ADB TA 8727-REG

CAREC: Study for Power Sector Financing Road Map

Mobilizing Financing for Priority Projects

Mongolia

September 2016

Section 1
Priority Project Selection Criteria

Key considerations for project prioritization

Secondary and Primary Sources Consulted

- Mongolia: Updating Energy Sector Development Plan, 2013
- State Energy Policy, 2015 (SEP)
- Energy Projects on Concession Agreement , (2015-2017)
- Information collected during country visit
- Input received from ADB

Basis of information analysis

- National objectives and priorities
- Current and projected demand supply situation
- Regional objectives and trading potential

Project prioritization criteria

Generation Projects

- Ensuring energy adequacy
- Increasing fuel mix diversity
- Socio-economic consideration

Transmission Projects

- Creating a unified national power transmission network
- Reducing T&D losses
- Evacuation to key demand centers

Priority Project List

Project selection criteria – Generation projects

Criteria for project (generation) prioritization

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.
- Cost of power import 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) is a key aspect for prioritization

Increasing fuel mix diversity

- Energy mix is heavily reliant on coal with almost 96% of power generated from thermal sources.

Project selection criteria – Transmission projects

Criteria for project (Transmission) prioritization

Creating a unified national power transmission network

- Creation of an integrated power system with unified information, control & supervision system is a key focus area
- This will be achieved by connecting the existing systems through HV electricity transmission overhead lines

Reducing transmission & distribution losses

- T&D losses at 13.7% are more than double those of many developed countries.
- SEP 2015 envisages reduction in T&D losses to 7.8% by 2030.

Evacuation to key demand centers

- Transmit power from new plants to regions with growing demand (e.g. industrial regions) to address the demand-supply imbalance.
- 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 the E-CASAREM initiative has been taken up, it is imperative for Mongolia's power sector to establish connectivity between the various energy systems first and strengthen its existing network.

Section 2
List of Priority Projects and Investment Requirement

* Types of projects not considered in the list of priority projects are projects that have achieved financial closure, and captive power projects.

* Details pertaining to information source for investment requirement for priority projects are provided in the country report.

List of generation projects

S.No.	Project	Brief Description and Benefits	Project Selection Criteria			Investment Requirement (USD Mn)
			Ensuring energy adequacy	Socio-economic considerations	Increasing fuel mix diversity	
1.	Egiin Gol Hydro Power Plant	315 MW hydropower project on the Eg river in northern Mongolia Will help diversify power generation mix.	✓	✓	✓	1,000
2.	Khovd River HPP (New)	90 MW Hydro Power Plant On Khovd River in the Khovd Aimag and BayanOUlgii Aimag will complement power generation during the summer season and also improve fuel diversity.	✓	✓	✓	250
3.	Dornod Combined Heat Power Plant (New)	Proposed 50 MW new CHP dedicated to the Dornod Province. This will play an important role in improving generation capacity for the EES that relies on a single 36 MW CHP.	✓	✓	✓	90
4.	Scaling up Renewable Energy Program (SREP)	SREP investments will support the government's target of increasing the share of renewable energy (RE) in the country's energy mix.	✓	-	✓	150

List of transmission projects (1/2)

S.No.	Project	Brief Description and Benefits	Project Selection Criteria			Investment Requirement (USD Mn)
			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	Power line will transmit power from Baganuur PP to the various regions.	✓	-	✓	40
2.	"Choir" Substation Expansion	Choir SS can supply industrial users in the South Gobi area such as Oyu Tolgoi (OT), Tavan Tolgoi (TT), and other regions which have high power demand due to industrial activity.	✓	✓	✓	25
3.	Power Transmission Line, Road, Substation And Bridge for EG Hydro	Transmit power from the EG Hydro project to the various regions.	✓	-	✓	20

List of transmission projects (2/2)

S.No.	Project	Brief Description and Benefits	Project Selection Criteria			Investment Requirement (USD Mn)
			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	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	Proposed OVTL to transmit power from Ulaanbaatar towards Mandalgovi.	✓	-	✓	120
6.	High voltage overhead transmission lines and substation in route of Choir – Sainshand	Proposed 178 km OVTL and substation to transmit power from Choir towards Saishand.	✓	-	✓	490

Other priority projects

S.No.	Project	Brief Description and Benefits	Investment Requirement (USD Mn)
1.	GOBITEC*	The Gobitec concept represents the idea of producing clean energy from renewable energy sources in the Gobi Desert and to deliver the produced energy to regions with a high demand of electric energy. 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.	293,000

*The GOBITECH initiative will primarily be driven by international financial organizations and investment from other countries

Other key energy sector programs

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, therefore, the air pollution and over-dependency on imports of petroleum products will be drastically improved for Mongolia.
2.	Energy Efficiency and Urban Environment Improvement	105	Upgrade the electrical transmission and distribution networks in and around Ulaanbaatar, thereby improve energy efficiency, reduce transmission and distribution losses and emission of greenhouse gases and other air pollutants from existing power plants in Ulaanbaatar.
3.	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.

