ADB TA 8727 REG

CAREC: Study for Power Sector Financing Road Map

Mobilizing Financing for Priority Projects

Mongolia

September 2016

pwc

CAREC

List of Abbreviations

ADB	Asian Development Bank
ADO	Asian Development Outlook
AT&C	Aggregate Technical & Commercial Losses
AuES	Altai-Uliastai Energy System
BOO	Build-Own-Operate
BOOT	Build-Own-Operate-Transfer
BOT	Build-Operate-Transfer
CAIFI	Customer Average Interruption Frequency Index
CAPS	Central Asian Power System
CAREC	Central Asia Regional Economic Cooperation
CES	Central Energy System
CHP	Combined Heat and Power
CIS	Commonwealth of Independent States
CRET	Central Regional Electricity Transmission Company
CTG	Coal-to-Gas
CTL	Coal-to-Liquid
DBM	Development Bank of Mongolia
DBOT	Design-Build-Operate-Transfer
EAP	Energy Action Plan
EBRD	European Bank for Reconstruction and Development
ECA	Export Credit Agency
E-CASAREM	East-Central-South Asia Regional Electricity Market
EES	Eastern Energy System
ERC	Energy Regulatory Commission
ES	Energy System
ESCC	Energy Sector Coordinating Committee
ESO	Energy Supplying Organizations
FDI	Foreign Direct Investment
FSL	Fiscal Stability Law
FSU	Former Soviet Union

GDP	Gross Domestic Product
GOM	Government of Mongolia
G-T-D	Generation-Transmission-Distribution
HPP	Hydro Power Plant
IEA	International Energy Agency
IFI	International Financial Institutions
IPO	Initial Public Offering
IPP	Independent Power Plant
IPPPD	Innovation and Public Private Partnership Department
JICA	Japan International Cooperation Agency
kWh	Kilowatt-hour
MEoD	Ministry of Economic Development
MNT	Mongolian Tughrik
MSE	Mongolian Stock Exchange
MTPP	Medium Term Priority Project
MW	Mega Watt
NDC	National Dispatching Centre
PLF	Plant Load Factor
PPA	Power Purchase Agreements
PPP	Public Private Partnership
R&M	Repair and Maintenance
RDC	Regional Dispatch Centers
RDTA	Research and Development Technical Assistance
REC	Regional Electric Grid Companies
REFIT	Renewable Energy Feed-in Tariff
RPMP	Regional Power Sector Master Plan
SAIFI	System Average Interruption Frequency Index
SAIDI	System Average Interruption Duration Index
SEP	State Energy Policy
SPC	State Property Committee
SREP	Scaling-up Renewable Energy Program
TA	Technical Assistance
TOE	Tons Of Oil Equivalent

TPP	Thermal Power Plant
TTPP	Tavan Tolgoi Power Plant
UBEDN	Ulaanbaatar Electricity Distribution Network Company
UHV	Ultra-High voltage
UNDP	United Nations Development Programme
USAID	United States Agency for International Development
USD	United States Dollar
WES	Western Energy System

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1. National power sector overview

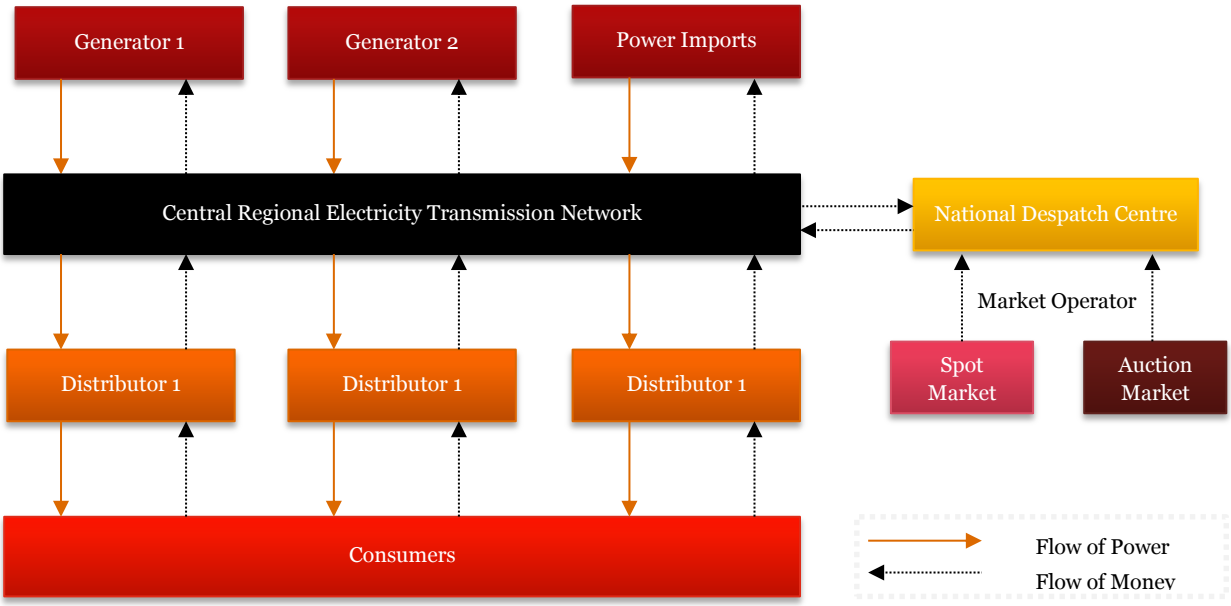
The power system of Mongolia consists of five key energy systems. The Central Energy System (CES) is the largest followed by four smaller energy systems. Most of the smaller energy systems were developed around coal supply zones. The electricity sector is primarily owned and operated by commercialized state-owned enterprises (SOEs).

In this section we have provided a brief description of the companies involved in the sector, including their roles and ownership structures. We have also discussed about the historical electricity demand and supply situation in the country along with the regulatory landscape and governing institutions of the sector.

1.1. Industry structure and institutional arrangements

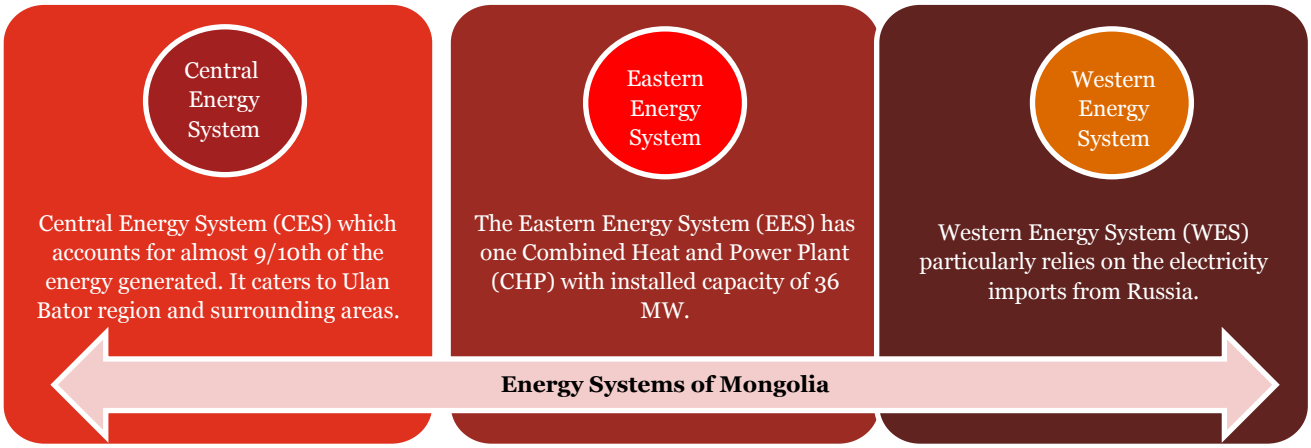
The power sector in Mongolia was deregulated in 2001 through enactment of the Energy Law of Mongolia. The Law sought to vertically segregate the sector into generation, transmission and distribution companies. After enactment of the Energy Law, the government approved Resolution 164 on introduction of structural reforms in the energy sector. This resulted in 18 state-owned companies involved in generation, transmission or distribution, and operating under the framework of the 'Single-Buyer Model'. The detailed list of companies is provided in Appendix B of the report:

- Generation: Five generation companies arranged around Thermal Power Plants (TPPs) - UB, Darkhan TPP and Erdenet TPP
- Transmission: Central Regional Electricity Transmission Company (CRET)
- Dispatch: National Dispatching Center (NDC) which regulates the National Grid
- Distribution: Regional electricity distribution network companies (EDNs) including UB, Darkhan-Selenge, Erdenet-Bulgan, Baganuur and South-Eastern Region
- District Heating Network Companies (DHN) including UB and Darkhan



The **Energy Regulatory Authority (ERA)** regulates the energy generation, transmission, distribution, supply and dispatch in the country. It approves prices and tariffs, awards licenses to operators and monitors compliance with terms & conditions/ requirements of licenses.

The energy sector in Mongolia has three key independent systems as shown below:



Apart from the above systems, there are the Altai-Uliastai (AUES) autonomous energy systems, Dalanzadgad steam power plant and diesel generators (some 600 diesel units with capacities ranging from 60 to 1000 kW) with provisional operations installed at small settlements.

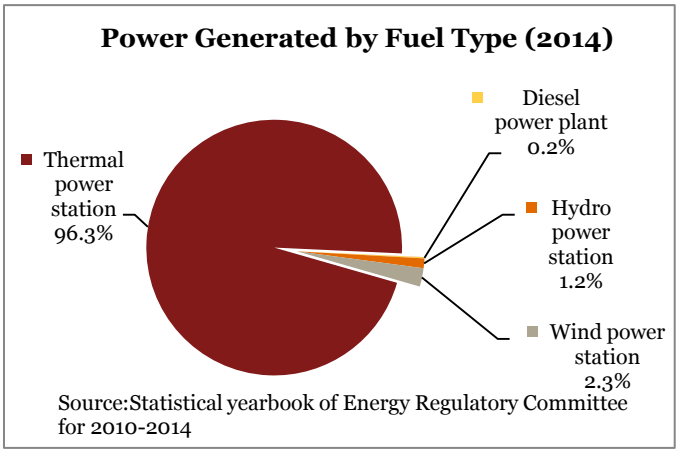
1.2. Power supply and demand

1.2.1. Power supply

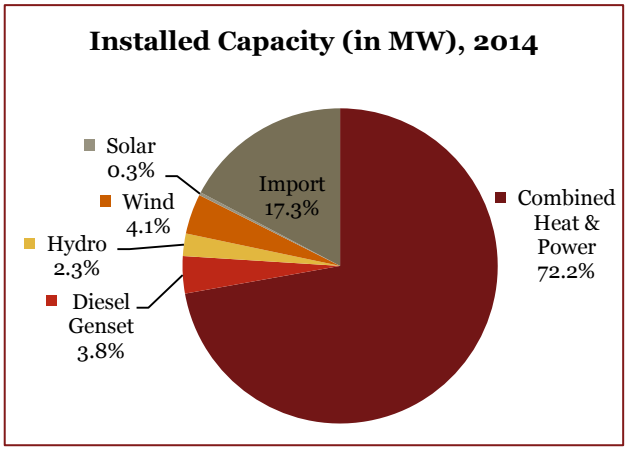
Mongolia has abundant deposits of minerals such as coal, copper, fluorspar, and gold. Among the minerals, coal is the most significant and abundantly available. Coal is the mainstay of Mongolia's primary energy accounting for more than 2/3rd of the energy share. Power generated by coal based thermal power plants accounts for more than 90% of total domestic generation.

Mongolia lacks natural gas deposits and depends on oil imports. Majority of the oil imports is primarily from Russia followed by China and the Republic of Korea.

Approximately, 96.3% of the power generated in Mongolia comes from thermal power plants followed by wind and hydro. A very small portion of the energy is generated from diesel generators which is used mainly in the far flung rural areas. The charts and table below show the installed capacity in Mongolia as well as the energy generated by different types of fuel.



Source:Statistical yearbook of Energy Regulatory Committee for 2010-2014



(Mn kWh)	2010	2011	2012	2013	2014
Thermal power station	4256	4450	4775.5	5014	5191.3
Diesel power plant	21.4	20.2	28.7	5.4	8.2
Hydro power station	35.3	52.6	52.1	59.9	66.3
Wind power station	0	0	0	52.9	125.4
Solar power station	0	0	0	0	0.6
Total production	**4312.7**	**4522.8**	**4856.3**	**5132.2**	**5391.8**

Source: The Institute of Energy Economics, Japan

It may also be noted that only about 4/5th of Mongolia's total installed capacity is available for power generation since most of the power plants are old and operate at a reduced capacities.

Mongolia has a 220 kV line interconnected with Russia's Siberian grid for peaking power supply. Electricity imports from Russia account for around 1/10th of the total electricity demand. Typically around 10 MW of power is imported from Russia into the WES and around 130 MW into the CES during peak demand hours. The maximum available capacity from Russia is 250 MW. The country also has connection with China through a 110 kV line that transmits power from the Chinese northern grid to the Oyu Tolgoi mines in South Gobi region. The net import from China was around 997.3 Mn kWh during 2013.

These imports are primarily aimed at meeting seasonal variations in electricity demand especially during times of peak demand. The table below shows the historical trend in import of power from Russia.

Year	2008	2009	2010	2011	2012	2013
Overall Power Imports (Mn kWh)	198	157	263	276	366	1,196

Source: IEA

1.2.2. Power demand

Mongolia has witnessed a significant structural change in energy demand wherein the industrial energy demand has swiftly increased in the last 8 years, from 464,000 tons of oil equivalent (TOE) in 2000 to 623,000 TOE in 2010, mostly due to rapid industrial growth.

For the power sector of Mongolia, the two main areas which require the Government's attention are the growing demand for electricity and the heating demand, both of which have increased almost by two folds[1] since early 2000s. This has mostly been driven by rapid growth in the mining segment and increasing urbanization rate in the capital city of Ulaanbaatar. The industrial sector is the largest consumer of electricity, accounting for about 62 % of the total power requirement.

Mongolia's power sector is unable to meet the daily system demand due to the poor peaking capability of ageing power plants which were commissioned during the Soviet era. The table below captures the historical electricity consumption, demand and peak production in Mongolia over the last few years.

1 GHG Mitigation Scenarios in Energy Sector, MEGD,

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012
Electricity Consumption (GWh)	2219	2341	2486	2675	2922	2900	3154	3421	3746
Demand (in MW)	431.9	461.1	490.8	528.9	583.0	578.4	634.7	689.2	758.2
Peak Production (in MW)	600.8	613.6	666.9	704.8	733.5	828.4	895.3	998.3	857.1

Source: Report-Updating Energy Sector Development Plan for Mongolia, 2013

During the cold winter nights when electricity loads are low but heat loads are high, there is excess generation of electricity from the CHP plants which is exported to Russia. The table below reflects the historical trend in export of power to Russia.

Year	2008	2009	2010	2011	2012	2013
Overall Power Exports (Mn kWh)	16	18	22	24	21	18

Source: IEA

1.3. Sector regulation

1.3.1. Key aspects of the legal and regulatory landscape

Regulatory structure and capacity

The regulatory function of the Mongolian power sector is being handled by the Energy Regulatory Agency (ERA). In 2012, ERA was expanded and renamed as Energy Regulatory Commission. The number of regulators was increased to five and external representatives were also included in order to strengthen the agency autonomy. The Chairman and 2 Commissioners are nominated by the Cabinet Minister in charge of energy and 2 part-time Commissioners are nominated by the Mongolian National Chamber of the Trade and Industry and Consumer Right Protection Association appointed by the Prime Minister. The Chairman and Commissioners are appointed for staggered terms of 2, 4 & 6 years which may be extended once for an additional term of 3 years. The appointed personnel may be removed from their post on justified grounds of expulsion. The Commission also has provision for part-time advisory boards comprising of equal numbers of consumers and licensees as representatives under the Regulatory Board.

