements were made without proper consideration of the ability of the power grid to absorb this much variable power or with regard to the ability and willingness of electricity consumers to accept the necessary tariff increases. For this reason, the licensed developers have run into difficulties in establishing their plants, leaving most licenses in limbo[14].

4. The government is now considering how to more effectively and efficiently incentivize RE investment. Recent reports of auctioned solar PV plants that produce power at prices as low as 5-6 US cents/kWh in countries with solar potential similar to Mongolia's, have given rise to doubts about the existing model. GoM has decided to explore alternative models and in particular to understand cost implications of solar PV systems that are competitively procured. The WES has been chosen as the testbed for the first public solar investment due to its unsustainable dependency on power imports (70 percent of supply), its urgent need for generation expansion and low likelihood to attract private investment due to its remoteness and low overall load.

[13] The present FiT for solar is between 15-18 US cents/kWh depending on the size of the installation. Wind FiT is 8-9.5 US cents/kWh. The existing thermal plants generate at around 4-5 US cents/kWh which is also the level of end-user tariffs.

[14] A 50 MW wind farm is already in operation and another 50 MW wind farm under construction. For solar only 10 MWp have been constructed.

Investment Plan

5. The SREP IP, which was approved in November 2015, will support the GoM in comprehensively addressing the country's RE potential by supporting physical investments and implementing policy actions to create an enabling environment for sustained public and private investments. The SREP IP is part of the government's comprehensive plan which is expected to facilitate development of 20% of the RE target for year 2023 and 30% by year 2030.

6. The objectives of the IP are: (i) to support upscaling of rural RE by demonstrating the application of 25 MW wind and solar PV resources in a remote rural area of Mongolia; and (ii) to encourage private sector investment in utility-scale renewable. The World Bank implements $12.4 million allocation from the SREP IP to support the establishment of a 10 MWp solar PV power plant in the Western Region. The SREP IP's financing plan is presented below.

Figure 1 - Financing Plan

(US$ million)

	Private	SREP		MDB		GOM	TOTAL
	Sector	Total	ADB	WB	ADB	WB	
Investment Plan Components							
PHASE 1 - TRACK 1: Upscaling Rural Renewable Energy							
1. Solar PV power plants 2x10 MW	-	24.8	12.4	12.4	11.4	11.4	1.0	48.6
2. Wind Energy plant 1x5 MW	-	-	-	-	11.5	-	0.5	12.0
3. Small hydropower development x1	-	1.2	1.2	-	-	-	0.1	1.3
4. Shallow Ground Heat Pumps x5	-	1.0	1.0	-	-	-	0.1	1.1
5. Technical assistance	-	1.5	1.0	0.5	-	-	0.2	1.7
Subtotal	**-**	**28.5**	**15.6**	**12.9**	**22.9**	**11.4**	**1.9**	**64.7**
PHASE 1 - TRACK 2: Strengthening Renewable Energy Regulations							
6. Technical assistance for ERC and NDC	-	1.2	-	1.2	-	-	0.1	1.3
Subtotal	-	1.2	-	1.2	-	-	0.1	1.3
PHASE 1 TOTAL		**29.7**	**15.6**	**14.1**	**22.9**	**11.4**	**2.0**	**66.0**
PHASE 2							
7. Scale up / replication in WES and AuES (20 MW)	5	-	-	-	35.0	-	3.5	43.5
8. Scale up / replication in EES (30 MW)	10	-	-	-	42.1	-	4.2	56.3
PHASE 1 and 2 TOTAL	**15**	**29.7**	**15.6**	**14.1**	**100.0**	**11.4**	**9.7**	**165.8**

B. Project description

7. The development objective of the proposed project is to improve reliability and sustainability of electricity services in Mongolia. The proposed Project aims to achieve its objectives by, inter-alia, supporting the development of one or two solar power plants. The investment includes construction of grid connected solar PV power generation capacity in the WES. The purpose of the component is to support upscaling of rural RE by demonstrating the application of solar PV resources in a remote area and the cost implications.

8. Utility-scale solar PV generation presents a clean and reliable source of power generation. For WES, the solar power supply will primarily substitute power imports from Russia, thus enhancing the energy security of the system. The 10 MWp solar PV plant to be constructed is assumed to result in a transmission loss reduction of 1.0% because of supply moving closer to the load center. It is also assumed to reduce future investments in the transmission networks. As a clean source of power supply, solar PV generation will also help reduce GHG emissions by substituting power generation from the Russian grid. The average grid emission factor of the Russian grid is estimated at 0.443 kg/kWh. Finally, adding the 10 MWp solar PV is expected to allow about 6,690 households in the Western region for increased access to clean energy and improved quality of electricity service, thus contributing to reducing poverty and providing a solid foundation for increased prosperity.