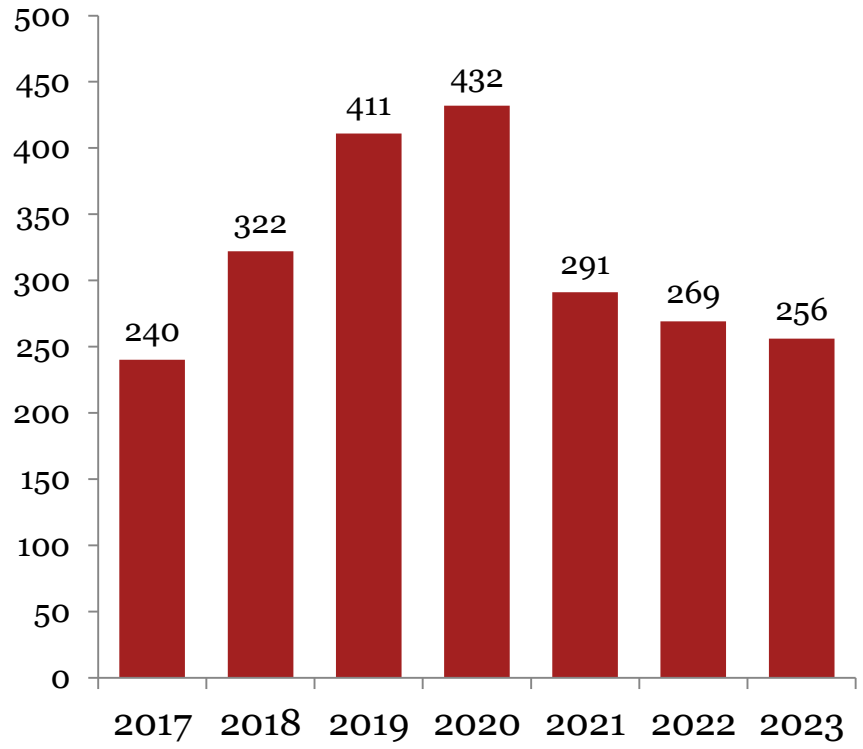
Other important sector programs that are at the early feasibility stage or development stage are as follows:

- 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 will promote regional integration through connecting countries like Japan , China, South Korea, Russia (far east). This is an important initiative to harness renewable energy potential in the Gobi region and promotion of regional integration.

Estimated investment requirement 2017-2023

- Based on the priority projects list estimated investment requirement is **USD 2,221 million**. (excluding GOBITEC).
- The time-frame in question 2017-2023 refers to a 7 year bloc when all key projects could be constructed with construction being initiated in 2017.
- The proposed investment plan comprises of the generation and transmission projects.
- Key assumptions
  - Some select hydropower project (e.g. Egiin Hydro) to commence construction in 2017 with a completion period of 8 years.
  - Small-Mid sized hydro power projects (e.g. Khovd river etc.) to commence construction in 2017 with a completion period of 5 years.

Overall Investment requirement by year in USD Mn (Timeframe : 2017-2023)



PwC Analysis

Section 3
Potential Sources of Funding for Financing Priority Projects

Investment plan and financing sources for 2017-2023
A snapshot

Estimated Requirement* (USD 2,221 Mn)

Estimated Funding from Development Partners (USD 1,287 Mn)

Estimated Government Budgetary Support (USD 1,135 Mn)

Investment plan and funding pattern from 2017-2023

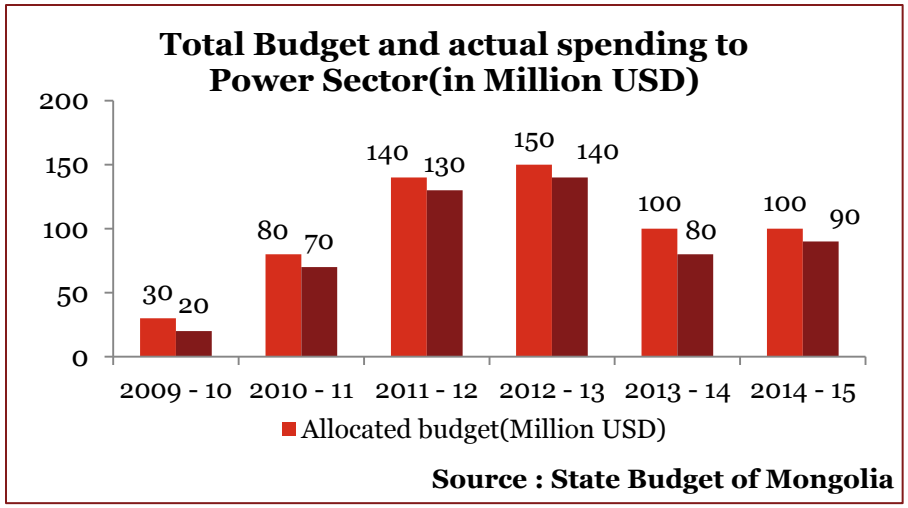
****Investment Requirement excludes GOBITEC***

