SECTOR ASSESSMENT (SUMMARY): ENERGY

1. Sector Performance, Problems, and Opportunities

1. **Low energy efficiency and urban air pollution.** Presently, heating and electricity needs in Ulaanbaatar are met by three old, inefficient coal-based combined heat and power (CHP) plants.\(^2\) It is generally agreed that most parts of the heat production system are nearing the end of their economic life.\(^3\) CHP plants number 2 and 3 lack proper emission control equipment and have become key sources of air pollution in Ulaanbaatar as a result of their particulate emissions.\(^4\)

2. **Urgent investment needs but no private investment.** The supply-side situation has become alarming due to the rapid growth in electricity and heating demand as well as the aging CHP plants. The current peak demand for electricity in the central grid system is 675 megawatts-electric (MWe), while heating demand in Ulaanbaatar is 1,425 megawatts-thermal (MWth). The available generation capacity in 2012 was 710 MWe and 1,585 MWth. If the operations of CHP plants number 2 and 3 are interrupted\(^5\)—which is likely given that the equipment is more than 40 years old—the available capacity will be reduced to 587 MWe and 980 MWth, resulting in serious shortages. There is thus an urgent need for a new CHP plant to address the vulnerability of the power and heating supply in Ulaanbaatar. To meet the needs of Ulaanbaatar, the use of CHP technology is highly advantageous, because the combined electricity and heating demand lasts more than 8 months per year.\(^6\)

3. **Limited access to energy in urban centers and remote rural areas.** There are 21 aimag (province), 314 soum (district), and 1,544 bagh (village) centers.\(^7\) The majority of aimag and soum centers lack proper access to heating services. Heating services are provided by the heat-only boilers, which are old and inefficient. Retrofitting of heat-only boilers and piping systems is necessary to provide reliable and adequate heating services. While considerable progress has been made in providing aimag and soum centers with access to electricity, most bagh centers still need to be electrified and the reliability of the renewable energy sources in some soum centers needs to be improved.

4. **Weak capacity in organizing power trade.** Opportunities for private investment and growth are emerging in new power generation projects in the South Gobi region.\(^8\) By 2016, if planned investments are pursued, some 20 terawatt hours per year of electricity would be exported to the People’s Republic of China (PRC). Mongolia’s Ministry of Energy has signed a memorandum of understanding with the PRC’s State Grid Corporation regarding the joint development of power plants and the export of electricity to the PRC. However, organizing a project finance package will be challenging given Mongolia’s weak institutional and financial capacity and

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2. Thermal efficiency of CHP plant 2 is 21.4% and CHP plant 3 is 37.2%. Overall efficiency of CHPs can reach up to 80%.
3. The equipment in CHP plant 2 has been operating for over 40 years, in CHP plant 3 for 30–41 years, and in CHP plant 4 for 18–26 years. The expected lifespan of CHP plant 2 ended in 2005, and of CHP plant 3 in 2011, according to Mongolia’s energy sector master plan.
5. Available capacity is 17.6 MWe and 43 MWth for CHP plant 2, and 105 MWe and 562 MWth for CHP plant 3.
6. According to the International Energy Agency. 2006. *Energy Technology Perspectives.* Paris, CHP technology results in up to 27% lower coal consumption, lower emissions of the particulate matter that causes air pollution, and lower carbon dioxide emissions (responsible for global climate change).
7. Source: Rural Department, Cabinet Secretariat of the Government of Mongolia.
8. In southern Mongolia, a large coal deposit is close to the existing railway line and less than 200 kilometers from the border with the People’s Republic of China. Preliminary estimates indicate that this site could support a 3,600 megawatt power project.
the poor transmission infrastructure within Mongolia. Cross-border projects have the added complication of needing to satisfy the laws, regulations, standards, and guidelines of all participating countries.

5. **Weak sector capacity.** The renewable energy law was enacted in 2007 and the first megawatt-scale wind power plant was put in operation in 2013 by the private sector. However, there are several operational challenges, such as the tariff structure and grid operation, which will negatively affect the future development of renewable energy in Mongolia.

2. **Government’s Sector Strategy**


7. In 2001, the government—by virtue of the Law on Energy and Tariffs—divided the then Energy Agency into 18 autonomous companies, each with its own management, balance sheet, and accounting system. Mongolia has a single buyer model for power—the transmission company buys electricity from five generation companies and sells it to four distribution companies for distribution and supply to end users. All prices are determined by the Electricity Regulatory Commission. Unlike most wholesale electricity markets, there is currently no scope for economic dispatch; instead the dispatch is based on availability, location, and demand for co-generated steam for heating and industrial use. The Ministry of Energy is responsible for policy making, planning and designing the publicly funded programs. The Electricity Regulatory Commission has been functioning since 2001; it is an independent regulator in charge of licensing, tariff setting, promoting competition, and dispute resolution among licensed energy utilities. An Asian Development Bank (ADB) assessment of the various regulatory agencies in the Central Asia Regional Economic Cooperation (CAREC) member countries in 2005 indicated that the Energy Regulatory Authority was considered transparent, independent, and capable.