9. **SREP Additionality.** The SREP funds are critical to address a market failure that is specific to the isolated grids of Mongolia. In the absence of the SREP funds to demonstrate viability of RE, the development and engagement of the private sector in clean energy development would take considerable time or not even materialize given the significant levels of perceived risks. Currently, there are no private sector plays in the WES. The proposed SREP-funded Project will pave the way for the further expansion of the RE market in Mongolia by demonstrating viability of RE engagements and attracting private sector investments.

10. In parallel, the regulatory support with SREP grant and other trust funded activities linked to the proposed Project is expected to strengthen the regulatory framework to remove barriers for private participation in power infrastructure and ultimately move towards a more sustainable energy sector development path. Through this work, key areas of engagement with the MOE, the NDC and the ERC are system analysis and operations, energy policy support, assistance with PPAs and RE pricing and market evolution.

C. Assessment of Proposed Project with SREP Investment Criteria

Increased installed capacity from RE sources

11. The Project will support the investment in a 10 MWp Grid Connected Solar Photovoltaic Power Plant and Maintenance Program. It will support design, supply, construction, commissioning and operation and maintenance of the 10 MWp solar plant to supply electricity directly to WES' distribution network. The solar PV array will be installed near the Myanagad substation in Hovd aimag and managed by WES' distribution network, as identified and agreed upon.

12. Depending on the availability of funds after financing the 10 MWp subproject, other potential sub-projects of investments on solar PV plants could be supported, which may bring additional installed capacity and electricity generated from RE. Subprojects brought forward for financing will be appraised when the feasibility study and needed safeguard documents have been prepared. The sub-projects will be selected based on key parameters, including: (i) priority areas for development and the match with the PDO; (ii) remaining funds of the Component and proposed subproject investment cost; (iii) technical and economic justification; and (iv) readiness for implementation in terms of environmental and social aspects.

Increased access to energy through RE sources

13. The proposed Project aims to provide utility-scale solar capacity to the isolated grid of the Western Energy System. Previously undertaken pilot projects of electrifying remote soum centers using wind-diesel, solar-diesel and diesel-only systems showed poor operational results suffering from insufficient operation and maintenance which led to low availability factors. This, in turn, led the country to grid-electrify all soums, which are now looking to meet their growing energy demand in a reliable and sustainable manner. The Project will increase access to modern energy services for businesses, communities, and households, and supply of RE to communities that already have access; thus improving the quality of access by in part displacing Russian imports that embed a substantial content of thermal generation.

Low Emission Development

14. The proposed Project will support Mongolia's initiatives toward a low carbon emissions development pathway by harnessing the country's abundant RE resources, contributing to the national long-term target of 30% RE by 2030. As a clean source of power supply, solar PV generation will also help reduce GHG emissions by substituting power generation from the Russian grid. The average grid emission factor of the Russian grid is estimated at 0.443 kg/kWh[15]. Using this emission factor, the estimated GHG emission reduction is 6,200 tCO2e per year or 155,000 tCO2eq over the lifetime of the solar PV generation facility, hereby estimated at 25 years. Going forward, during the Scaled-up Phase when the penetration of RE reaches 20% by 2023, the expected GHG emission reduction at the grid's emission factor of 0.535 kg/kWh is about 434,916.5 tCO2e per year and 10,872,912 tCO2e over an estimated useful life of 25 years of the underlying power plants – assumed to be utility-scale solar PV with a capacity factor of 16%.

Affordability and competitiveness of renewable sources

15. As result of the project investment, WES utility will purchase less power from Russia. Power imports saved equal to the sum of the power generation from the solar PV plant and the reduced transmission loss to the network. The cost of electricity is low in the WES, with the weighted average tariff being around 4.2 USc/kWh. Electricity rates have been kept low by the central government subsidies for affordability-related issues. The Project will support keeping electricity costs low by reducing cost of supply and transmission. By reducing the WES's cost of supply and transmission loss, the Project investment will improve the utility's financial bottom line, which, in turn, will also reduce its subsidy