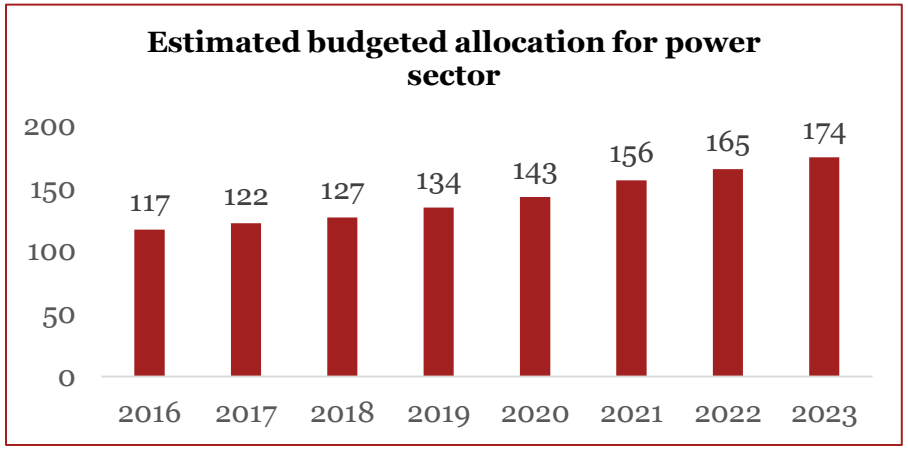
National government

Estimate of government spending towards the power sector

- 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.

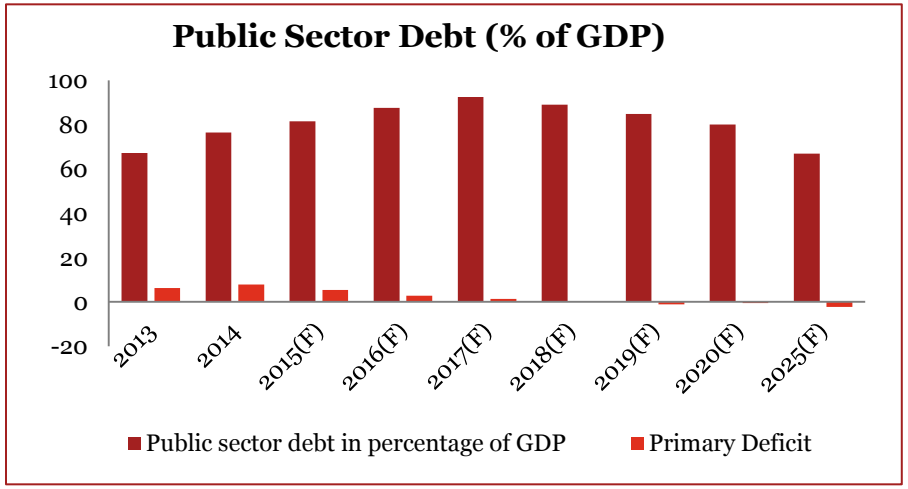
- It may be noted that the variance between budget allocation and actual spending has been in the range of 10-15% over the last six years.

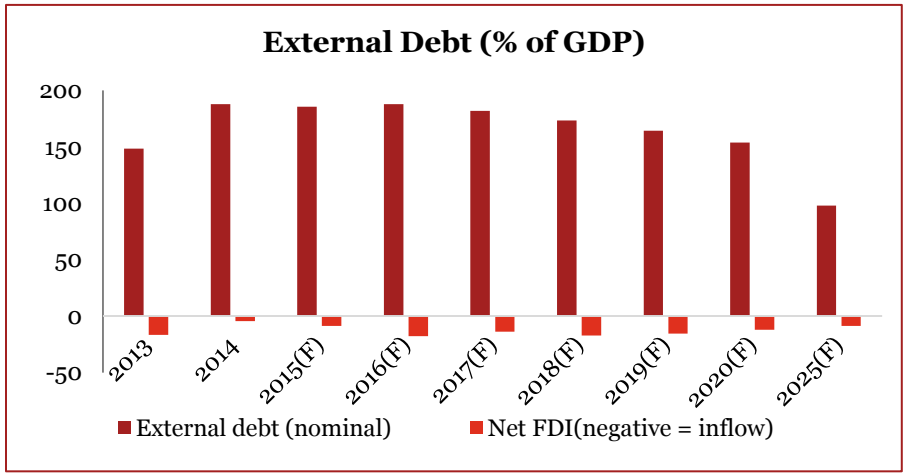




Maximum government borrowing

- 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.