Electricity market structure

The Mongolian energy market currently operates primarily on the basis of the single buyer model. The unbundling of the power sector by introduction of the Energy Law was soon followed by the commencement of wholesale power market operations with contracts between generators and distributors.

Since 2002, the Central Regional Electricity Transmission Network has been operating as the single buyer in Mongolia's energy market. It purchases power from five power generation companies and also imports power from Russia and then sells it at regulated prices to the ten distribution companies. One of the key differences between the working of this model in Mongolia and in other parts of the world is the presence of regulated prices.

"Single Buyer Market" model played a positive role in the development of the national power system during difficult times. It prevented the power system infrastructure from financial collapse and helped maintain reliable operation of the power system by bringing financial stability to the power sector.

Setting of tariff

In Mongolia, the Energy Regulatory Commission (ERC) is responsible for setting tariffs. The Energy Law has provisions for regulating the principles of tariff fixation. The law states that tariffs will be determined separately for each licensed activity including generation, transmission, distribution & dispatch of electricity.

Increase in end-user tariff was planned on an annual basis from 2010, but was implemented in 2011 & 2013, in a two-tiered approach.

- In July 2013, tariffs were increased by 30% to MNT130 ($0.078) per kWh for mining firms, 18.32% to MNT88 ($0.053) per kWh for businesses, while for residential consumers it remained flat at MNT79 ($0.047) per kWh for users up to 150kW and MNT96 ($0.058) for those above 150kW.
- Given that these levels of tariff are not sustainable for the power utilities operating in the country, the government grants subsidies to the power sector which have been recorded in the State budget since 2010. In 2013, the total subsidy granted to the power sector via the State budget was MNT60 billion ($36 million).

Focus on renewable energy: Feed-in tariff

Mongolia has vast resources of renewable energy and has favorable climatic and weather conditions so that it can use these resources effectively. The Government intends to implement policies to achieve the objective of increasing the percentage share of renewable energy in the total energy production of the country. The State Energy Policy, 2015 clearly outlines government priorities for ensuring environmental sustainability and promoting green development.

The implementation of the program had been envisaged in two stages:

- Phase 1 (2015-2023)
- Phase 2 (2024-2030)

The target as per the program has been summarized hereunder:

Details	Phase 1 (2015-23)	Phase 2 (2024 – 30)
Overall	20% share of renewables in energy mix	30% share of renewables in energy mix
Emission of greenhouse gases for every GCal of energy generation	0.49 ton CO_2 equivalent	0.47 ton CO_2 equivalent
Reserve margin of electricity generation installed capacity	Not less than 10%	Not less than 20%

The SEP emphasizes on utilizing abundant solar and wind resources available in Gobi desert region of Mongolia for electricity generation so as to export electricity to North-Eastern Asian countries. There is a large capacity Renewable Energy complex built in the Gobi desert region. One of the major aims of the SEP is to increase Mongolia's cooperation with regional countries in implementing Gobi-Tech initiative. Moreover, the

amendments to the Law on Renewable Energy during June 2016 clearly looks to improve the financial situation of single buyer model of the power sector and ensure feeding tariffs in the Law.

2. Power sector development and investment plan

Mongolia has abundant deposits of minerals such as coal, copper, fluorspar, and gold. Among the minerals, coal is the most significant and abundantly available, which is used as fuel. Coal is the mainstay of Mongolia's primary energy, accounting for more than 2/3rd of the energy share. Power generated by coal based thermal power plants accounts for more than 90% of total domestic power generation.

The main areas requiring urgent attention for sustainable progress of Mongolian power sector are the growing demand for electricity and the heating demand, both of which have increased almost by two folds[2] since early 2000s due to rapid growth in the mining segment and increasing urbanization rate in the capital city of Ulaanbaatar.

2.1. Objectives driving sector development

Mongolia has taken impressive strides in developing its economy over the past decade. The main driver of this rapid development has been the expansion of the mining sector. With increasing commodity prices in the world market for the last 15 years, the mining sector's share in GDP has increased from 14 to 25%. [2]

The rise in Mongolia's energy demand has also been driven by the rapid development of the country's mining based economy. Mining output expanded by 20.7%, due to the ramp-up of copper production at the vast Oyu Tolgoi mine, which started in June 2013. During the next five years, major mining projects of copper (Oyu Tolgoi project) and coal (Tavan Tolgoi project) will reach their full capacity and are expected to result in further economic growth and electricity demand.

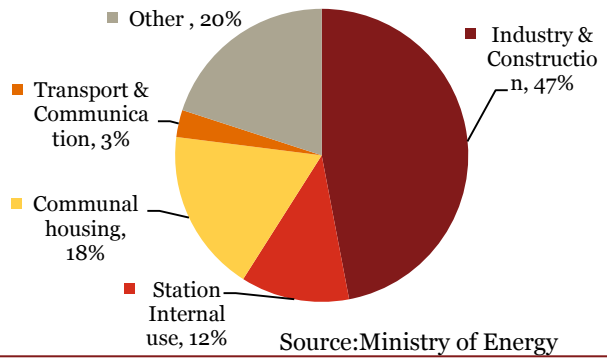
The energy sector of Mongolia contributed to around 6% of GDP in 2012 and has been strongly influencing the social and economic evolution of the country. Power demand in industry, transportation, agriculture and households have increased by 30% since 2008. However the installed capacity growth has increased at a modest rate of 6.8%.

GDP growth (%) by sector (Source: ADB Asian Development Outlook)

Year	GDP	Agriculture	Industry	Services
2008	8.9	4.7	-0.8	16.6
2009	-1.3	3.6	-0.4	0.8
2010	6.4	-16.6	4.3	9.8
2011	17.5	-0.5	9.1	16.8
2012	12.4	21.6	9.9	16.3
2013	11.7	13.5	20.1	10.0

Source: ADB ADO

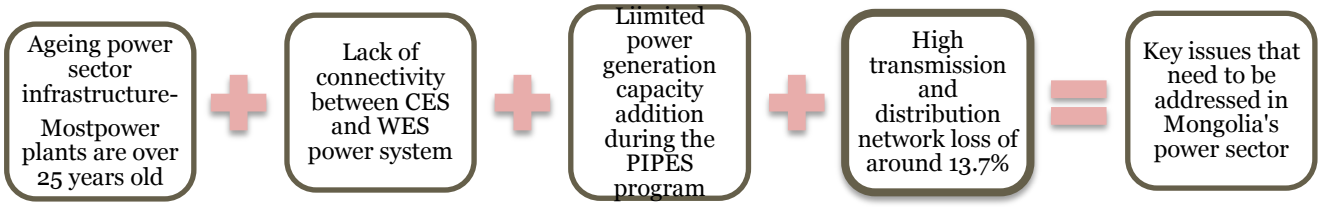
Electricity Consumption by sector



Source:Ministry of Energy

[2] A snapshot of Mongolia's Macroeconomic overview is provided in Appendix A

The Program on Integrated Power Energy System of Mongolia (PIPES), ratified by the Parliament in late 2007, has aimed at enhancing the generation capacity and improving efficiency. However the implementation of the PIPES was not successful when it came to addition of newly constructed power plants. Planned power generation projects were not constructed as per scheduled time. Meanwhile the demand for power grew



steadily. Moreover, the reserve margin of installed capacity in the power system got reduced from the required suitable level. This was because Mongolia lacks local power generating sources to operate in peak-demand which could cover operational regime and provide stability to the entire power system. The schematic below captures the key challenges that Mongolia's power sector currently faces:

Given these challenges, the State Energy Policy of 2015 envisages to fully provide reliable operation of the energy utilities, energy security, sustainable development and economic growth of the country and also improve participation of private players in the sector. It aims to create an efficient and environment friendly energy sector based on efficient regulations and competitive market principles so that Mongolia can become a reliable energy exporting country.

State Energy Policy (SEP), 2015

On 19th June 2015, the Parliament approved the State Energy Policy (SEP) which replaced the National Program for Renewable Energy of 2005 and the National Program for Integrated Energy System of 2007. The SEP document is expected to be used as a basis for implementing measures such as improving the legal and institutional framework of the energy sector, managing utilization of primary energy resources, constituting fuel reserve, guiding electricity & heat generation and power supply activities, introducing PPPs in the energy sector, providing a regulated competitive market framework for the sector and introducing capacity building & capacity reinforcement guidelines.

Envisaged objectives: The energy policy sets forth a vision to make the country a source of reliable and secure energy supply. This will be accomplished by assessing the current situation and challenges of the energy sector and identifying the actionable strategic goals and objectives. Mongolia aims to fulfill the following strategic goals:

- Ensure the security and reliability of energy supply;
- Develop mutually beneficial relationships with the regional countries with respect to energy;
- Develop and improve the human resources capacity in the energy sector;
- Transition the energy sector to a private sector based regulated and competitive market;
- Introduce innovation and advanced technology to enhance energy efficiency;
- Increase renewable energy generation.

The table below shows the major targets according to the State Energy Policy of 2015 across the two phases:

Key Targets of State Energy Policy 2015			
Key Aspects	**2014 (Base Year)**	**First Phase (2015-2023)**	**Second Phase (2023-2030)**
Installed power generation reserve	-10%	not exceed 10%	not exceed 20%
Heat source capacity reserve of the major cities	3%	not exceed 10%	not exceed 15%
Profit norm for electricity price structure of central region	-16.22%	0%	5%
Internal usage of thermal power plants	14.40%	11.20%	9.14%
Electricity transmission and distribution loss /not including Oyutolgoi's import/	13.70%	10.80%	7.80%
The proportion of the total installed capacity of renewable energy for domestic consumption	7.62%	20%	30%
Greenhouse gases to produce 1Gcal power energy	0.52 tonn CO_2 equivalent	0.49 tonn CO_2 equivalent	0.47 tonn CO_2 equivalent
Reduction volume for construction heat loss	0%	20%	40%
Technology	High pressure technology	Sub critical pressure technology, To use natural gas, Large-scale charge trap system, Header station	super critical and too super critical high pressure technology To use hydrogen, To use solar energy
Source: State Policy On Energy Sector,2015-2030			

Alignment of the power sector objective of Mongolia with the CAREC Energy Work Plan, 2016 – 20

The table below provides a brief overview of alignment of Mongolia's power sectors goals and objectives with the CAREC EWP 2016-20

No	Element of EWP	Objectives of Mongolia's State Energy Policy,2015
1.	**Developing the East-Central Asia-South Asia Corridor**	• The development of the North East Asia Super grid that is expected to be part of East-Central-South Asia Regional Electricity Market (E-CASAREM) will link Mongolia with the other CAREC members and facilitate power transmission. • The 2nd phase of the SEP, 2015 envisages that during the period from 2024-2030 Mongolia will become one of the countries that will actively participate in energy trade in the North-East Asian region.
2.	**Promoting Regional Electricity Trade and Harmonization**	SEP envisages a mutually beneficial long-term agreement for importing and exporting power to neighboring countries and extending collaboration.
3.	**Managing Energy-Water Linkages**	-
4.	**Mobilizing Financing for Priority Projects**	SEP envisages increased private sector participation in power generation and power distribution. The National program for implementing State Policy on Energy Sector will be financed with the collaboration of public and private sectors through: • Foreign and local investments; • Issuing shares on stock exchange; • State Budget and investment programs; • Cooperation with international financial organizations; • Loan funds and other sources.
5.	**Implementation of Energy Sector Priority Projects.**	The SEP lists out key power generation and transmission projects that need to be implemented between 2015 and 2030 to achieve the SEP targets.
6.	**Capacity Building and Knowledge Management**	The SEP focusses on developing and improving human resource capacity in the energy sector.
7.	**Promoting and Prioritizing Clean Energy Technologies**	• Creating a favorable legal and tax environment in order to increase renewable energy investments and establishing a financing mechanism to promote Renewable Energy based power generation are key priorities of the SEP. • Mongolia will leverage its abundant solar and wind resources available in Gobi desert region to export electricity to North-Eastern Asian countries from a large capacity RE complex built in that region and cooperate with regional countries in implementing Gobi-

No	Element of EWP	Objectives of Mongolia's State Energy Policy,2015
		Tech initiative.

2.2. Projected supply and demand

Drivers of demand growth

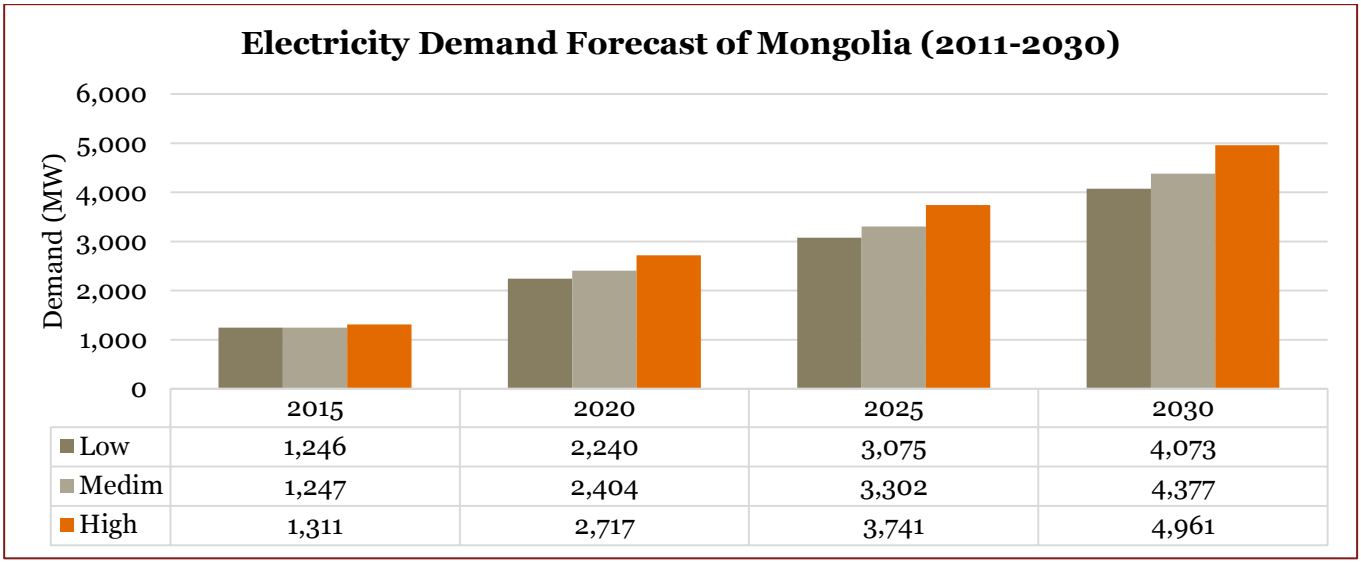
The key drivers of electricity consumption in Mongolia are indicated in the schematic below:

Residential
- Increasing consumers of electricity as well as population growth
- Increasing use of appliances

Commercial /Government
- Increasing floor space
- Office hours

Industrial
- Growth of metal fabrication, mining and other industries with heavy power demand (it is envisaged that mining will account for 1/3rd of Mongolia's power demand by 2030)

A growing mining sector, intensive industrialization & construction activities in and around Ulaanbaatar, Darkhan and Erdenet cities, in South Gobi and in the provinces, and consistent connection of remote aimags and soums to the centralized power grid, are the key reasons for the increasing power demand. Specifically, the power demand in South Gobi is expected to grow steeply to around 400 MW by 2020[3]. The graph and the table below shows the electricity demand forecast of Mongolia till 2030 under different scenarios of economic growth.