[15] According to IEA's *Russia 2014 (*https://www.iea.org/publications/freepublications/publication/Russia_2014.pdf.), Russian grid's generation mix comprises of 49.1% of natural gas, 16.6% of nuclear, 15.7% of coal, 15.5% of hydro, 2.6% oil and 0.3% of biofuel and waste. The emission of factor of natural gas, coal and oil are assumed at 0.553 kg CO_2/kWh, 0.962 kg CO_2/kWh and 0.767 kg CO_2/kWh, respectively (source: http://www.eia.gov/tools/faqs/faq.cfm?id=74&t=11)

requirement going forward. In parallel to the implementation of the proposed Project, SREP-funded TA will help address some of the barriers affecting private sector investment in cost competitive utility-scale RE. An enhanced regulatory framework will encourage private sector investments in utility-scale solar PV and wind energy, which are cost competitive with existing thermal generation options provided coal externalities are considered and prevailing subsidies are removed from thermal power.

Productive use of energy

16. The proposed Project will positively affect productive uses of energy given the improved reliability and quality from the potential increase in solar energy-based power. This will act as a demonstration project for Mongolia, thus encouraging investment in RE projects, which could contribute to meeting Mongolia's growing energy demand. Ensuring an adequate level of capacity additions with an emphasis on bringing on-line clean megawatts is key to mitigating the risk of disruptions in the provision of electricity service by means of brown- and black-outs. Such disruptions reduce the potential for productive use of energy. Minimizing their occurrence can reduce overall system costs and improve productivity for businesses.

Economic, social and environmental development impact

17. *Improved energy security.* WES relies for over 70 percent of its electricity supply on imports from Russia. The investment in a 10 MWp capacity of Grid Connected Solar Photovoltaic Power Plant in WES will primarily substitute power import from Russia, thus enhancing the energy security of the system. It will have great implications in terms of greening, diversifying the energy mix and increasing energy security of the country. Solar power is not affected by price fluctuations and delivery of fuel unlike power imported from the Russian grid. Making WES more independent of imported power from Russia will be a hedge against future tariff hikes if Russia were to increase the present export price.

18. *Employment opportunities.* The development of a 10 MWp solar PV power plant will generate employment opportunities to local population. WES is the poorest region in Mongolia with 26 percent poverty headcount rate as of 2014. Given that the region is characterized with high unemployment rate and the main livelihood of the local people is hunting and fishing, the construction and maintenance of a PV plant is expected to generate jobs and economic benefits for the local population.

19. *Environmental impact.* The proposed Project will bring in positive environmental impact, not only by avoiding greenhouse gas emissions through production of clean energy but also by reducing local air pollution emissions which would have otherwise occurred from thermal power generation. At the local pollution level, a solar PV plant will contribute to reducing emissions of sulfur dioxide (SO2), nitrogen oxides (NOx), and total suspended particulates (TSP).

Economic and financial viability

20. A cost-benefit analysis was carried out for the 10 MWp solar PV plant in the WES. The project costs comprise of investments and on-going O&M. The investments are expected to generate global environmental benefit in terms of avoided GHG emissions. With a discount rate of 6%, the project investment in a 10 MWp solar PV plant in WES is expected to generate an ENPV of $1.7 million with an estimated economic EIRR of 6.9%. Moreover, with a WACC of 2.5%, the project investment in a 10 MWp solar PV plant in WES is expected to generate a FNPV of $11.68 million with an estimated FIRR of 10.0%.

The financial value of the reduced power purchase is at the current import tariff of 3.33 rubles or 5.1 US cent per kWh or 6.0 US cent per kWh at the end-user level, growing at an assumed annual rate of 3.0%. Without the SREP grant, the FIRR of the component will decrease from 10.0% to 4.3%; the FNPV will decrease from US$ 11.68 million to US$4.28 million; and the levelized cost of supply at the end-user level will increase from 5.4 US cent per kWh to 8.6 US cent per kWh.

Leveraging of additional resources

21. The proposed Project is estimated to cost $24.4 million, of which $12 million IDA financing, $0.5 million counterpart financing and $12.4 million SREP grant. Therefore, a leveraging of about 1:1 is expected as a direct consequence of the project interventions, as envisaged in the SREP IP. The Project is also expected to demonstrate the viability of solar power in the isolated grid of the WES, possibly mobilizing private sector funding for additional clean energy investments at a later stage, which will contribute to the achievement of GoM's ambitious RE target, 20% by 2023 and 30% by 2030. The scaled up phase is expected to bring on-line 580MW of clean energy, which priced at $1.5 million per MW, is expected to leverage $870 million in sustainable power investment.