3. **ADB Sector Experience and Assistance Program**

8. By the end of 2013, the ADB had provided in excess of $90 million cumulatively for four loans and $6.4 million for three grants financed by Japan Fund for Poverty Reduction (JFPR); most of the lending was for energy efficiency and urban environment improvements, and energy access for all. A total of $9.5 million has also been provided for 18 technical assistance (TA) projects that have supported energy sector planning, promotion of renewable energy, and application of the public–private partnerships (PPP) model in new power plant development. In 2002, ADB provided TA to the government to develop a renewable energy policy for isolated rural areas, and implemented two demonstration projects to integrate renewable energy power systems with diesel

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9 Each company also has a board of directors drawn from the shareholders: state-owned company (39%), Ministry of Mineral Resources and Energy (41%), and Ministry of Finance (20%). In practice, membership in the board of these companies overlaps considerably.

Recent operations have provided support for (i) improved district heating systems and housing insulation; (ii) reliable and affordable electricity, and expanded heating services for poor communities; (iii) development of a legal and regulatory framework for energy conservation and emission standards; (iv) fostering regional knowledge sharing under the CAREC framework; and (v) assisting PPP transactions in a new major power plant.

9. An independent evaluation of ADB assistance to the energy sector was undertaken, which concluded that the Ulaanbaatar District Heating Project contributed to improving heating efficiency in Ulaanbaatar by nearly 45%, although the project encountered numerous implementation problems. According to the report (i) ADB’s exit from the energy sector was premature in the 2000–2002 country operational strategy, given a widening supply–demand gap in the sector; (ii) ADB gave insufficient attention to energy conservation despite an increasingly serious urban air pollution program; and (iii) ADB support for regional cooperation through CAREC helped sensitize the authorities to the urgent need to bring power tariffs more in line with supply costs. It recommended that ADB’s role be reoriented to address energy efficiency issues and to help the government establish a public utilities tariff and regulatory regime that would facilitate the PPPs needed to help meet Mongolia’s power and urban infrastructure requirements.

10. Several other partners provide support to the energy sector including the European Bank for Reconstruction and Development (EBRD), the German development cooperation through Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), the Japan International Cooperation Agency (JICA), KfW, and the World Bank. The energy working group has been coordinating sector and subsector demarcation among donors since April 2007. It is chaired by the Ministry of Energy and comprises ADB, EBRD, GIZ, JICA, KfW, the World Bank, and other development partners.

11. ADB’s assistance in the energy sector will create conditions for (i) competitive, sustainable, and regionally integrated growth; and (ii) inclusive social development by providing reliable, adequate, and affordable energy services. The development of the energy sector is closely linked to the water supply and other municipal infrastructure and services and thematic focuses such as private sector development and natural resource management (climate change response), including support for air pollution abatement and energy efficiency.

12. The intended outcome of ADB assistance is improved energy access and efficiency in urban centers and rural remote areas. The key sector output to which ADB will contribute is an improved and well-managed energy infrastructure for better efficiency and power trade. Specifically, ADB will support (i) improved energy and economic efficiency in major power plants by supporting PPPs to upgrade existing inefficient CHP plants and district heating systems and to construct a new CHP plant in Ulaanbaatar, (ii) improved energy access in urban centers and rural remote areas by upgrading district heating and power systems, (iii) measures to support cross-border power transmission and foreign direct investment in the energy sector, and (iv) capacity in energy sector planning by updating the energy sector master plan for 2010–2020.

13. Supply and demand side energy efficiency and environment improvement. New energy-efficient CHP plants with proper emission reduction equipment, efficiency improvements in existing CHP plants and transmission and distribution networks, and promotion of demand-side energy efficiency are essential to meet growing demand, avoid a

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14 Due to the need to rebid three procurement packages and delays caused by the re-designation of the executing agency when the Energy Authority was dissolved in the restructuring of the energy sector.
heating and power crisis that may be caused by a breakdown of Ulaanbaatar’s ageing CHP plants, and improve urban air quality. TA was provided to (i) prepare a technical study on a new CHP plant, (ii) assess sector issues, and (iii) identify various options for project development and financing through a PPP. ADB financial support could be considered for a new CHP plant through ADB’s public or private sector window, or some combination of the two. Opportunities for power generation and heating supply using unconventional gas and renewable energy sources will also be explored.