	2015	2020	2025	2030
Low	1,246	2,240	3,075	4,073
Medim	1,247	2,404	3,302	4,377
High	1,311	2,717	3,741	4,961

Sr. No.	Scenario	Driver	Economic Indicator	Forecasted Demand (MW)
1.	Low Growth	Includes organic growth associated with existing domestic, commercial & industrial consumers (Oyu Tolgoi i.e.	GDP will grow in real terms from USD$1,600 in 2013 to USD$3,600 per	4073

[3] Source: Mongolian power sector: Background and current policy (2014)- Representing UBEDN , Mongolia

Sr. No.	Scenario	Driver	Economic Indicator	Forecasted Demand (MW)
		OT & Tavan Tolgoi i.e. TT are significant loads associated with mines)	capita by 2025. Electricity consumption will grow from 1,700 kWh per capita in 2013 to 2,880 kWh per capita by 2025.	
2.	Medium Growth	Assumes that industrial development takes place over 30 years period in Northern Zone, Central Zone & Southern Zone	GDP is expected to grow to USD$5,300 per capita by 2025. Electricity consumption is expected to reach 3,660 kWh per capita by 2025.	4377
3.	High Growth	Assumes that industrial growth takes place over 20 years period	GDP is expected to reach USD$7,300 per capita by 2025. Electricity consumption will grow to 4,700 kWh per capita by 2025.	4961

Key supply sources

The envisaged growth of electricity demand necessitates increasing the existing power generation capacity and leveraging Mongolia's renewable energy sources. It is important for the country to build power stations (high capacity hydropower, wind parks and solar systems) near mining deposits.

It is envisaged that coal fired power plants will account for 35-40% of the total installed capacity. Thus, development of long-awaited power projects such as the CHP 5 in Ulaanbaatar and the Tavan Tolgoi Power Plant (TTPP) along with some coal mine-mouth plants, will significantly increase Mongolia's power generation capacity in the years to come. The mine mouth power generation plants will aid mining operations. Some of these may also be utilized for supplying excess power to the grid or towards power exports. With the rehabilitation and modernization of CHP4 and the Hushuut, Mogoin Gol power plant, Mongolia could add approximately 750 MW of new CHP power plants and also approximately 1,200-1,800 MW of coal based power plant between 2018 and 2025[4].

The table below captures the estimated installed capacity from key power plants vis-à-vis the envisaged demand in Mongolia till 2030.[5]

Power Plant/Generation Source	Y2020	Y2025	Y2030
Total Capacity MW	**3,284**	**5,023**	**6,007**

[4] Source: Updating Energy Sector Development Plan
[5] PwC analysis based on major proposed power plants based on SEP 2015 and Updating Energy Sector Development Plan

Power Plant/Generation Source	Y2020	Y2025	Y2030
Forecasted Demand (MW)	**2,404**	**3,302**	**4,961**

The SEP, 2015 clearly outlines the completion of the following projects between 2015 and 2023:-

1. Combined Heat and Power Plant 5 in Ulaanbaatar and coal-fired condensing type thermal power plants at Tavantolgoi and Baganuur.

2. Completion of the Egiin Hydro Power plant.

3. Construction of a thermal power plant in Western region of Mongolia, a hydropower plant on Khovd River and a thermal power plant in eastern region's Dornod province.

Assuming timely completion of the above projects by 2023, the government aims to achieve the goal of doubling the installed electricity generation capacity of Mongolia and start using highly energy-efficient equipments. They also intend to create a conducive environment for diversifying the energy mix by creating not less than 10% of hydropower capacity in the total installed capacity and having 10% of capacity reserve margin. The period from 2024 to 2030 is earmarked as the period for exporting electricity and sustainably developing renewable rnergy in Mongolia according to the State Energy Policy, 2015.

Trading potential

The feasibility of large scale electricity export to Russia is restricted to a great extent by the fact that Russia's Central Siberian Plateau region is energy-rich with a substantial surplus of coal, natural gas and hydropower resources. However, current proposal for export oriented projects include the development of a 3,600MW (6 x 600MW) mine-mouth coal power plant complex for electricity export to China. The envisaged total installed capacity of the complex is expected to rise to 10,800MW. A 500kV DC transmission line to China having length of 1,300km will be constructed. A 200kV DC connection to the CES will also be built. There are also plans of a 220 kV network that connects Russia, Mongolia and China, allowing power exchange among these countries. The connecting plan will play an important role for the Mongolian grid to increase system reliability and security.

Further, it is foreseen that the China North Grid, to which Inner Mongolia belongs, will be strongly interconnected to Beijing/Tianjin, China Central Grid and also to China Northeast Grid via a combination of 500 kV, 765 kV and ultra-high voltage (UHV) 1000 kV lines, including both AC and DC connections. This will change the electricity market situation and also open up long-term prospects of power exchange with the Korean and Japanese markets.

One of the key goals of the State Policy on the Energy sector, 2015 is quenching Mongolia's continuously growing energy demand in a reliable way and advancing the country to become an exporter of electricity. Power export is being seen as one of the means to support economic development of Mongolia. The key objectives

envisaged during the 2nd Phase of the State Energy Policy (2024-2030) for exporting electricity is sustainable development of renewable energy. It is envisaged that during this period Mongolia will be connected with neighboring countries through high capacity direct current electricity transmission lines for exporting electricity.

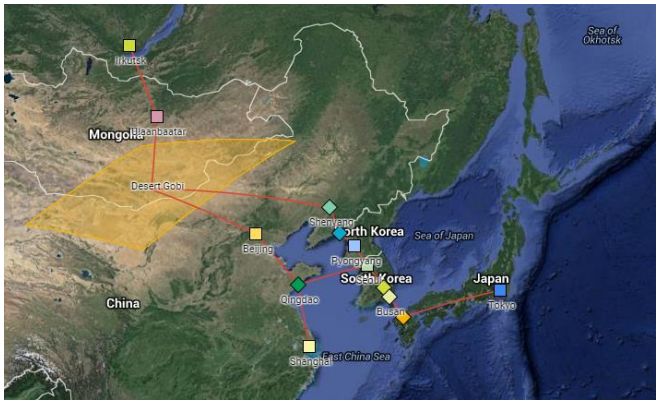
Renewable energy development plans

The Mongolian government has come out with a three pronged approach for implementing renewable energy plans with the focus being on households, local, national and regional grids.

Renewable Energy Program (NREP) - 2005	•Set goals for broad-based renewable energy development •Increase share of renewable energy technologies in total energy supply from 0.9% in 2005 to 3-5% by 2010 and to 20-25% by 2020. •To provide power to far flung areas and remote settlements, which are currently devoid of grid power including connection to small distributed RE system.
Mongolian Integrated Power System Program - 2007	•Create a unified power grid by connecting existing power systems. This will improve the reliability and cost effectiveness. •Plans to use renewable energy sources such as hydro, solar, wind, geothermal etc. .
The Renewable Energy Law of Mongolia - 2007	•Regulate the generation and supply of energy from renewable energy sources. •The energy regulator shall set feed-in tariffs for electricity generated & supplied by RE sources connected to a transmission network within the limits set out by the Law

GOBITEC & Asian Supergrid: The proposed Gobitec and the Asian Supergrid (ASG) project aims to produce energy from renewable sources in the Gobi desert and transmit the same to high demand regions across North- East Asia. The Gobi desert is seen as a region with high renewable potential with an overall solar and wind potential of around 2,600 TWh.

The power generated would be transmitted through the Asian Supergrid, which would connect Russia, Mongolia, China, South Korea and Japan. The Gobitec and the Asia Supergrid project will have a cascading effect on Mongolia's economic growth as well as contribute towards reduction of CO2 emissions and improvement of energy security. The Gobitec project is expected to have an installed capacity of 100 GW of wind and solar power. The Gobitec project costs are estimated at around USD 293 Billion along with a yearly maintenance costs of US 7.3 Billion. The image alongside shows the envisaged Asian Supergrid project which will transmit power generated from the Gobi desert to several North-East Asian countries.

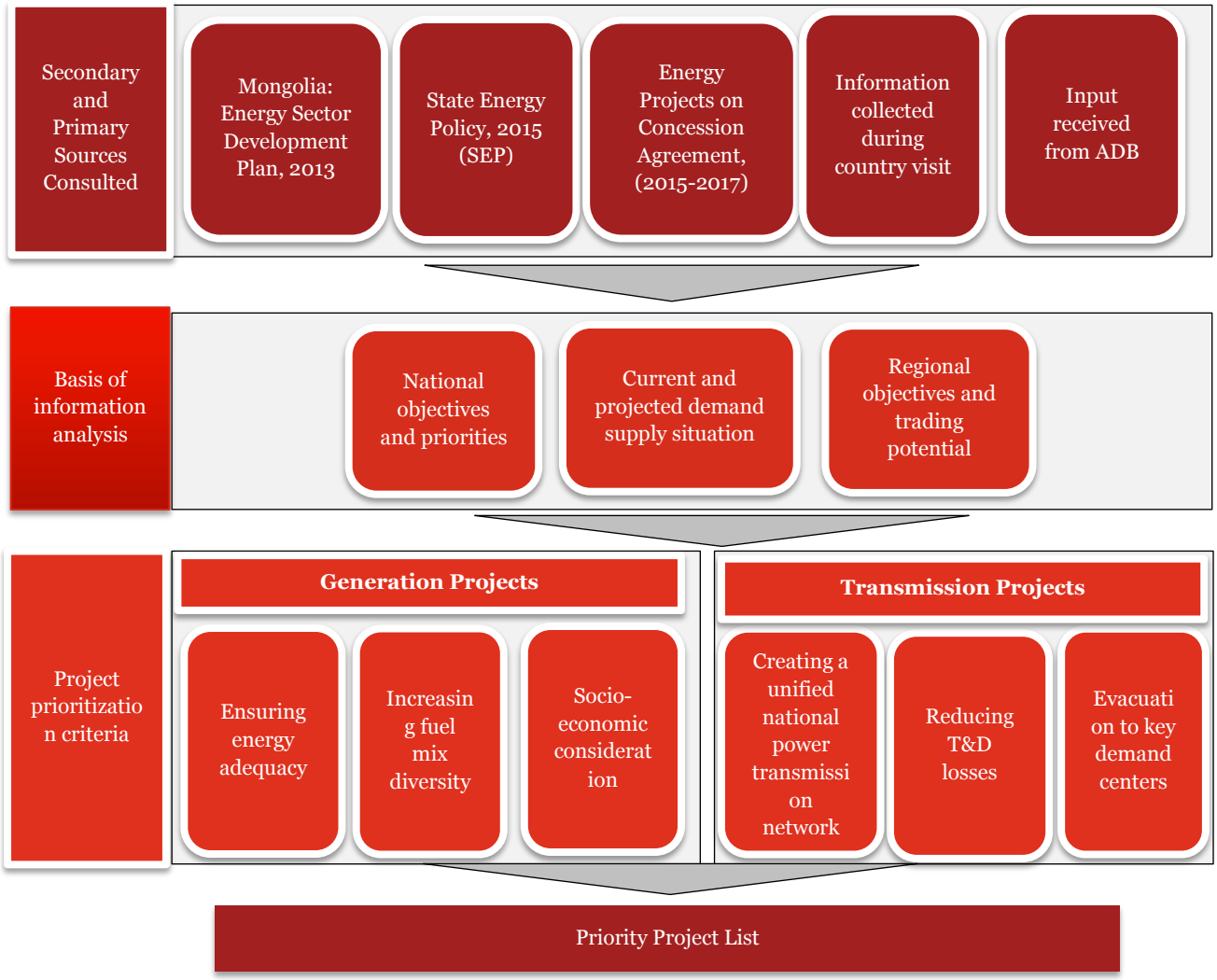


The focus for Government of Mongolia has been improving energy security by reducing reliance on imports from Russia and development of Renewable Energy Systems across Mongolia through grid-connected and off-grid projects. The SEP, 2015 lays down guidelines for intensive development of renewable energy in order to achieve 10% of capacity reserve margin by 2023. The second phase of SEP aims to achieve 20% of the security reserve capacity margin of the energy generating capacity with a share of RE based generation. While the GOBITEC project will diversify Mongolia's power generation mix away from thermal sources in a big way and also improve the energy security in the Dalanzadgad Energy System (DES) and other Energy systems, the focus will be on exports to North-East Asian countries. Off-grid Solar PV and Wind installations could play a key role in Mongolia providing power to the far-flung rural areas with limited access to grid power.

East-Central-South Asia Regional Electricity Market*:* The CASA-1000 power transmission line is the first phase of the East-Central South Asia Regional Electricity Market (E-CASAREM) development program, which envisions the creation of a shared power market among the countries of East, Central and South Asia. The line is expected to support up to 1,300 MW of clean electricity trade between Central Asia and South Asia.

2.3. Approach and key considerations for project prioritization

Based on assessment of the current and targeted macroeconomic and sector status, we have framed our approach to prioritize projects as shown below:



An initial list of projects was identified from updated Mongolia Energy Sector Master Plan (2013), the State Energy Policy (2015), Energy projects on the Concession Agreement List (2015-17) and in consultation with ADB. This was further discussed, during the country visit which took place between 23rd and 28th November 2015, with the CAREC energy focal points, ministries and various development partners. A holistic view of the power sector was obtained to understand the key government priorities, thrust areas and taking into consideration the existing and forecasted demand-supply situation vis-à-vis the regional objectives. This provided us with an understanding of the priorities for the power sector based on which we have identified the different categories of projects to be considered and also the key considerations/ criteria for project prioritization. A consultative methodology for prioritising the projects which included a mix of secondary research and inputs from our national consultants on a regular basis and subsequent analysis and review, have been followed to arrive at the list of priority projects.

Project selection criteria – Generation projects

The table below represents the key criteria for selection of generation projects from the initial list developed. These criteria along with rationale for selection are further discussed in brief below.

Criteria	Overview
Ensuring energy adequacy	• Ensuring energy adequacy is key to reducing dependence on fuel & power imports. • Fuel imports are unstable and often inadequate to meet demand. • Mongolia relies on power and diesel supply from Russia to meet its power demand. • The cost of power imports from Russia has increased over the years and fuel imports are also unreliable due to geo-political concerns.
Socio-economic considerations	• Overall socio-economic implications (e.g. the present level of electrification is 90% with plans to achieve 95% by 2016) of the projects is a key aspect that has been assessed for prioritizing the projects.
Increasing fuel mix diversity	• Mongolia's energy mix is heavily reliant on coal for power generation with almost 96% of power generated from thermal sources.

Project Selection Criteria – Transmission projects

The table below represents the key criteria for selection of transmission projects from the initial list developed. These criteria, along with rationale for selection are further discussed in brief below.

Criteria	Overview
Creating a unified national power transmission network	• Creating an integrated power system with a unified information, control & supervision system is a focus area with respect to the T&D network. This may be achieved by connecting the existing systems through high voltage electricity transmission overhead lines.
Reducing transmission & distribution losses	• T&D losses are at 13.7%, which is more than double the losses found in many developed countries. The SEP envisages reduction in T&D losses to 7.8% by 2030.
Evacuation to key demand centers	• Power generated from new power plants needs to be transmitted to regions with growing demand (e.g. industrial regions) to address the demand-supply imbalance. • This will entail constructing new sets of transmission lines and expanding existing infrastructure across specific transit routes.