Source: IMF

Assistance from Development Partners

Current support in power sector and envisaged trends

No.	Sector	Current Degree of Support	Expected Trend	Comments
1.	Power Generation	High	↓	Major portion of the recent power sector assistance from multilateral financing institutions has been directed towards power generation. With increasing private participation, investment requirement in power generation is expected to come down.
2.	Power Transmission	High	↑	T&D networks need to improve across Mongolia and require new investment to connect the various far flung remote areas. We envisage that this will require significant multilateral funding.
3.	Renewable Energy	Medium	↑	With growth in wind, solar PV ,wind-solar hybrid based power plants, the role of multilateral funding agencies will be important in development of Mongolia's vast RE potential.

Assistance from Development Partners

Estimates of support from ADB and World Bank

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.

WB 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	
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	**1070**	

ADB 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**	

Other Governments

Major investors are China, Russia, Germany and South Korea

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. 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.**

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
- There has been 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

- Government is actively looking to increase the share of private participation in Mongolia's power sector more through a range of procurement 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.

Envisaged funding probability of priority generation projects

Projects	National Government	Other Governments	Development Partner Assistance	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 (1/2)

Projects	National Government	Other Governments	Development Partner Assistance	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

Envisaged funding probability of priority transmission projects (2/2)

Projects	National Government	Other Governments	Development Partner Assistance	Private Investment
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 Ulaanbaatar – Mandalgovi	Low	Medium	High	Low

Section 4
Barriers to Private Investment and Mitigation Measures

Investment barriers

Aspects	Issues	Probable Mitigation Measures
Generation tariffs below cost recovery levels	• Existing generation tariffs for Mongolia's CHP are below cost recovery levels. • In order to improve the situation, price and tariff revisions were done six times in the last decade resulting in 3 times increase in sales income. • Tariff escalation has not been able to reduce the problem of debts burden in the sector. • The energy sector has been operating at a loss and has not been able to make technical innovations, repairs or capital investment.	• Quasi-judicial status to the regulator to increase its independence and autonomy, and boost investor confidence. • Public consultation to bring in transparency in tariff setting. • Performance based tariff regulations to incentivize efficiency improvement. • Guidelines for competitive bidding in generation to ensure cost reflective power generation tariff.
Economics for Renewable Sources	• Tariffs for Russian imports are lower than that of wind energy (which average USD 0.096/MNT 160) resulting in limited market for renewable energy sources. • Transmitting renewable power from southern region (where the potential is) to northern region (the market) needs substantial investment in developing transmission infrastructure.	• Enhanced government focus on sustainable renewable energy sources through incentives and benefits for investors. • Focus on developing an evacuation plan for transmitting electricity from RE sources to the demand centres.

Regulatory barriers

Aspects	Issues	Probable Mitigation Measures
Sector regulator – operational roles, responsibilities and autonomy	• As per article 11 of the Energy Law, the functions of Regulatory Boards of aimags are almost similar to an Energy Regulator. With an installed capacity of 1,200 MW, the presence of multiple regulators at federal and aimag level with similar functions results in regulatory uncertainty. • Negotiated route is followed for licensing process at present. • Operation of the sector regulator can be more independent and transparent without intervention from other sector entities.	• Transparent processes, institutional capability and a clearly defined legal framework for the regulator to operate and discharge its roles and responsibilities. • Public consultation on matters related to licensing to increase confidence of investors.

Promoting private sector financing
A strong PPP framework 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 is fairly recent and has been the first piece of special legislation adopted in the country without any prior experience in concessions, save for the mining sector.
Law on Innovation adopted on 22 May, 2012	In May 2012, a new law on foreign investment was adopted. • Law on innovation lays down the legal ground for the principles, governance, organization, 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).

Promoting private sector financing

Significant progress on PPP legislations and Govt. focus

Compared to many other CAREC countries, Mongolia has a relatively advanced and a stable PPP framework in place.

Mongolia's Concession Law was drafted with the best internationally accepted standards and in accordance with lenders expectations in order to ensure the bankability of project finance based transactions.

The concession laws factor in a good range of PPP models as well as for all sorts of security instruments unlike other members

- SEP 2015 outlines various procurement methods, including PPPs or purely private financing for power projects.
- Government action plan for 2012–2016 foresaw a major role for PPPs.
- Subsequently the Government has come up with an updated list of projects to be featured in the concession list required by the Law on Concession.
- Political commitment to PPPs remains strong with an aim to attract foreign investment.
- As of May 2014, 880 separate projects are listed as available for private entities to engage with the GoM including energy projects.

Scope for improving PPP framework

The regulatory and judicial framework to allocate license, set tariffs and protect the interests of consumers while managing international private sector investors is fundamental to ensure an efficient PPP process. Institutional capability of government institutions in handling PPP projects is also critical.