Gender

22. It is expected that the solar investment proposed through this Project will equally benefit women and men in terms of better security, reliability and sustainability of power supply. It is also expected that such investment will open up opportunities for targeted job creation for women (e.g., through the establishment of requirements including that plant operators provide earmarked jobs for women) and, possibly reduce their time from collecting woods and other biomass for fuel use.

Co-benefits of RE scale up

23. The development impact of this Project will support achieving the following results associated with the SREP IP, including: (i) supporting low-carbon development pathways by increasing energy security; (ii) increasing supply of RE; and (iii) new and additional resources for RE projects/program.

24. *Supporting low-carbon development pathways by increasing energy security is expected to have two main co-benefits: (i) avoided GHG emission; and (ii) employment opportunities.* On the former, SREP investments will improve energy security and reduced dependence on imported fossil fuels. They will provide clean and reliable energy sources, and will reduce GHG emissions from the avoided use of fossil fuels. The capacity building TA could potentially facilitate development of hundreds of megawatts on new RE capacity with huge reducing impact on CO2 emissions from coal based power generation. In terms of employment opportunities, SREP funding will support job creation and skills development related to the construction/installation, operation and maintenance of renewable technologies. The employment opportunity will extend to the remote Western Region of the country, which is lagging behind in economic development and income as compared to the country's average. Education of the workforce in the deployment of these technologies will be a feature of the Western Energy System RE project. The SREP intervention is expected to encourage private sector participation and create new economic activities and jobs related to these RE technologies.

25. *Increasing the supply of RE is expected to translate into an increased reliability co-benefit.* The establishment of RE sources of 10 MWp in the Western Energy System could contribute to obtaining around 19% of electricity to the region from the new RE plants where demand is typically met by imports from Russia and other conventional fuels sources. The SREP interventions are expected to contribute to increasing energy security. Solar PV will generate electricity during high-demand daytime periods and will similarly enhance supply adequacy and reliability during the hours of the day in which the value of lost load and losses are typically the highest.

26. *Finally, new and additional resources for RE projects/program are expected to reduce the cost of RE*. SREP investments will facilitate the reduction of electricity imports and promote a higher level of energy independence. The country lacks indigenous natural gas resources, and is landlocked; not only can it be expected that the cost of importing gas will be high but high dependence on neighboring countries for gas supply involves fuel supply risks that may be very costly to mitigate.

D. Monitoring and Evaluation

27. Overall monitoring and evaluation of the project activities will be performed by the PMO to be established within the MOE and headed by a Project Director – this position will be filled by the Director General of the Energy Policy and Planning Department of MOE. The PMO will monitor project implementation against the performance indicators listed in the Annex 1 – Results Framework every six months. The PMO is familiar with M&E procedures, given its experience with the previous Bank-supported ESP1. Data and statistics on actual project outputs and outcomes will be gathered, analyzed and included in the quarterly progress reports to be submitted to the Bank.

E. Implementation Readiness

28. Country and Energy Sector Strategies: The GoM has taken actions to support energy sector development in the country. Legal frameworks include: Energy Law (updated in 2011), Renewable Energy Law of Mongolia in 2007, which stipulates the attractive feed-in-tariff by different renewable sources and Concession Law in 2010 to promote the private sector participation. It has also approved a number of development programs such as: Program on Integrated Energy System of Mongolia, National Renewable Energy Program (RE capacity target: 20% of total generation capacity by 2020), and Comprehensive Policy on National Development which contains concrete short-term and long-term strategies for the development of the energy sector. The Government has also taken several initiatives for RE deployment. Most notably: (i) from 2000 to 2012, the GoM implemented the successful National 100,000 Solar Ger Electrification Program, which provided access to modern energy to over half a million nomadic herders through Solar Home Systems; and (ii) the first grid connected mega-watt scale wind farm (50 MW Salkhit wind farm) was put into operation in 2013, which generates about 170 GWh per annum.

Institutional Arrangements: A PSC has been established to provide overall strategic and policy guidance and facilitate coordination among different agencies on project implementation. It will be chaired by MOE and will comprise representatives from MOE, MOF, Ministry of Environment, local government, etc. A PMO will be established within MOE headed by a Project Director – this position will be filled by the Director General of the Energy Policy and Planning Department of MOE. Some of the PMO staff are familiar with Bank-funded projects and have developed internal capacity through the implementation of

the ESP1. WES has agreed to appoint two safeguards officers (environment & social). Candidates will be selected, based on existing skills, interest and willingness to learn. They will be trained along with the distribution companies' staff and PMO Safeguard staff. The PMO will also include a safeguards staff member, with existing environmental expertise who will be dedicated to safeguards related matters for the solar investments.