Mongolia, currently, is connected only to China among the CAREC countries. While E-CASAREM initiatives have been taken up, it is imperative for Mongolia's power sector to first establish connectivity between the various energy systems and strengthen its existing network.

2.4. List of priority projects and investment requirements

The list of generation, transmission and other key energy projects are presented in the tables below[6]. It may be noted that the proposed time frame for commissioning of these projects is between the years 2017 and 2023:

List of Power Generation Projects

No.	Projects	Investment Type	Brief Description	Key Benefits	Investment Requirement (USD Mn)	Project Selection Criteria			
						Ensuring energy security	Socio-economic considerations	Increasing fuel mix diversity	Comments
1	Egiin Gol Hydro Power Plant	New	Proposed 315 MW hydro power plant on the Eg River in northern Mongolia.	Will help diversify its power generation mix.	1,000	✓	✓	✓	As Mongolia's power generation is challenged with insufficient capacity addition since 2007- focus has been on identifying new projects which will improve energy security and diversify the power generation mix.
2	Khovd river Hydro Power Plant	New	90 MW, HPP on Khovd river in Khovd and Bayan-Ulgii aimag.	Will reduce dependence on exports from Russia for the WES.	250	✓	✓	✓	
3	Dornod Combined Heat Power Plant	New	Proposed 50 MW new CHP dedicated to the Dornod Province.	The CHP will play an important role in improving generation capacity for the EES that relies on a single 36 MW CHP.	90	✓	✓	✓	

[6] Source: Report-Updating Energy Sector Development Plan (Volume I and II), List of Projects included on the Concession Agreement 2015-17-Government of Mongolia, List of major approved/proposed ADB energy projects in Mongolia, State Energy Policy 2015

No.	Projects	Investment Type	Brief Description	Key Benefits	Investment Requirement (USD Mn)	Project Selection Criteria			
						Ensuring energy security	Socio-economic considerations	Increasing fuel mix diversity	Comments
4	SREP	New	Scaling up Renewable Energy Program (SREP) will support the Government of Mongolia (GoM) in comprehensively addressing the country's renewable energy potential.	SREP investments will support the government's target of increasing the share of renewable energy (RE) in the country's energy mix.	150	✓	-	✓	SREP will assist in supporting physical investments and implementing policy actions to create an enabling environment for sustained public and private investments.
Total					**1,491**				

- Investment requirement for Project No' 1 is as per estimates from hydroworld.com (http://www.hydroworld.com/articles/2016/06/us-1-billion-proposed-315-mw-egiin-hydroelectric-project-in-mongolia-on-hold.html)
- Investment requirement for Project No 2 and 3 is as per estimates provided by CAREC country focal point
- Investment requirement for Project No. 4 was estimated assuming a cost of USD 1.83 per MW

List of Power Transmission Projects

No.	List of Power Transmission Projects	Investment type	Brief Description and Key Benefits	Investment requirement (USD Mn)	Project Selection Criteria			Comments
					Creating a unified national power transmission network	Reducing T&D losses	Evacuation to key demand centers	
1.	Power Line From Baganuur To Undurkhaan And Undurkhaan To Choibalsan & Substation	New Transmission Line	Power line will move power from Baganuur PP to the various regions.	40	✓	-	✓	Mongolia currently is connected only to China among the CAREC countries. While E-CASAREM initiatives are being driven, it is imperative for Mongolia's power sector to first establish connectivity between the various regions followed by strengthening existing network.
2.	"Choir" Substation Expansion	Expansion of Existing System	Choi SS can supply industrial users in the South Gobi area such as Oyu Tolgoi (OT), Tavan Tolgoi (TT), and other Regions which are seeing high power demand due to industrial activity.	25	✓	✓	✓	
3.	Power Transmission Line, Road, Substation And Bridge for EG Hydro	New Transmission Line	Transmit power from the EG Hydro project to the various regions.	20	✓	-	✓	

No.	List of Power Transmission Projects	Investment type	Brief Description and Key Benefits	Investment requirement (USD Mn)	Project Selection Criteria			Comments
					Creating a unified national power transmission network	Reducing T&D losses	Evacuation to key demand centers	
4.	High voltage overhead transmission lines and substation in route of Baganuur-Choir	New Transmission Line	Proposed 178 km OVTL to Transmit power from Baganuur to Choir.	36	✓	-	✓	
5.	High voltage overhead transmission lines and substation in route of Ulaanbaatar - Mandalgovi	New Transmission Line	Proposed OVTL to transmit power from Ulaanbaatar towards Mandalgovi.	120	✓	-	✓	
6.	High voltage overhead transmission lines and substation in route of Choir - Sainshand	New Transmission Line	Proposed 178 km OVTL and substation to transmit power from Choir towards Saishand.	490	✓	-	✓	

- Investment requirement for Project No.1,2 and 3 projects is based on PwC estimates
- Investment requirement for Project No.4, 5 and 6 is as per estimates from CAREC Energy sector focal point and other agencies.

GOBITEC International Initiative: The Gobitec concept represents the idea of producing clean energy from renewable energy sources in the Gobi Desert and transmitting the produced energy to regions with a high demand of energy. The transmission of the produced energy is planned to be done by using power corridors: the planned Asian Super Grid (ASG), connecting Russia, Mongolia, China, South Korea and Japan. The planned installed capacity is around 100 GW. The GOBITEC initiative will primarily be driven by international financial organizations and investment from other countries.

No.	Projects	Investment Type	Brief Description	Key Benefits	Investment Requirement (USD Mn)	Project Selection Criteria			
						Ensuring energy security	Socio-economic considerations	Increasing fuel mix diversity	Comments
1	GOBITEC	New	Gobitec concept represents the idea of producing clean energy from renewable energy sources in the Gobi Desert	Planned 100 GW capacity complex will deliver the produced energy to regions with a high demand of electric energy	293,000	✓	✓	✓	The delivery of the energy produced is planned to be using power corridors: the planned Asian Super Grid (ASG), connecting Russia, Mongolia, China, South Korea and Japan. The planned installed capacity is around 100 GW.

- Investment requirement for GOBITEC Initiative is as per estimates from the document "Gobitec And Asian Super Grid For Renewable Energies In Northeast Asia" (Link: http://www.energycharter.org/fileadmin/DocumentsMedia/Thematic/Gobitec_and_the_Asian_Supergrid_2014_en.pdf)

Description of power projects

Project Name	Brief Details
Eginn Hydro	A proposed 315-MW hydroelectric project in northern Mongolia. Construction of the dam for power generation to address peak demand during shortages will help reduce imports from Russia and improve the currently skewed generation mix.
90 MW Khovd River HPP	Proposed 90 MW HPP on the Khovd River, Bayan-Ulgii Aimag. The Khovd HPP although a small power plant will help complement the thermal power generation during the summer season. The Khovd Aimag is located in the central extreme west of Mongolia and requires a dedicated HPP to cater to the region's power demand.
Dornod Combined Heat Power Plant	This is a proposed 50 MW CHP plant for the Dornod province. This is an important project since majority of the existing combined heat and power plants in the Dornod, UB and Darkhan provinces were built from 1960-1980 which currently have a high percentage of aged leading to lower available power. Since the Eastern Region Energy System serves the Dornod province, the proposed CHP will play an important role in improving generation capacity for the EES.
SREP	The Scaling up Renewable Energy Program (SREP) will support the Government of Mongolia (GoM) in comprehensively addressing the country's renewable energy potential by implementing policy actions which would create an enabling environment for sustained public and private investments. The proposed SREP investments will provide impetus to the government's target of increasing the share of renewable energy (RE) in the country's energy mix
Power Line from Baganuur to Undurkhaan and Undurkhaan to Choibalsan & Substation	Includes a set of 220 kV and Overhead power line between Undurkhaan and Choibalsan and its substation project. This line will play an important role in evacuating the surplus power generated from the 700 MW Baganuur TPP (one of the nine Districts of Ulaanbaatar) to Undurkhaan (central mid-east of Mongolia) and thereafter to Choibalsan in the Dornod province (Eastern Energy System).
"Choir" Substation Expansion	Expansion of "Choir" Substation and Differentiation Station. This project involves the expansion on "choir" substation existing capacity of '220/110/35/6 kV to 200 MW as well as the expansion on existing capacity of 220/110/35/6 kV differentiation station. From Baganuur sub-station the power could reach Choir to supply industrial users in the South Gobi area such as Oyu Tolgoi (OT), Tavan Tolgoi (TT), and others. The Baganuur sub-station is linked with the Choir sub-station by a 220 kV one circuit 180 km long line. The line transmitter is AC 240 and the transmitter's peak current of one circuit is 605 A or 217 MW. The economically efficient maximum capacity is 96 MW. An expansion of the Choir substation will help cater to the growing power demand from South Gobi and other industrial regions. The image alongside shows the distance between the key power plants such as UB, Baganuur and Chandgdana and distances between them. The Choir

Project Name	Brief Details
	transmission route will play an important role by supplying power to the industrial regions with heavy demand in Gobi region.
Power Transmission Line, Road, Substation And Bridge for EG Hydro	Power Transmission facilities which includes a road, a substation and a bridge for EG Hydro is essential to leverage power generated from the EG HPP.
High voltage overhead transmission lines and substation in route of Baganuur-Choir	220 kV Overhead transmission lines from Baganuur to Choir with a length of 178 km along with a substation.
High voltage overhead transmission lines and substation in route of Ulaanbaatar - Mandalgovi	Transmission line and substation to transmit power from the city of UB towards Mandalgovi towards the Dundgovi province of Mongolia bordering the Gobi desert.
High voltage overhead transmission lines and substation in route of Choir - Sainshand	220 kV Overhead transmission lines from Choir towards Sainshand with a length of 216 km along with a substation. This transmission line will help transmit power from the Choir towards Saishand in the eastern Gobi desert.

Other key energy sector programs not included as priority projects

Apart from the power generation and transmission projects described above, below is the list of other key programs that have not been included in the list of priority projects.

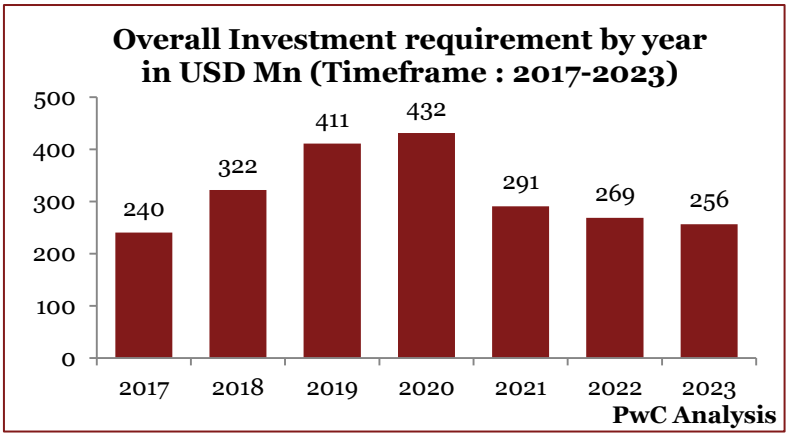
S.No.	Project	Investment Required (USD Mn)	Brief Details
1	Coal-to-Liquid (CTL)projects Coal to Cleaner Fuel Conversion for Heating in Ger District and Power Generation	2,000	• Promote the utilization of cleaner fuel using abundant domestic coal resources, thereby reducing the air pollution and over-dependency on imports of petroleum products for Mongolia
3	Energy Efficiency and Urban Environment Improvement	105	• Upgrade the electrical transmission and distribution networks in and around Ulaanbaatar and thereby improve energy efficiency, reduce transmission & distribution losses and also reduce emission of greenhouse gases and other air pollutants from existing power plants in Ulaanbaatar
4	Solar District Heating Supply in Rural Remote Areas Project	2.5	• Solar District Heating Supply Project in Rural Remote Areas will demonstrate central solar heating plants as cleaner and reliable heating system in one or two pilot centers

Other important sector programs that are at the early feasibility stage or development stage are as follows

- Coal-to-Gas (CTG) projects that will promote use of cleaner fuel for district heating and power generation.
- Northeast Asia Power System Interconnection - Northeast Asian super grid that integrates countries like Japan, China, South Korea, Russia (far east). This is an important initiative to harness renewable energy potential in the Gobi region and also promote regional power sector integration.

Project implementation and year-wise investment requirement for the power generation & transmission projects[7]

Thus, the total investment requirement for power generation and transmission projects in Mongolia is estimated at USD 2,221 Mn[8]. The proposed investment plan comprises of the generation and transmission projects (GOBITEC Initiative has been excluded from this list). We assume a project start-up year of 2017 and completion period of 7 years with a major portion of the investment envisaged between the years 2018-2020. The chart alongside captures the estimated yearly investment requirement till 2023 for the priority projects assuming project start-up from 2017 onwards.



Assumptions

- The time-frame in question i.e. 2017-2023 refers to a 7 year block when all key projects could be constructed with construction being initiated in 2017.
- We have assumed an estimated project start-up of 2017 for all the priority projects.
- Some selected hydropower projects (e.g. Egiin HPP) to commence construction on 2017 with a completion period of 8 years.
- Small-Mid-sized hydro power projects (e.g. Khovd Irver HPP) to commence construction in 2017 with a completion period of 5 years.

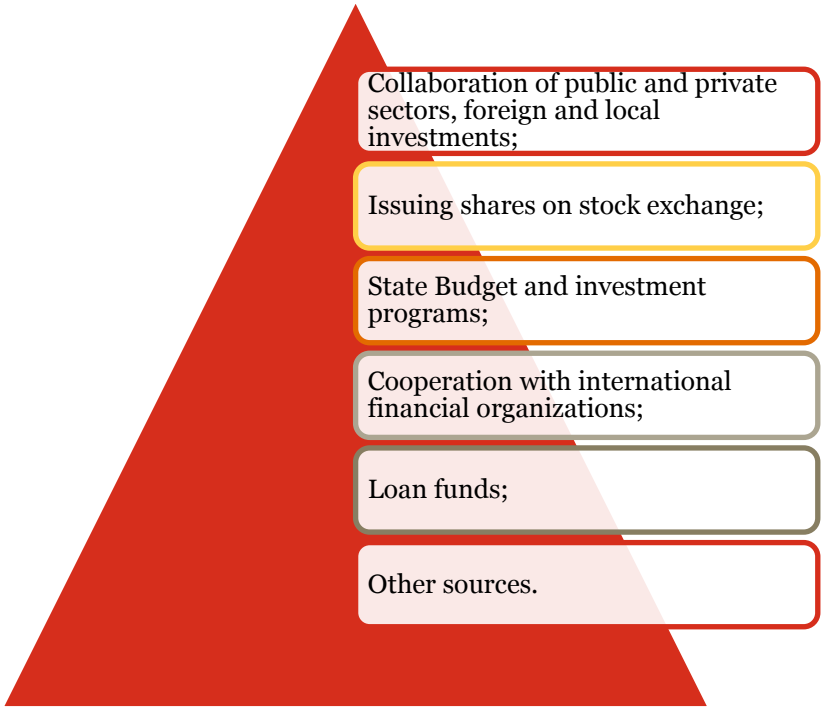
[7] We have provided a snapshot of the investment requirement as per Updating Energy Sector Development Plan for Mongolia (ADB TA 7619 – MON) in Appendix B.

[8] This excludes the investment requirement towards the GOBITECH initiative which will primarily be driven by international financial organizations and investment from North-East Asian countries.