Key Issues/Areas requiring intervention	Recommendation
• The Concession Law is relatively new, and there is no prior experience in concessions, except for the mining sector. • Limited PPP and concession experience across sectors require additional support to see whether new laws fit the current legal framework and business environment.	• To support PPP pilot project implementation, capacity building programs need to be designed to strengthen the government's PPP project development capacity.
• 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 as well as other expenses for project structuring.	• Provision for government support towards funding for initiation of PPP process and other allied activities needs to be taken into consideration.

Appendix 1
Macroeconomic indicators

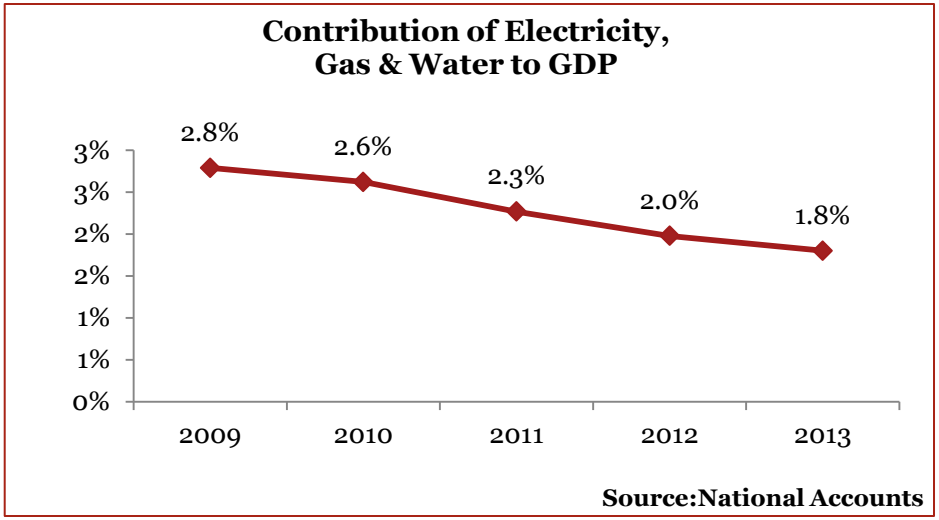
Macroeconomic overview – Historical (1/2)

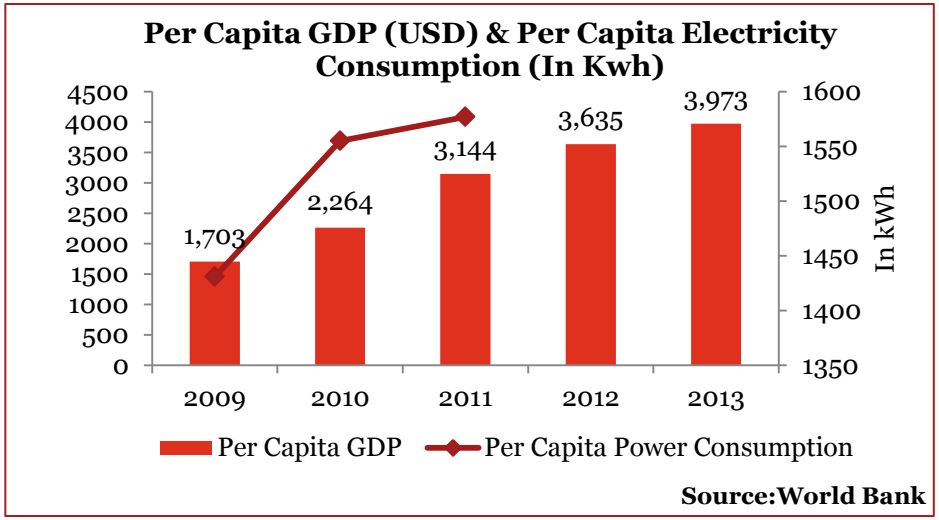
- Mongolia has made impressive progress in developing its economy over the past decade with the mining sector being one of the main drivers of the growth.
- In 2015 , there was a sharp decline in the growth rate mainly due to decline in foreign direct investment, fall in the mineral price, and less expansionary fiscal policy.
- Inflation has remained high in Mongolia, owing mainly to rising government spending and higher food prices though the situation has improved in recent years.
- The rapid economic growth has also led to a significant reduction in poverty from 27% of the population in 2012 to 21 % in 2014.