14. **Access to energy for all.** Public sector financing support will be provided for (i) rehabilitation and retrofitting of heating systems in priority urban centers, (ii) expansion of power transmission and distribution systems to increase electricity access and energy security, (iii) improvement in reliability of renewable energy (solar and coal hybrid) sources in some soum centers, and energy efficiency and renewable energy, possibly funded by the Climate Investment Funds. Priority will be accorded to the use of renewable energy sources to increase power and heating system access in rural and urban areas.

15. **Regional power development.** ADB will foster regional power trade and grid interconnection within Mongolia through policy formulation, and designing a robust project engineering and finance structure. ADB will work closely with other multilateral development banks, the private sector, and non-governmental organizations to promote this initiative.

16. **Sector capacity building.** ADB will build operational capacity in the energy sector and support policy development in renewable energy and tariff formation.

17. **Private sector participation.** Supporting PPPs and inviting foreign direct investment in the energy sector will be key focuses of ADB’s support during this CPS period. ADB’s public sector operations and Private Sector Operation Department have been collaborating on a new CHP plant project. In 2011 the government appointed ADB to lead transaction advisory services for a new CHP plant project that is expected to be financed primarily through private sector participation.

18. The proposed loan, grant, and TA projects will have sector- and project-specific indicators and targets for monitoring project implementation. These indicators will include the timely implementation and disbursement of project resources and compliance with environmental and social safeguards. ADB will maintain policy dialogue with the government on sector-wide issues during the preparation of new investments and TA projects and will monitor project-specific issues with government counterparts during review missions. ADB will use reports from the ministries and agencies concerned to monitor the technical milestones.
**Problem Tree for Energy**

**Core Problem**

- Energy service is unreliable

**Effects**

- Slowing economic development
  - Unreliable social services in the health and education sector
- Issuance of new business licenses and housing construction declining
  - Using independent inefficient heating system and running inefficient old power plants
- Aged power plants and heating boilers

**Causes**

- Lack of spare parts
- Lack of capacity in the Energy Agency
- Outdated energy planning
- Power plants and heating stations run, operating loss
- Lower electricity and heating tariffs

- No rehabilitation and upgrading in the power system
  - No new power plant construction and power trade
- Lack of investment budget from the states
- Lack of investment from the private sector
- Unfavorable investment environment
  - Issuance of new business licenses and housing construction declining
  - Slowing economic development
  - Unreliable social services in the health and education sector
  - Increasing urban air pollution

**Effects**

- Increasing urban air pollution
  - Using independent inefficient heating system and running inefficient old power plants
- Slowing economic development
  - Unreliable social services in the health and education sector
- Lower electricity and heating tariffs
### Sector Results Framework (Energy, 2014–2016)

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<th>Country Sector Outcomes</th>
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<th>Planned and Ongoing ADB Interventions</th>
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| Improved energy access and efficiency in urban centers and rural remote areas | Electrification rate increased to 95% in 2016 (2013 baseline: 90%) | Improved and well-managed energy infrastructure for better efficiency and power trade | Installed 560 MWe of generation capacity by 2016 (2013 baseline: 0 MWe) | **Planned key activity areas:**  
Power transmission and distribution systems  
Energy efficiency  
Renewable energy  
**Pipeline projects with estimated amounts:**  
Urban Environment Improvement and Energy Efficiency ($105 million)  
Energy Efficiency and Renewable Energy Project ($55 million)  
Power Sector Energy Efficiency Project ($80 million)  
Solar District Heating Supply in Rural Remote Areas ($2.5 million)  
Utilization of Cleaner Fuel for Heating Supply in Ger District and Gas based Power Generation ($0.3 million)  
Power Trade Strategy for Mongolia ($1.5 million)  | **Planned key activity areas:**  
Energy efficient generation facilities constructed and upgraded (100 MWe equivalent)  
**Pipeline projects**  
Concession agreement for a new CHP plant (450 MWe and 587 MWth) concluded by 2016  
Energy efficient transmission and distribution network in Ulaanbaatar designed by 2016  
Demand-side energy efficiency project designed by 2016  
Energy efficiency project in existing CHP plants designed by 2016  
Solar integration in conventional heating system demonstrated by 2016  
Policy advice to advocate coal to liquid development prepared by 2016  
A road map to advocate Asian Super Grid concept prepared by 2016 |

- **ADB =** Asian Development Bank, **CHP =** combined heat and power, **GWh =** gigawatt hour, **km =** kilometers, **MWe =** megawatt-electricity, **MWth =** megawatt-thermal, **PPP =** public–private partnership, **PRC =** People’s Republic of China.
- **Source:** Asian Development Bank estimates.