3. Options for funding and financing power sector investment plans

In recognition of the fact that energy has become a binding constraint on the acceleration of GDP growth, the Government has placed the highest priority on allocating resources to this sector. Nevertheless, the investment needs are too large to be met only through the Government's own resources. It may be noted that the financial capabilities of the energy sector entities in Mongolia are not adequate to provide support in the form of investments, financing of major overhaul and maintenance & renovation since the electricity and heat retail tariffs have been set at levels lower than the costs. **The energy sector operated with a financial operating loss of 68 billion MNT in 2014.**

The national program for implementing the SEP envisages that the financing of projects will be from the following sources:



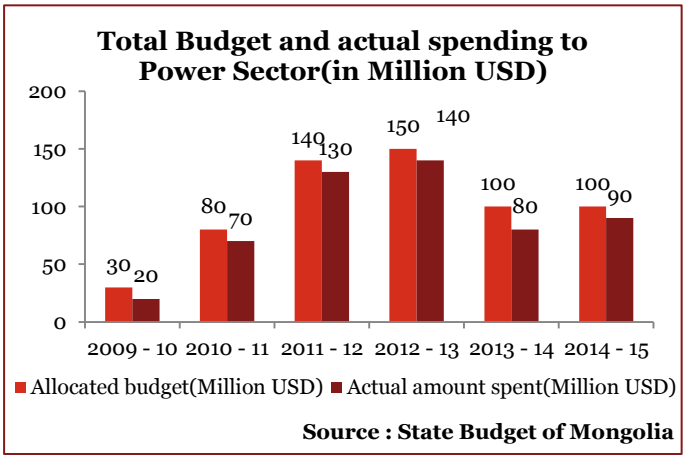
In line with the investment plan for Mongolia from 2017-23, proposed funding from National Government budget, other governments, assistance from development partners (ADB and World Bank) has been estimated and the funding gap has been determined. This gap needs to be filled up from other sources such as private investors, PPPs etc. The following section describes the proposed funding from each source in details.

3.1. National government

Mongolia has made excellent progress in developing its economy over the past decade. However, lately, the country is facing a serious balance-of-payments (BOP) pressures due to low FDI and weak commodity prices. This could impact the growth as well as funding /budgetary support from Government for power sector. Currently the power sector investments are driven by state owned companies implementing projects financed

through government and international financial institutions. Most of the funding has been dedicated to expansion and rehabilitation projects.

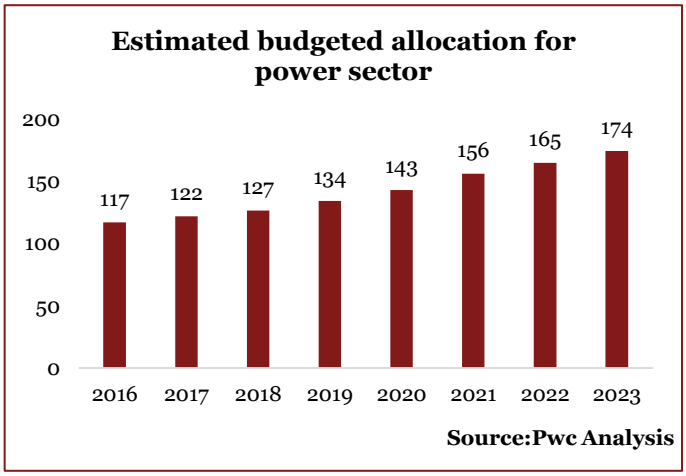
Investment for the energy sector in Mongolia has slowly increased over the years. As evident from the graph provided alongside the government has not been able to spend the entire amount allocated in each budget in the last 6 years.



According to the Mongolian budget, investments in the power sector are expected to increase over the medium term (2015-2020). The Government has taken measures to restrict the budget deficit, debt, and off-budget expenditures by adapting the Fiscal Stability Law (FSL) in 2015. They set a deficit and debt ceilings for 2015-18. The 2015 budget focused on controlling the structural deficit within 5% of GDP and to tighten to 2% of GDP by 2018. The 2016 draft budget is expected to limit the structural budget deficit within 4% of GDP, as required by the Fiscal Stability Law.

Government budgetary support over 2017-2023 is estimated at **USD 1,135 Mn** based on the following assumptions:

- Budget support assumed at 1% of the GDP based on trend of last 6 years.
- The estimations are based on actual amount spent by the Government during the last 6 years.
- Average GDP growth of 5.7% till 2023 (as per IMF projections till 2020).
- Estimation has been done based on current exchange rate.



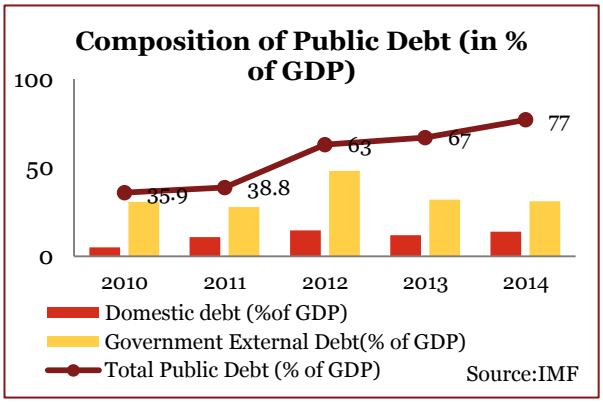
It may be noted that the variance between budget allocation and actual spending has been in the range of 10-15% over the last six years.

Government's ability to borrow

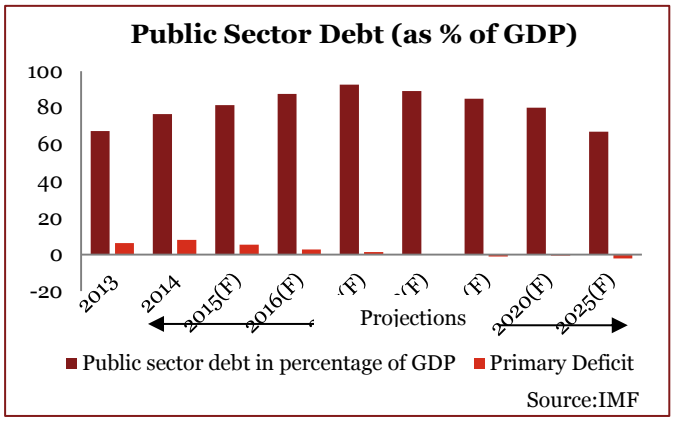
The government's ability to borrow is broadly based on the current and projected levels of debt in the near future. The following section provides a broad overview on the overall ability of the Government of Mongolia to borrow from various sources based on the debt sustainability. Considering the already high persisting debt levels, limited space exists to borrow for power project financing.

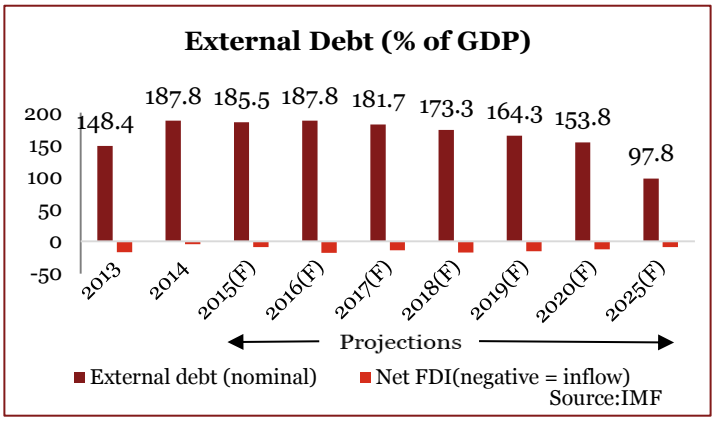
Debt sustainability analysis

Mongolia's external debt has increased significantly in recent years. The external debt (nominal) as percentage of GDP increased significantly from 92.7 % of the GDP in 2010 to 187.8 % of the GDP in 2014.The external debt is predominantly long term and from multilateral sources. The Debt service ratio has also seen a significant increase in recent years. The interest rate is mostly concessional, although the grants have been declining continuously.



These debt indicators suggest the external debt might become unstable and the serious efforts must be undertaken for the betterment of the situation such as raising domestic resources, improvement of the balance of payment situation by improving export of goods and services and non-debt creating financial flows.





The debt sustainability analysis report by IMF for Mongolia in 2015 suggests that the country suffers from high risk of debt distress. Both external debt and public debt have been high in recent years and are still expected to remain above the threshold even in future. The public sector debt is expected to reach its peak in 2017 then show a declining trend and reach around 80% of the GDP in 2020.

- In January 2015, the ceiling on the present value of the government debt (previously 40% of GDP) was relaxed to 58.3%.
- The total public debt is 76.5 % of GDP as of 2015.
- As per IMF projections total value of public debt is expected to increase to ~92.6% of GDP by 2017 and subsequently reduce to 80% by 2020.
- Based on the above assumptions the average net borrowing by the Government of Mongolia is expected to be limited to **USD 1.3 billion** per year across all sectors.

3.2. Assistance from development partners

Assistance from multilateral financing institutions will play a pivotal role in Mongolia's power sector as the Mongolian government is struggling with limited financing ability for its power projects. The support from multilateral funding institutions is primarily required in the power transmission & distribution and to a certain extent in the renewable energy space. The table below provides an analysis of the trends of multilateral support to power sector in Mongolia.

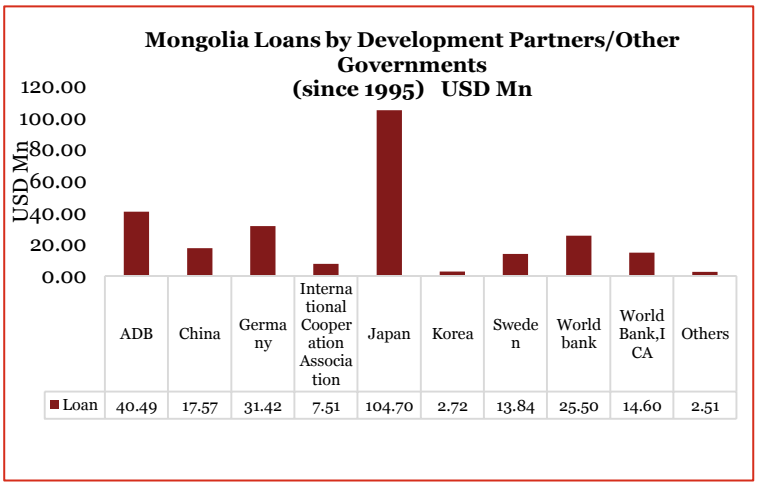
No	Sector	Current Degree of Multilateral Support	Expected Trend (till 2025)	Comments
1	Power Generation			• A major portion of the recent power sector assistance from multilateral financing institutions has been directed towards power generation. • With increasing private participation in the power generation sector with players such as Prophecy Power Generation LLC, GDF Suez/ENGIE group, Posco Energy, Sojitz Corp, Newcom Group etc. the requirement in power generation is expected to come down
2	Power Transmission			• Transmission & Distribution networks need to improve across Mongolia and require new investment to connect the various far flung remote areas which would entail a significant investment in Power transmission and hence will rely a lot on multilateral funding
3	Renewable Energy			• With growth in wind, solar PV, wind-solar hybrid based power plants, the role of multilateral funding agencies will be pivotal in development of Mongolia's vast RE potential.

Legend					
Probability of financing	Very Low	Low	Medium	High	Very High

The current degree of multilateral support captured in the table above is based on current activity and past trends in the Mongolian power sector.

Rationale for degree of multilateral support and future trends		
1	**Power Generation**	Mongolia's power generation projects have seen significant assistance in the form of loans and grants towards power generation projects. For instance the UB CHP4 has seen substantial funding from JICA while the Baganuur and Darkhan TPPs have seen significant funding from World Bank and Germany respectively. However in the last few years there has been significant focus on private players investing in the power generation space as is evident from the financing of the CHP 5 in UB. The CHP5 project is the first Public-Private Partnership in Mongolia of this scale in the energy sector, and it is the first large thermal power plant to be built in Mongolia since 1984. Moreover the SEP 2015 clearly envisages that the private sector participation will form a major portion of the installed power generation capacity in the future. In this context, we expect a decreasing involvement of multilateral funding agencies towards Mongolia's power generation space.
2	**Power Transmission**	Given the unreliable and uninterruptable operation of power transmission networks, improving the quality of energy supply is of paramount importance. Since there is insufficient financing capability of the government, the reliance has been on multilateral and bilateral support in the power transmission sector. With increased private sector participation in power generation envisaged in the near future, we foresee that transmission projects could see a lot more support from development partners in the future.
3	**Renewable Energy**	In the context of ambitious renewable energy goals as envisaged in the SEP, 2015, it may be noted that while small-mid level RE projects could attract some private investors, a lot of support from multilateral financing institutions will be required. The current level of RE activity in Mongolia has been limited. However given the government focus on the RE landscape, regular funding from development partners will be required to provide a fillip to RE based projects in the country.

The chart shown alongside captures the details of loans [9] directed towards the power sector by development partners (also includes bilateral assistance) in Mongolia since 1990. Among the multilateral financing institutions supporting Mongolia's energy sector ADB continues to be among the top investors along with JICA and World Bank. Other key partners in Mongolia include the Government of Japan, the Government of the Republic of Korea and the Government of the People's Republic of China, GIZ (formerly GTZ) GmbH, and the United States Agency for International Development (USAID).



[9] Loan and its interest granted by foreign countries and international institution in power sector

Energy	Donor agencies and Involvement across the Energy Sector			
Sector- → Agency ↓	ADB	World Bank	Japan International Cooperation Agency (JICA)	GIZ (German Society for International Cooperation)
Energy policy	◕	◔	◕	◕
Power generation	◔	◕	◕	◕
Power transmission & distribution	◔	◕	◕	○
Renewable energy	◕	◔	○	◕
Indicates Level of Involvement		● *High/Active*		○ *Low*
Source: World Bank Country Partnership Strategy For Mongolia				

Rationale: The schematic above captures the current level of development partner involvement in the power sector. This is a qualitative assessment based on past trends derived from the country partnership strategy documents for Mongolia. We have also taken into account the level of assistance provided in the past by these agencies against the key areas of involvement such as the historical data of loans provided during the period 1993-2013.

Legend	○	◔	◒	◕	●
Probability of financing	**Very Low**	**Low**	**Medium**	**High**	**Very High**

Assistance from development partners – Future trends

Assistance from multilateral financing institutions are expected to play a pivotal role in development of Mongolia's power sector in future. It is expected that ADB and World Bank would continue to be amongst the top development partners even in future. Mongolia is estimated to receive **USD 1070 Mn** worth of assistance from ADB and **USD 217 Mn** worth of assistance from the World Bank over 2017-2023.

ADB estimates

Year	Amount (in Mn USD)	Remarks/ Assumptions
2016	105	Based on COBP
2017	130	25% annual increase in allocations over the current CPS.
2018	130	

Year	Amount (in Mn USD)	Remarks/ Assumptions
2019	130	
2020	160	25% annual increase in allocations over the previous CPS.
2021	160	
2022	160	
2023	200	25% annual increase in allocations over the previous CPS.
Total	1,070	

WB estimates

Year	Amount (in Mn USD)	Remarks/ Assumptions
2016	25	Based on Country Strategy Plan
2017	25	
2018	30	20% annual increase in allocations over the current CSP.
2019	30	
2020	30	
2021	30	
2022	36	20% annual increase in allocations over the previous CSP
2023	36	
Total	217	

Thus, based on Country Partnership Strategies/ Country Operations Business Plan, funding from ADB and the World Bank for power sector projects is estimated to be **USD 1,287 Mn** over 2017-2023.