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

Macroeconomic overview – Historical (2/2)

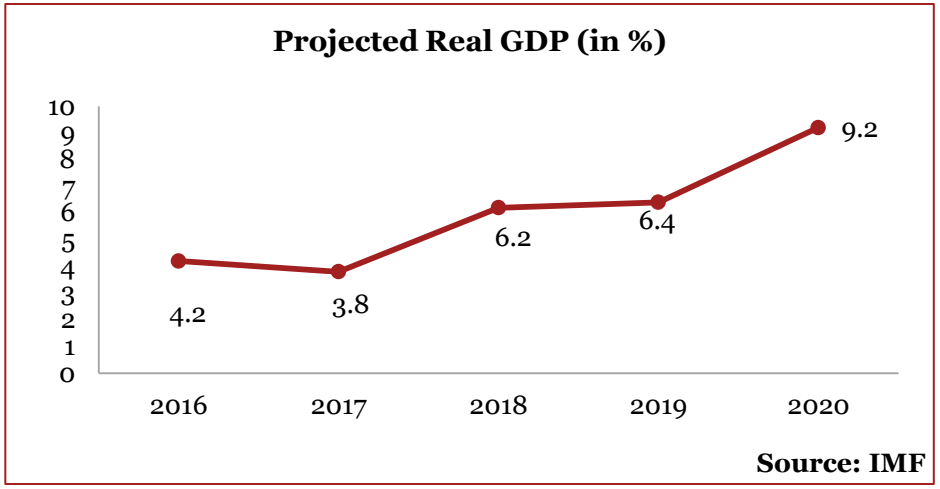


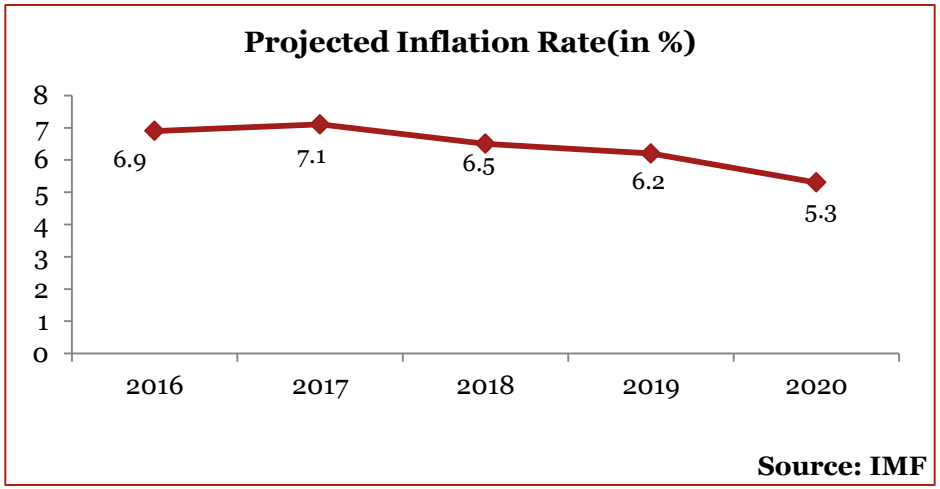


- Mongolia has officially been declared a middle income country in 2011. GDP per capita has increased many folds over the last 5 years.
- Mongolia has also made substantial progress regarding several of the Millennium Development Goals.
- The energy sector of Mongolia contributes to and strongly influences 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 2
Industry structure & institutional arrangement

Industry structure and institutional arrangements (1/3)

- The power sector in Mongolia was deregulated in 2001 upon the passing of the Energy Law of Mongolia.
- The law sought to vertically segregate the sector by separating the generation, transmission and distribution companies.
- After enactment of the Energy Law, the government approved Resolution 164 on structural reform of 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 electricity sector is primarily owned and operated by commercialized state-owned enterprises (SOEs)

Industry structure and institutional arrangements (2/3)

Generation: Five generation companies centered around Thermal Power Plants (TPPs) – 3 in UB, Darkhan TPP and Erdenet TPP

Transmission: Central Regional Electricity Transmission Company (CRET)