3.3. Private sector participation

Private sector involvement - Past trends

Currently, private players operating in the sector are: Prophecy Power Generation LLC, GDF Suez/ENGIE group, Posco Energy, Sojitz Corp, Newcom Group.

Two Turkish companies are already operating in Mongolia's energy sector

Interest from Turkish companies for developing the Tavaltain Khavtsal HPP and the Khovd HPP

ZTM LLC has completed a feasibility study for Tavaltain Khavtsal HPP

Dornod Combined Heat Power Plant is seen as a potential PPP Project

The Government is actively looking to increase the share of private participation in Mongolia's power sector through a range of strategic methods including public-private partnership or purely private financing. Moreover, the SEP 2015 clearly outlines collaboration of public and private sectors, foreign and local investments as potential financing options for development of the Mongolian power sector.

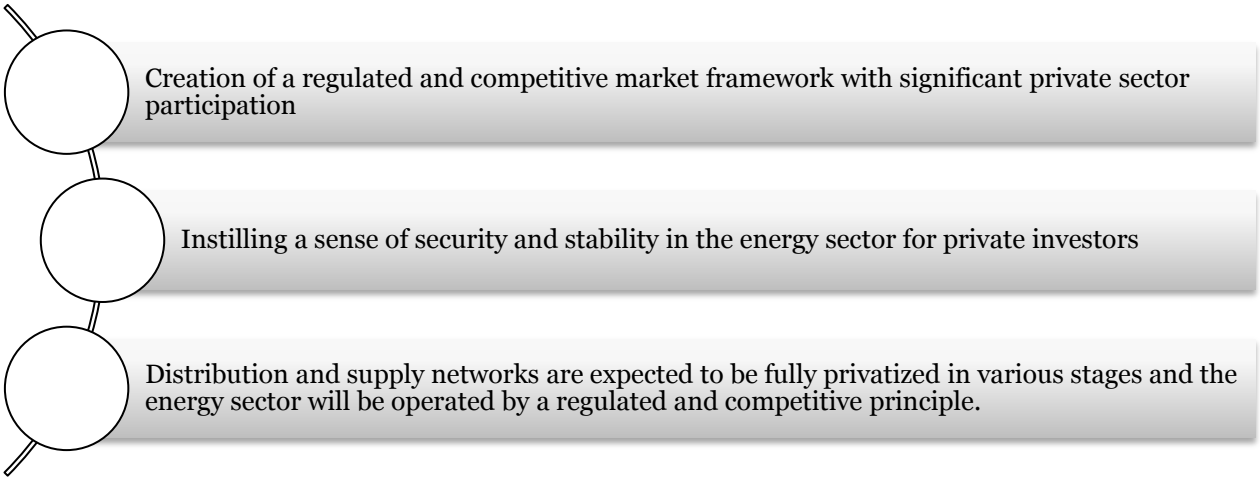
Potential for private financing

The Government of Mongolia (GoM) is actively looking to increase the share of private sector in Mongolia's power sector through a range of strategic methods including public-private partnership (PPP) or purely private financing models. Moreover the SEP, 2015 clearly outlines collaboration of public and private sectors, foreign and local investments as potential financing options for development of the sector.

The SEP, 2015 is seen as a basis for implementing measures such as developing public-private partnership in the energy sector, promoting a regulated competitive market framework and introducing capacity building and capacity reinforcement guidelines.

Low levels of energy tariff and inadequate legal environment have been barriers in raising funds for financing the construction of large capacity power projects and attracting private sector investment in the energy sector.

Key goals aimed at increasing private investment in Mongolia's energy sector:



3.4. Other governments

Countries like China, Russia, Germany and South Korea have invested in Mongolia's power sector in the past. However China and Russia are significant investors amongst them and it is expected that they would continue to invest in Mongolia's power sector in the future.

China: In 2014, the Chinese president proposed expansion of bilateral trade between Mongolia & China to USD 10 billion by 2020. In November 2014, Mongolian "Mogul Power" LLC and China's state owned Sepco III Electric Power Construction Corporation had signed a Memorandum of understanding to cooperate on Tevshiin Gobi Power Project. Over USD 1 Billion is estimated to be invested into Mongolia to construct 600 MW Power Plant relied on Tevshiin Gobi. Significant Chinese investment is envisaged towards export-oriented power plants

Russia: Almost 15 agreements were signed during the 2014-15 Russian state visit to Mongolia. Russia could be a significant investor in power sector in Mongolia in the future. Most of these 15 agreements signed during Russian state visit are non-binding and the two sides aim to launch a dual-tracking and electrification of the Trans-Mongolian Railway. However, in the current context of the economic crisis in Russia, we envisage limited investment from Russia towards the priority power projects.

3.4.1. PPP in Mongolia

Mongolia's legislative assembly adopted the State Policy on Public-Private Partnership (PPP) in 2009, followed by a Law on Concessions which came into effect in 2010. The Law on Concessions has been amended on a quite a few occasions since then, with additional amendments under consideration.

In 2009, the GoM established the National Development and Innovation Committee (NDIC) to ensure continuity in implementation of strategies for national economic and social development. The NDIC developed a dedicated PPP unit under the State Property Committee (SPC) in 2011.

The Government action plan for 2012–2016 foresees a major role for PPPs in the years to come and subsequently the Government has also come up with an updated list of projects to be featured in the concession list required by the Law on Concession. The table below mentions the key laws pertaining to concessions & PPPs in Mongolia.

Laws	Brief Details
State Policy on PPP	• The Parliament of Mongolia ratified the State Policy on PPP in 2009. • The law promotes private sector participation in the development of infrastructure and social services and state support to PPP.
Concession Law of Mongolia	• This constitutes the core element of the legislative framework for PPP. • The Concession Law adopted by the parliament in 2010 has been the first piece of special legislation adopted in the country without any prior experience in concessions, save for the mining sector.

Laws	Brief Details
Law on Innovation adopted on 22 May, 2012	• In May 2012, a new law on foreign investment was adopted. • Law on innovation details the legal framework, principles, governance modalities, organizational structure, financing, state support for innovation activities as well as utilization of intellectual property as an economic asset. • Due to adoption of this law relevant amendments to support innovation activities have also been introduced to the existing law on foreign investment.

Responsibility for PPP development was entrusted with the Innovation and Public Private Partnership Department (IPPPD) in the newly established Ministry of Economic Development (MEoD).

Assessment of PPP framework in Mongolia

PPP legislations in Mongolia have undergone many revisions. The main drivers of the improvement were aimed at providing a level playing field to foreign and domestic private-sector entities for investment in Mongolia. Training programs provided by international organizations have helped improve PPP capacity since 2011.

Quality of the PPP legislative framework in Mongolia[10]: The schematic below details the PPP framework in Mongolia. The right extreme of each scale (100) represents an ideal score in line with international standards such as the UNCITRAL Legislative Guide for Privately Financed Infrastructure projects. The higher the score, the more closely concessions laws of the country approximate these standards.

[10] Based on EBRB Commercial Laws Assessment 2014 for Mongolia

The overall framework that governs the PPP process in Mongolia is almost in parity with the international standards. This will require further capacity building of the related entities to ensure proper implementation of the PPP regulations driving the energy related infrastructure development in the country.

Key Issues/Areas requiring intervention	Recommendation
• The Concession Law is relatively new and among the first pieces of special legislation adopted in Mongolia without any prior experience in concessions, save for the mining sector. • Limited PPP experience and lack of substantial prior concession expertise across other sectors requires additional support to see how these laws fit the current legal framework and business environment.	• For the purpose of supporting the implementation of the PPP pilot projects, capability building programs need to be designed to strengthen the government's capabilities in PPP project development
• The implementation of the PPP program, including the development and structuring of PPP pilot projects would require budget allocation to fund advisory services for feasibility assessment and transaction support and also fund other expenses for project structuring.	• Provision of government support towards funding for initiation of PPP process and other allied activities needs to be taken into consideration.

3.5. Envisaged funding probability of priority projects

Overview of Investment plan and financing sources for 2017-2023

From 2017 to 2023, the estimated requirement for development of the power sector is USD 2,221 Mn. Further it can be estimated that the power sector is likely to receive USD 1,135 Mn as Government budgetary support and USD 1,135 Mn as assistance from development partners (from sources such as World Bank, ADB) over the 2017-2023 period.

Envisaged funding probability of priority generation projects

Projects	National Government	Other Governments	Assistance from Development Partners	Private Investment
Egiin Gol Hydro Power Plant	Low	Medium	High	Low
Khovd river Hydro Power Plant	Low	Low	Medium	High
Dornod Combined Heat Power Plant	Low	Low	High	Medium
SREP	Medium	Low	High	Medium

Envisaged funding probability of priority transmission projects

Projects	National Government	Other Government	Assistance from Development Partners	Private Investment
Power Line From Baganuur To Undurkhaan And Undurkhaan To Choibalsan & Substation	Low	Medium	High	Low
"Choir" Substation Expansion	Low	Medium	High	Low
Power Transmission Line, Road, Substation And Bridge for EG Hydro	Low	Medium	High	Low
High voltage overhead transmission lines and substation in route of Baganuur-Choir	Low	Medium	High	Low
High voltage overhead transmission lines and substation in route of Ulaanbaatar - Mandalgovi	Low	Medium	High	Low
High voltage overhead transmission lines and substation in route of Choir - Sainshand	Low	Medium	High	Low

4. Barriers to investments in power sector

In this section we have discussed some of the key issues related to investment climate and regulatory landscape which is resulting in inadequate investments in the sector.

Revision of the Mongolian tax code

The Mongolia tax code had been revised in order to increase revenues from tax. However, the revised tax provisions are not encouraging for investors, especially foreign investors, which is impacting the investment climate:

- Mongolia has revoked the double taxation treaties with countries like Netherlands, Kuwait, Luxembourg, UAE etc. for increasing revenues from companies which were actually not headquartered in these countries but were still using the treaties to avoid taxation in both the countries and in place of the double taxation treaties, it has introduced bilateral DTTs. This in turn has impacted the attractiveness of investment from such countries.
- Mongolia has also imposed 20% withholding tax on interest earned on foreign-held, interest-bearing banking accounts and other deposit types. This is an additional tax and thus cost for foreign investors which impacts their ease of doing business in Mongolia.

Economics for renewable sources

Mongolia has the least population density and its greatest wind resource areas are in the sparsely populated southern provinces whereas the northern region has more consumption. Hence transmitting renewable power from southern region to northern region needs huge transmission infrastructure whose cost overweighs the benefit. Moreover, the generation tariff of existing conventional power sources and imports are far below renewable energy tariffs. A comparative analysis of the generation tariff for various CHP's is given in the table below:

Source	Tariff
CHP2	MNT 60 (USD 0.036)
CHP3	MNT 60 (USD 0.036)
CHP4	MNT 40 (USD 0.024)
Darkhan	MNT 60 (USD 0.036)
Erdenet	MNT 90 (USD 0.054)
Russian imports	MNT 110 (USD 0.066)
Chinese imports	MNT 160-MNT 220 (USD 0.096- USD 0.132)
Renewable - wind	MNT 160 (USD 0.096)
Source: The Report: Mongolia 2014, Oxford Business Group	

As can be seen from the above table, even the tariffs for Russian imports are lower than that of wind energy (which average USD 0.096/MNT 160). This has resulted in the Government focusing more on affordable source of electricity like coal rather than renewable energy to meet the power shortfalls. However, in order to improve investment climate, there needs to be an increased focus on promoting renewable energy in alignment with the global environment concerns.

Regulated single buyer market structure

The Single Buyer Model supported by spot market and auction market in Mongolia has helped the power sector survive the financial crisis, as pointed out earlier. Many Asian and African countries have preserved an artificial monopoly over the wholesale trading of electricity even after the vertically integrated national power company is unbundled. Mongolia however has retained its single buyer model even after introduction of both spot and auction market in 2007. Central Regional Electricity Transmission Network purchases electricity from the 5 Power Plants operating in the Central region and through import from Russia and sell it to the 10 electricity distribution companies. The Single Buyer market still trades about 99% of electricity while the rest is being shared by spot and auction market. However, the single buyer model needs to evolve to improve efficiency in the sector, promote competitiveness and increase number of players in the market.

The disadvantages of the single buyer model are:

i. The government has excessive power over the sector in terms of capacity addition and thus the capacity addition is not driven by the demand - supply gap.

ii. The PPAs create a contingent liability for the government in case the state owned single buyer is not able to honour its commitment to the generators. Thus the sovereign creditworthiness is affected.

iii. Development of cross border electricity trade with neighboring countries having liberal market is due to lack of incentive to lower power purchase cost.

iv. Most importantly, the distribution companies do not have incentive to focus on collections because no action is generally taken by the single buyer against low performing distribution companies.

The investors in the generation and distribution sector generally prefer bilateral contracts (through competitive bidding/auction etc.) over regulated prices in the single buyer model. An orderly spot market where both the generator and distributors can settle their deviations also acts as an attractive proposition in the sector. Similarly, investors in the distribution sector would prefer collection and retaining of revenues by themselves rather than relying on a Government third party agency “The Central Regional Electricity Transmission Network” to do the settlement. This would help in improving collection efficiencies and would incentivize more efficient distributors.

Moreover, in regulatory framework of countries with unbundled structures, the system operator is generally required to be independent of market stakeholders and focussed on assuming operational control over transmission system. The system operator in such cases serves as a facilitator of market transactions without being a party.

Independence and capacity of the regulator

An independent regulator is crucial for the transparency of the sector and to balance the needs of all stakeholders, including investors.

In Mongolia, the Energy Regulatory Committee is principally an independent body for energy. However, in reality the regulator is controlled by Government, as confirmed by Deputy Minister T. Enkhtaivan in October

2011, when he said: *"Although at present the law states that the ERA should operate independently from the government, in a legal sense it remains dependent on the government".*

It has been observed worldwide that any bureaucratic and political intervention in the working of sector regulator has always resulted in discharge of ineffective regulatory functions by the body. An independent regulator can provide assurance to investors that prices, outputs and inputs will not come under the pressure of 'regulatory capture' and pressures from economic and political interest groups. The independence of ERC has always been debatable because Chairman and the two Commissioners are nominated by the Cabinet Minister in charge of energy. Additionally even the two part-time Commissioners are appointed by the Prime Minister (nominated by the Mongolian National Chamber of the Trade and Industry and Consumer Right Protection Association). Further, the government continues to exercise considerable control over it in matters of tariffs and pricing which poses challenge on transparency in setting of tariffs.

Duplicated regulatory/inspection functions at the local level

As per article 11 of the Energy Law, the functions of Regulatory Boards of aimags are almost similar to Energy Regulatory Commission. With an installed capacity as low as 1090 MW, the presence of multiple regulators at federal and aimag level with similar functions results, poses challenge on accountability and clarity of functions.

Detailed guidelines for issuance of license

In Mongolia, the functions of generation, transmission and distribution are licensed. However, the detailed criteria for acceptance and examination of applications from legal bodies wishing to obtain a license, has not been specified. For example, provisions concerning the issuance of licenses to financially capable legal bodies that have previously operated or are able to operate in this field are not detailed. As highlighted in the report on Energy Governance Initiative Assessment Mongolia by Open Society Forum:

"It has been observed that external or political influence greatly affects the granting a license to build new energy sources, electricity grids, heating networks and infrastructure."