Dispatch: National Dispatching Center (NDC) which regulates the National Grid

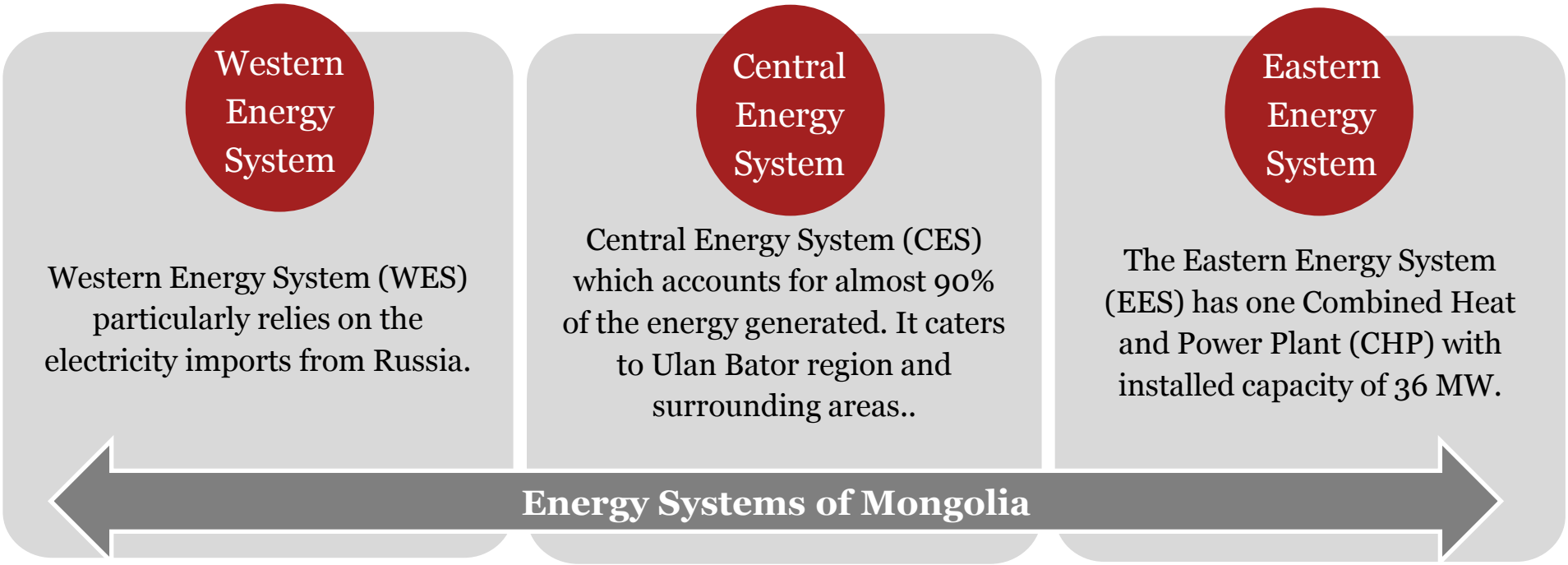
Distribution: Regional electricity distribution network companies (EDNs) including UB, Darkhan-Selenge, Erdenet-Bulgan, Baganuur and South-Eastern Region

District Heating Network Companies (DHN) including UB and Darkhan

- The Energy Regulatory Authority (ERA) regulates the energy generation, transmission, distribution, supply and dispatching.
- ERA approves prices and tariffs, awards licenses to operators, and monitors compliance with terms and requirements of licenses

Industry structure and institutional arrangements (3/3)

Energy sector in Mongolia has three major independent systems



- Apart from this 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.
- CES and the WES grid are both linked with the Russian grid through 220 kV double lines connecting the CES and 110 kV lines connecting the WES.

Appendix 3
Demand-Supply Situation

Demand-Supply Situation (1/3)

Power Generation by Source

(Mn kWh)	2011	2012	2013	2014
Thermal power station	4,450.0	4,775.5	5,014.0	5,191.3
Diesel power plant	20.2	28.7	5.4	8.2
Hydro power station	52.6	52.1	59.9	66.3
Wind power station	-	-	52.9	125.4
Solar power station	-	-	-	0.6
Total production	4,522.8	4,856.3	5,132.2	5,391.8

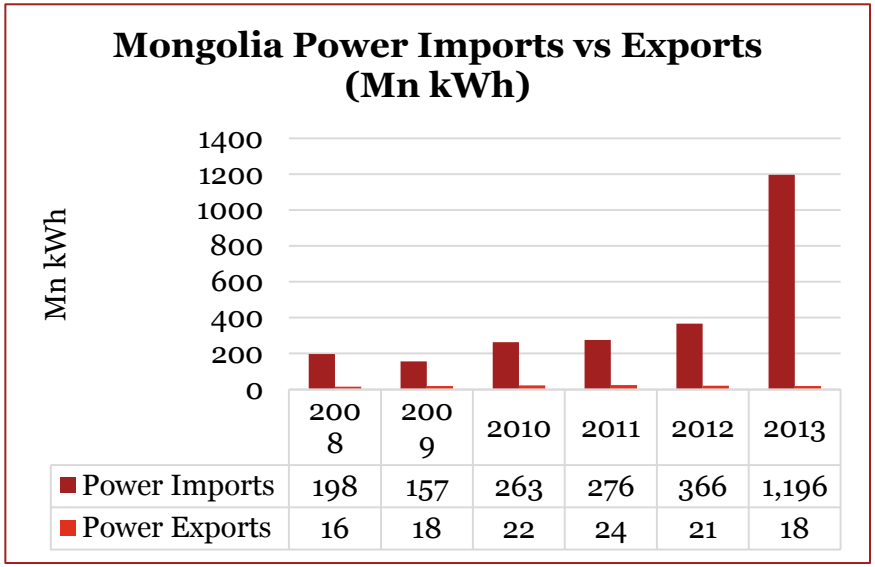
- Power demand and heating demand have increased almost by two folds since early 2000s.
- Industrial energy demand is estimated to have increased from 2,090 GWh to ~4,050 GWh between 20010-2015, due to the expansion of energy industrial activity
- Mongolia's power sector is unable to meet daily system demand due to poor peaking capability of ageing plants
- Mongolia's rapid energy demand results in almost zero reserve margin of electricity