Thus, there is a lack of specific criteria for evaluation of license applications which is important for increasing the transparency in the process for investors.

Tariffs below cost recovery levels

Existing generation tariffs for Mongolia's CHP are well below cost recovery levels. In order to improve the situation, price and tariff revisions were done six times (2002, 2005, 2007, 2008, 2009, 2011) in the last decade which resulted in increase in sales income by 2.9 times. However, this increase has not been able to reduce the problem of debts in the sector. Despite sector structural reform, the problem of debts and receivables is yet to be resolved.

The following figure shows the growth in tariff over the last decade:

Year	2002	2005	2006	2007	2008	2010
Growth Rate	2%	8%	5%	2%	20%	21%

Source: Energy Charter Secretariat 2011

The Government is trying to move tariffs closer to real cost to serve for each consumer category. The Parliament (by SIK Resolution no. 72) mandated the Government to take policy and organizational measures to transition

towards market relations from 2014, using price indexation and gradual increases in prices and tariffs. It aims to keep household electricity prices low for users of up to 150 KW/h (lifeline consumers) a month and increase tariffs in gradual stages for households and organizations using more electricity. But in reality, the desired increase in tariffs have not been attained.

5. Reform action plan for facilitating investments

In this section we have discussed some indicative reform measures that the Government may consider for facilitating investments and making the sector more attractive for private investors.

Strengthening of the sector regulator

For increasing the autonomy and transparency of ERC, the government may come up with an enabling guideline to ensure that the members and the chairperson are independent of the government. The guideline needs to have stricter eligibility criteria for members of ERC so that the regulatory body has adequate and capable regulatory manpower to discharge its responsibilities effectively. The members shall have technical knowledge and relevant professional expertise in the areas of tariff and regulatory policies.

A brief snapshot of the suggested reform measures to strengthen the sector regulator is provided below:

Indicative measures for strengthening of ERC

- The selection criteria for the part time Commissioners and other members of the regulator may be made more transparent so that more independence is ensured and the part time commissioners shall have requisite technical capabilities to oversee the regulatory aspects of the electricity sector.
- At present, the ERC is regulating energy activities of 83 licensees who have 173 licenses of 10 types. The capacity of the regulator may be strengthened to align with the multi-functional requirements and constantly changing regulatory landscape.
- Increased focus may be given on monitoring and managing performance of licensees on various parameters ensure adherence with SOPs. A separate cell within the regulatory framework may be formed for this purpose.
- An effective grievance redressal mechanism framework like appointment of an Electricity Ombudsman for resolution of energy cases before going to courts or respective commissions may be developed. This will help the regulator focus on core regulatory functions.
- In order to promote competition and efficiency, new policies and regulations may be evolved to enable moving from Single Buyer model to competitive market structure.

Case Study regarding funding of Independent Regulatory Agencies.

There are various ways in which an independent agencies are funded. The three basic ways are:

- Assessments on Regulated Companies
- Appropriations from General Treasury
- Fees for Special Services/Activities

The most common method for funding regulation is by assessing the costs of regulation to the regulated companies, and then allowing them to simply pass those costs directly on to the consumers. The second most utilized method is through an appropriation from general tax revenues. The third, and least common

methodology, is specific fees for services/activities.

Like Pakistan, Mongolia is currently using the third methodology for funding ERC which ensures financial autonomy to a greater extent but such methods has the highest transaction costs, and may yield less stability and reliability in a revenue stream thus hampering key regulatory activities. Fess, however, can be a very useful mechanism for providing supplemental funds for agencies when required for specific purposes.

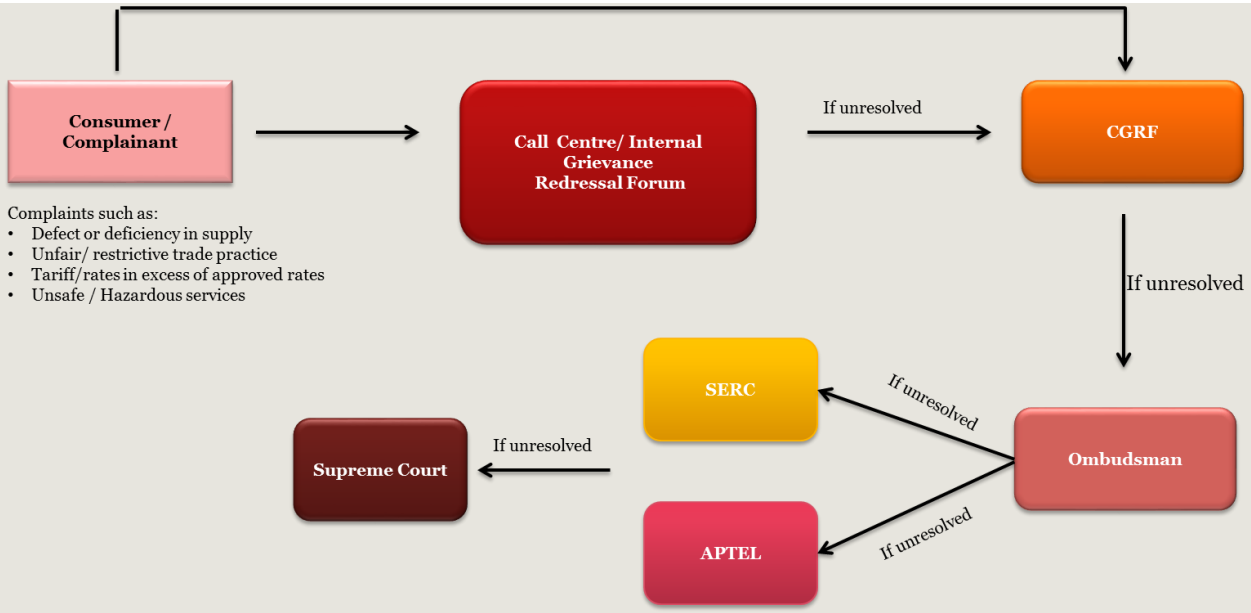
India on the other hand uses the second method of funding the Central Electricity Regulatory Commission namely from appropriation from general tax revenues. As per article 11 of The Electricity Regulatory Commissions Act, 1998, the expenses of the Central Commission including all salaries and allowances payable to, or in respect of, the Chairperson and the Members of the Central Commission shall be charged upon the Consolidated Fund of India.

Even though the above methodology may not always attract political interference in the operation of the agency but is not as reliable or has stable assessments, and does not internalize regulatory costs into the sector.

Case Study : Grievance redressal process in India

The current framework of consumer grievance redressal mechanism consists of consumer first going to the internal complaint center of utilities. In case the complaint remains unresolved at this stage or if the consumer is unsatisfied with the resolution, the consumer can go to the CGRF (consumer grievance redressal forum). The CGRF is governed by the Consumer Grievance Redressal Forum regulation of the respective states. The CGRF is appointed by the utility on the directions of State Electricity Regulatory Commissions. There can be multiple CGRFs setup by utility, each having a sub-jurisdiction area within the jurisdiction area of utility. In case the consumer complaint is still unresolved at the CGRF stage, the consumer can then approach Ombudsman. Ombudsman is an independent body appointed by the SERCs.

The existing framework of grievance redressal is shown below:



The advantage of such a grievance redressal framework is that the Regulatory Commission does not have the burden of resolving consumer grievance instead this activity lies with the independent bodies like CGRF and Ombudsman. Depending upon size of the sector, the countries may choose to have only one independent body in an Electricity Ombudsman or may wish to have two independent bodies (both CGRF and Ombudsman). Since, the benefit of such activities goes to consumers, thus the cost and expenses shall be borne by distribution licensees and recovered from consumers through tariffs.

Promotion of existing auctions and spot market

The disadvantages of the single buyer model, as stated earlier, are drivers for transitioning the sector towards an efficient and competitive wholesale market of electricity. As a small step towards this, open access may be allowed in transmission to enable private power producers or any other generating utility to sell its power to a consumer or distribution company using transmission network (without any discrimination). Over a period of time and after successful implementation of open access, the market structure in the power sector of Mongolia may evolve from the single buyer to a multi-buyer model. The generator could sell power to any buyer using the open access provision in transmission and the high end consumers will have the choice to choose their supplier.

Open access means the non-discriminatory provision for the use of transmission lines or distribution system or associated facilities with such lines or system by any licensee or consumer or a person engaged in generation. This system provides the buyer or seller the right to use the transmission line owned and controlled by other utility. Thus the generators and buyers can trade freely without having the right of transmission, by just paying appropriate wheeling charges to the transmission system owner

Prerequisite for introducing open access and bulk purchase

- The regulatory framework should allow for open access and should recognize power trading as a distinct activity
- The regulator should provide an enabling environment for short term and long term open access by drafting regulations/ guiding principles for the same

The transition from a single-buyer model to a multi-buyer multi-seller model should result in a competitive power market so as to incentivize new investments while providing affordable and quality power to consumers. In the long term, the already existing auction market may be promoted so that the trading volumes are increased resulting in efficient price discovery. The Energy Policy may evolve in a manner that it promotes Auction and Spot Market and eliminates the need of single buyer model eventually.

Case Study : Trading and Open Access

With the enactment of Electricity Act 2003 in India, power trading was recognized as a distinct activity.

Through Trading Licensee and Open Access regulations in 2004, CERC created a framework for a robust and healthy short-term power market in the country. The short-term power market currently constitutes 9 % (about 100 BU) of the total electricity generation. In the last decade, the short- term power market has become an integral part of the electricity sector in the country. It has helped the electricity providers to balance their portfolios on day ahead basis and adjust to fluctuating power requirements. It has also enabled power producers and procurers to sell their surpluses.

Hence a typical Indian market reform moving towards competitive market segment can be illustrated as below:

Cost reflective tariffs

While the regulations and policies provide for tariffs to be revised in order to make them cost reflective, the same needs to be implemented in spirit. Also, while tariffs are revised to be cost reflective, there is a requirement for specifying the principles of determining tariff for various categories/consumer groups, road map for cross subsidies etc. Some of the reform measures that can be considered in this respect are discussed below:

Indicative measures for ensuring cost reflective tariff

- Judicious one-time settlement of debts in the electricity value chain may be considered so that the sector can recover from its current state of losses and under-investments.
- Transparency in tariff setting process, to ensure periodic and justified revisions of tariff, by public

Indicative measures for ensuring cost reflective tariff

consultation and clear performance-based regulatory guidelines for tariff may be considered. For example, information about costs and expenditure, allocation of foreign loans and assistance, purchase and bidding activities and results should be open to the general public and researchers.

- Clear guidelines for competitive bidding in generation to ensure efficient power generation cost.
- Tariff can be fully cost reflective in the event when the tariff will be determined on the basis of demand and supply considerations in a market operated regulatory regime.

Case Study : Price reform in Vietnam

The key idea of the price reform in Vietnam was to make the price reflect real costs and changes in upstream and downstream markets and gradually reduce the State subsidies to electricity costs and prices.

In 2009, Prime Minister Nguyen Tan Dung issued Decision 21/2009/QD-TTg initiating electricity price reform. The price was planned to move towards cost recovery, increasing average electricity prices and transparency in price setting. The Decision also regulated the phase out of cross subsidies in prices for different consumer groups. The 7th National Power Development Plan (PDP), approved by the Prime Minister in 2011, sets a specific target of increasing the electricity price to "meet the long-run marginal cost of the electricity system by 2020, equal 8-9 cents per kWh".

The sale prices were to be adjusted within a fiscal year as per changes in fundamental input indexes, including fuel price, foreign exchange rate and the structure of electricity generation outputs. The minimum time between two consecutive adjustments was decided as three months. The Ministry of Industry and Tradethen decided to regulate the electricity price adjustment as per fundamental inputs including foreign exchange rate, electricity generation structure and fuel price. The electricity price adjustment are specifically regulated and openly announced.

As a result of this measure, within 1.5 years electricity retail prices were increased thrice and thus increased by 8.3% in USD. However, still the electricity prices in Vietnam are lower than their cost of production but situation is slowly improving

Transparent licensing process

Some indicative reform measures that can be considered for ensuring a transparent licensing is discussed below:

Indicative measures for ensuring transparent licensing

- Transparency on the status of licensing process to the applicant at every stage.
- More clarity may be provided regarding provisions concerning the issuance of licenses. For example, the criteria for selection and rejection of licenses may be highlighted making it mandatory for the respective commission to adhere to the same.
- Transparency and clarity to the applicant regarding reasons of rejection/application.

Appendix A. - Macroeconomic overview

Macroeconomic overview – Historical

Mongolia has made impressive progress in developing its economy over the past decade with the mining sector being one of the main drivers of the growth.

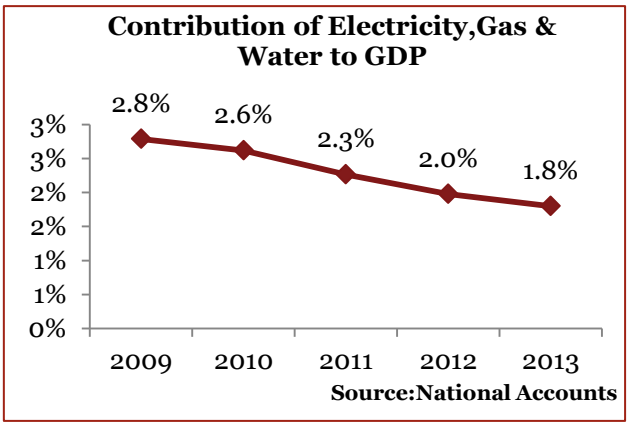
In 2015, there was a sharp decline in the growth rate mainly due to decline in foreign direct investment, fall in the mineral price and a less expansionary fiscal policy.

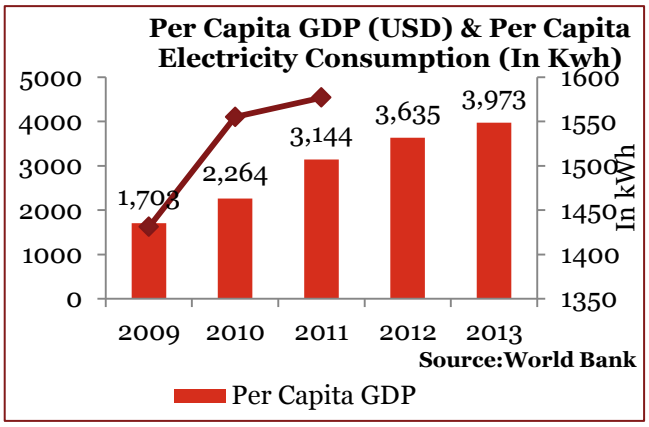
Inflation has remained high in Mongolia, owing mainly to rapidly rising government spending and higher food prices though the situation improved a bit in recent years.

GDP by sectors (in %) (Source : ADB Outlook)

Year	Overall GDP growth	Agriculture	Industry	Services
2008	8.9	4.7	-0.8	16.6
2009	-1.3	3.6	-0.4	0.8
2010	6.4	-16.6	4.3	9.8
2011	17.3	–0.3	8.8	17.8
2012	12.3	21.1	14.8	10.3
2013	11.6	19.2	14.6	7.8
2014	7.9	13.7	12.7	7.8
2015	2.3	10.7	8.8	1.1

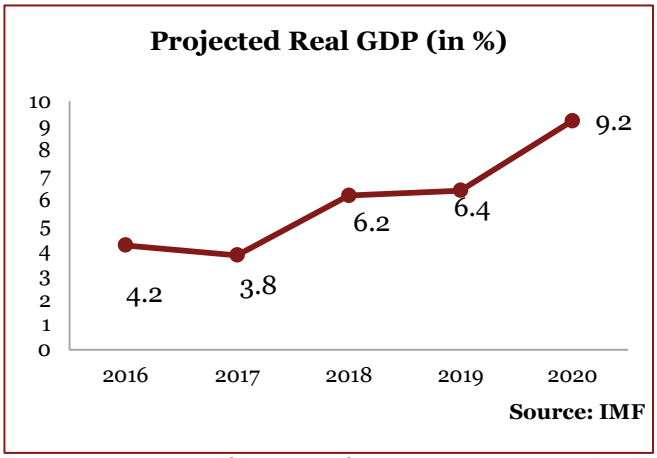
The rapid economic growth has also led to a significant reduction in poverty from 27% of the population in 2012 to 21 % in 2014.

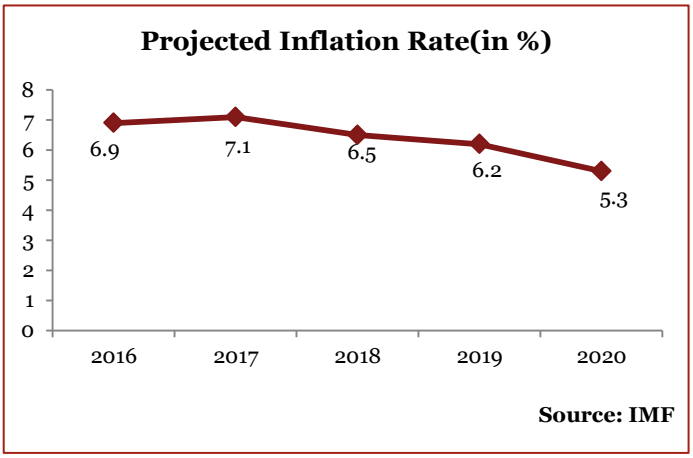




Mongolia has officially been declared a middle income country in 2011. GDP per capita has increased many folds over the last 5 years. Mongolia has also made substantial progress regarding several of the Millennium Development Goals.

The energy sector of Mongolia contributes and strongly influences the social and economic viability of the country. The dramatic and continuing rise in Mongolia's energy demand is being driven by the rapid development of the country's mining based economy.





Macroeconomic overview –Future outlook

- The GDP growth rate is projected to increase drastically from 4.2% in 2016 to 9.2% by 2020 due to rise in domestic demand, large mining projects etc.
- Inflationary pressures will decrease due to reduction of the policy loans that will help the central bank gradually achieve their objective of single-digit inflation (expected to be about 5.3% by 2020).
- For sustainable growth in the economy the country is putting efforts into improving their investment climate.
- In the longer term, Mongolia needs to diversify its economy and protect the country from the notions of unstable price changes and huge FDI.

Appendix B. - List of companies by energy system in Mongolia

Energy System	Sector	Company Name	Company Ownerships
UB	Generation	CHP2 SOJSC	State-owned JSC
	Generation	CHP3 SOJSC	State-owned JSC
	Generation	CHP4 SOJSC	State-owned JSC
	Generation	Nalaikh HS SOJSC	State-owned JSC
	Power Transmission & Imports	NETransNetwork SOJSC	State-owned JSC
CES	Power distribution & sales	UB EDN SOJSC	State-owned JSC
	Power distribution & sales	Nolgo LLC	Private LLC
	Power distribution & sales	Erchim Suljee LLC	Private LLC
	Power distribution & sales	JV UB Railway	Mongolian & Russian JV
	Heat distribution & sales	UB DHN SOJSC	State-owned JSC
	Energy generation	Darkhan CHP SOJSC	State-owned JSC
	Energy generation	Erdenet CHP SOJSC	State-owned JSC
	Energy generation	Baganuur HS SOJSC	State-owned JSC
	Power distribution & sales	Darkhan-Selenge EDN SC	Private JSC
	Power distribution & sales	Erdenet-Bulgan EDN SOJSC	State-owned JSC
	Power distribution & sales	Baganuur & South East Regional EDN SOJSC	State-owned JSC
	Power distribution & sales	Bayankhongor Erchim EDC LLC	Locally owned LLC
	Power distribution & sales	Khuvsgul Erchim LLC	Locally owned LLC
	Power distribution & sales	Erdenet-Amidral LLC	Locally owned LLC
	Heat distribution & sales	Darkhan DHN SOJSC	State-owned JSC
WES	Power transmission & imports	WRES SOJSC	State-owned JSC
AuES	Power distribution & sales	Altai Uliastai ES SOJSC	State-owned JSC
EES	Energy generation	EES SOJSC	State-owned JSC
	Power distribution & sales		

Energy System	Sector	Company Name	Company Ownerships
	Heat distribution & sales		
Dalanzadgad	Energy generation	Dalanzadgad SOJSC	State-owned JSC
	Power distribution & sales		
	Heat distribution & sales		

Appendix C. - The energy sector development plan for Mongolia: Investment requirement

The Power sector Master Plan for Mongolia has estimated that approx. USD 10.26 Billion worth of investment will be required by 2025 at the rate of USD 840 million annually. Of the total investment, approximately USD 4 Billion is required for CES electricity and combined heat and power capacity addition, while USD 0.35 Billion is required for heat only boiler capacity addition in Ulaanbaatar.

Area of Investment	Investment Required (USD Billion
CES Capacity Addition	4.1
South Gobi Capacity Addition	1.9
Heat only Boiler Capacity Addition in UB	0.3
Capacity Addition across other Grid Systems	0.7
Heat Capacity Rehab & Addition-Aimag	0.4
Transmission	1.7
Distribution	1.2

Source: Mongolia Updating Energy Sector Master Plan

CES: For CES the investment will primarily be towards increasing and modernization of the power sector infrastructure and heating facilities in Ulaanbaatar. Rehabilitation and modernization of existing power sector infrastructure is expected to

- Bring supply side energy efficiency gain of up to 30% in combined heat and power stations,
- Up to 50% efficiency gain in electrical transmission and distribution networks.

It has been envisaged that for the period 2013 to 2025, the CES requires a capital investment of USD 300 Million towards heat supply expansion in Ulaanbaatar, and USD 4 Billion for power supply capacity expansion.

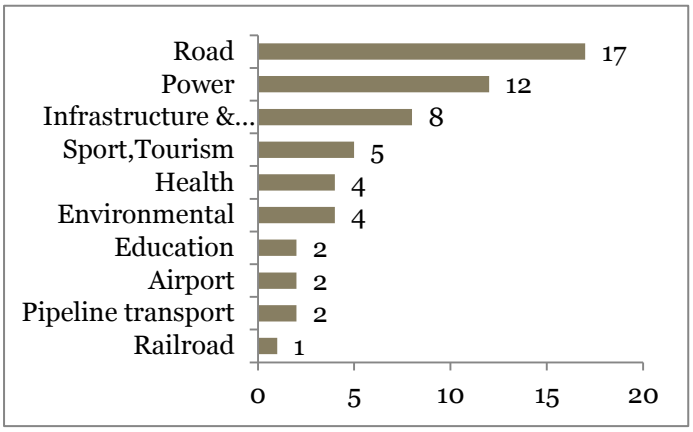
For Altai-Uliastai ES, EES and WES, the total investment need for the period between 2013 to 2025 is pegged at USD 750 Million, with a proposed 450 MW of new generating capacity envisaged across these areas.

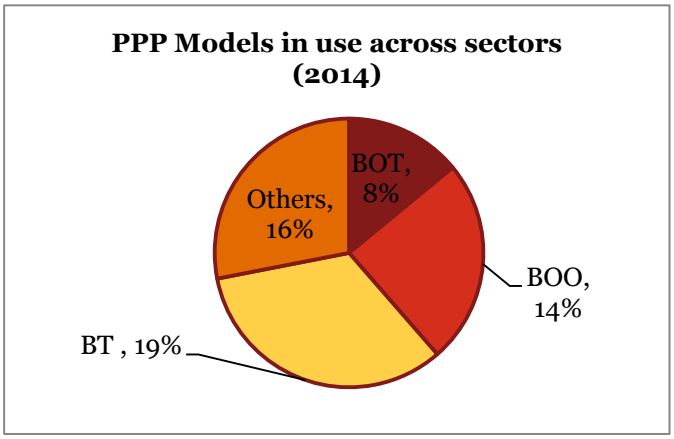
Dalanzadgad / South Gobi Energy System: The investment need for the period 2013 to 2025 is expected to be USD 2 Billion with plans to establish around 1,200 MW of capacity in the South Gobi region.

Transmission & Distribution investment requirement is projected to be USD 2.8 Billion. Transmission infrastructure requires replacement and modernization of key equipment such as power transformers, circuit breakers and transmission lines.

Appendix D. - PPP projects in the power sector

In 2010, the Government approved the list of 121 concession projects, which was amended and reduced to 51.The revised list was finalized on 07 Sep 2013. The new list consists of 52 projects submitted by line ministries and 5 projects submitted by private sector





Proposed concession type for major power sector projects in Mongolia

Details pertaining to major power projects with diverse procurement methods are being promoted by the GoM:

- The Combined Heat and Power Plant Number 5 (CHP 5) in the capital city of Ulaanbaatar (to be developed in two phases, with phase one a 450MW CHP), and the Salkhit wind farm in the Tuv region, 75 kilometers south of Ulaanbaatar. Financing for Salkhit was recently closed and the plant is now under construction.

- Both CHP 5 and Salkhit are being developed on a project finance basis, but using different methods. CHP 5 is being tendered as a PPP to the private sector by the State Property Committee of the GoM, with ADB assistance under a government concession model. In contrast, Salkhit was developed privately by the Clean Energy division of the Mongolian conglomerate Newcom LLC.

The diagram below captures details of some key Concession Agreements in the Mongolia power sector that were signed in the last 5 years:

"Tuul-Songino power plant" project

- Project description: Re-treated Waste Water Used For 100 MW Hydro Charged Power Plant
- Concession type: BOO
- Concession term: 23 YEARS
- Total cost: Cny 1.0 Bln
- Concessionaire: "Morit Impex" Llc
- Location: Ulaanbaatar City, SONGINOKHAIRKHAN DISTRICT
- Signed date: April 08, 2014

CHP number 5 project

- Project description: Construction Of 450 MW Power Plant To Meet Electricity And Thermal Demands Of Ulaanbaatar City
- Concession Type: BOT
- Concession Term: 25 Years
- Total Cost: USD 1.2 Bln
- Concessionaire: "GDF SUEZ, SOJITZ, POSCO, NEWCOM"
- Location: Ulaanbaatar City, Bayanzurkh District
- Signed Date: June 20, 2014

"Telmen power plant" project

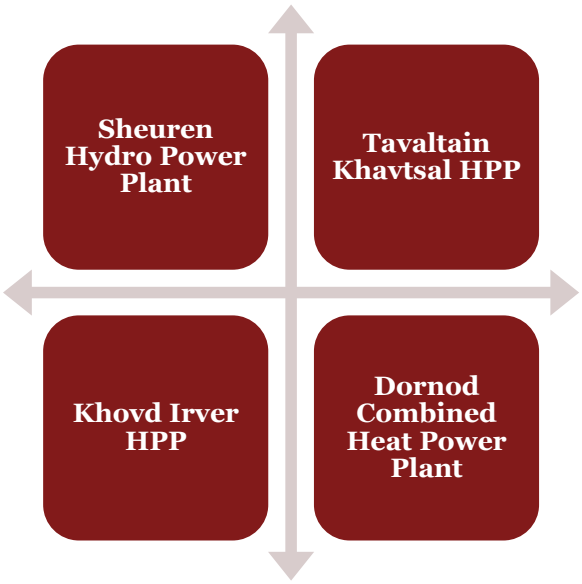
- Project description: 100 MWt Power Plant Project
- Concession type: BOT
- Concession term: 22 Years
- Total cost: USD 183.0 Mln
- Concessionaire: "New Asia Group" LLC
- Location: Zavkhan AIMAG
- Signed date: June 28, 2013

The table below captures the key PPP projects along with the concession type:

No.	Project Name	PPP Type
1	700 MW Baganuur Power plant	BOT
2	270 MW Shivee-Ovoo power plant	BOOT
3	270 MW Shivee-Ovoo power plant	BT

No.	Project Name	PPP Type
4	Oyutolgoi-TsagaanSuvraga220 kW electric power transmission line and substation	BT
5	600 MW ChandganPower Plant and Construction of Baganuur-Undurkhaan Electric Power Transmission Line	BOT
6	Unudrkhaan-Choibalsan 220kW Electric Power Transmission Line and Substation	BT
7	600 MW Tevshiin Gobi Power Plant in Saintsagaansoum of Dundgoviaimag	BOO
8	Extension and renovation of Choir substation	BT
9	450 MW CHP number 5	BOT
10	50 MW Dornod Thermal power plant	BOT
11	Tuul-Songinohydro charged power plant complex	BOT
12	100 MW Telmenthermal power plant	BT
13	Highway connecting Ulaanbaatar City with the new Airport	BOT
14	Altanbulag-Ulaanbaatar-ZamynUud Highway	BOT

Priority Projects that could be implemented through PPPs: We envisage all 4 of the identified power generation projects could implemented through PPP between 2017 and 2023.



Appendix E. - Bibliography

- *Report-Mongolia Updating Energy Sector Development Plan*
- *Report-Demand in the Desert: Mongolia's Water–Energy–Mining Nexus*
- *Ministry of Energy Presentations*
- *Mongolian Energy Systems And Power Market by NDC,2013*
- *Report-Sustainable Energy Development-Mongolian Energy Policy and Goals*
- *Report-GHG Emissions and Its Mitigation Measures and Technologies in Energy Sector Of Mongolia*
- *Mongolian power sector: Background and current policy Kh.Erdenechuluun Representing UBEDN, Mongolia*
- *Asian Development Outlook*
- *Mongolia: 2015 Article IV Consultation-Staff Report ,IMF*
- *National Dispatching Center Of Power Systems, Mongolia*
- *The Current State of Energy Sector in Mongolia, Development Trends, Ministry Of Mineral Resources & Energy*
- *Report-UNDP- Rapid Assessment and Gap Analysis Mongolia*
- *ADB Interim Country Partnership Strategy-Mongolia*
- *Report-World Bank: Mongolia Economic Update (Nov 2013)*
- *Report-In-depth review of the investment climate and market structure in the energy sector of MONGOLIA (2013)*
- *Introduction of Renewable Energy Sector In Mongolia and Their Policy Environment , T.Tserenpurev, J.Osgonbaatar*
- *Near Term Actions in Energy in Mongolia , Ministry Of Fuel And Energy*
- *Report- Higher Education Reform Project, Asian Development Banks*
- *2015 Article IV Consultation staff report ; Press Release ; And Statement by the Executive Director of Mongolia*
- *Articles Public Debt Sustainability in Developing Asia: An Update*
- *Bank of Mongolia Annual Reports*
- *Capital Market Development in Mongolia by V.Danaasuren*
- *State Budget of Mongolia*

- *Info-Mongolia*
- *In-depth review of the investment climate and market structure in the energy sector of MONGOLIA*
- *Source: Statistical yearbook of Energy Regulatory Committee for 2010-2014*
- *Ministry Presentations*
- *List of Projects included on the Concession Agreement 2015-17-Government of Mongolia, List of major approved/proposed ADB energy projects in Mongolia, State Energy Policy 2015*
- *The Institute of Energy Economics, Japan*
- *Country Partnership Strategy documents for Mongolia: World Bank, JICA, etc.*

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