Key issues resulting in demand-supply imbalance

Ageing power sector infrastructure- Key power plants are over 25 years old + Lack of an integrated Energy System interconnecting CES and WES + Unreliable diesel and oil imports + Growing Power demand on account of growth across Mining and Industrial sectors + High Transmission losses of more than 30% across WES

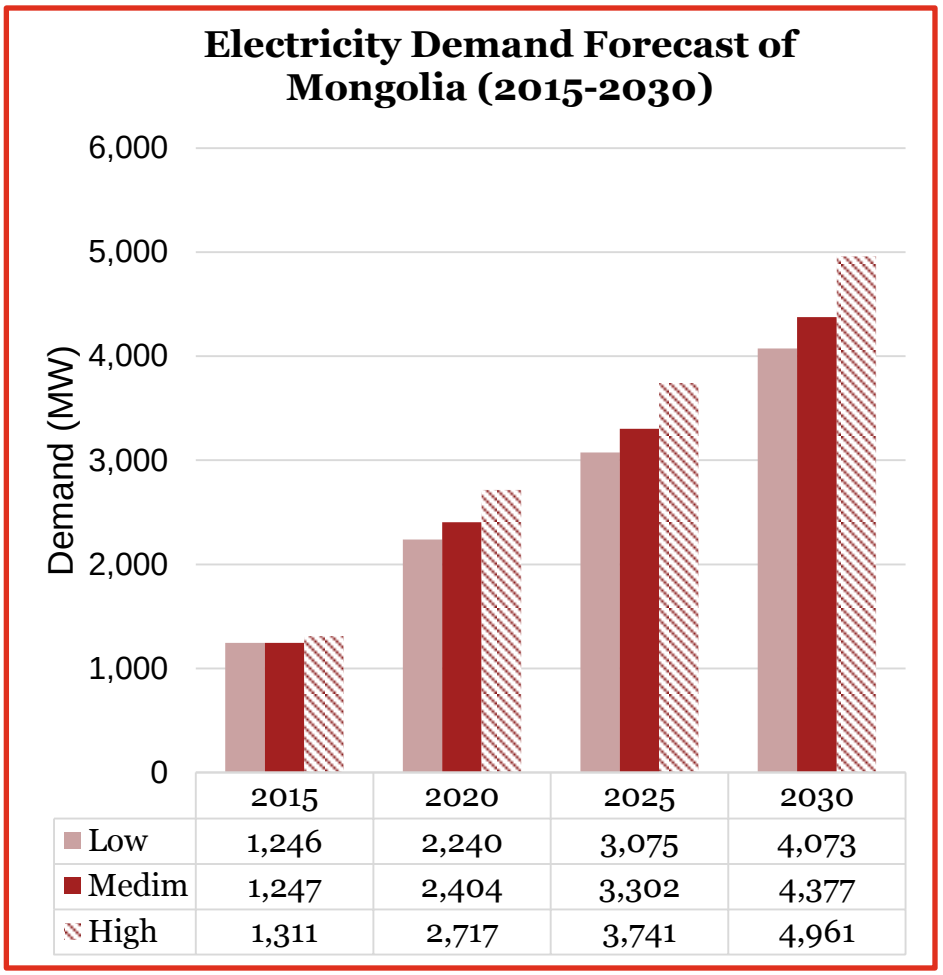
Demand-Supply Situation (2/3)

Year	2008	2009	2010	2011	2012
Electricity Consumption (GWh)	2922	2900	3154	3421	3746
Demand (in MW)	583.0	578.4	634.7	689.2	758.2
Peak Production (in MW)	733.5	828.4	895.3	998.3	857.1



- Around 80% of Mongolia's installed capacity is available as most plants are old and operate at a reduced capacity.
- Existing facilities which provide heating and electricity are old and energy inefficient.
- Interconnection among energy systems will help improve energy security through cross-grid sharing of energy resources.
- Mongolia lacks natural gas deposits and depends on oil imports.
- Major portion of the oil imports are primarily from Russia followed by China and the Republic of Korea.
- Power Imports are primarily aimed at meeting seasonal variations in electricity demand especially during times of peak demand.

Demand-Supply Situation (3/3)



	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

- Future demand to be driven by the mining sector, intensive industrialization and construction activity in and around UB, Darkhan and Erdenet cities, in South Gobi .
- Mining activity will drive mine mouth power generation plants to aid the mining operations.
- South Gobi demand expected to grow steeply to around 400 MW by 2020.
- Imperative to build power stations near mining deposits along with big capacity HPPs, wind parks, and solar PV systems.
- Coal fired power plants will account for 35-40% of the total installed capacity by 2030.
- High demand growth necessitates leveraging Mongolia's RE sources.

Thank you!