

SECTOR ASSESSMENT (SUMMARY): ENERGY

Sector Road Map

1. Sector Performance, Problems, and Opportunities

1. The energy sector underpins Uzbekistan's sustained growth and private sector development.¹ Uzbekistan enjoys abundant fossil fuel energy resources with rich coal, oil, and gas reserves. However, it is also one of the most energy- and carbon-intensive countries in the world.² Uzbekistan's household electrification rate is almost 100% but its aging and overloaded electricity system is causing a power demand–supply gap, especially in rural areas. This affects households' quality of life, economic activity, and delivery of social services.

2. **Primary energy.** Uzbekistan has about 1.8 trillion cubic meters of proven natural gas reserves, 590 million barrels of proven oil reserves, and about 3 billion tons of recoverable coal reserves. Uzbekistan's primary energy demand was 48.3 million tons of oil equivalent (mtoe) in 2012. This is projected to increase to 72.6 mtoe in 2030, growing at 1.8% annually. In 2014, about 16% of 63,949 million cubic meters of natural gas produced was exported. The reserve–production ratio for local gas is about 25–30 years, but this is likely to increase as potential natural gas reserves are being explored. Aging infrastructure and a lack of investment caused oil production to decline rapidly to 63,000 barrels of oil per day in 2013, a 60% fall from its 2000 level. The government is seeking ways to augment its petroleum and natural gas output, increase natural gas exports, and draw direct foreign investment to the energy sector.

3. **Sector structure.** The government owns and manages the energy sector in Uzbekistan.³ After a sector reorganization in 2001, the Ministry of Energy and Electrification was transformed into Uzbekenergo as a state joint stock company. Uzbekenergo, a vertically integrated and state monopoly (in charge of electricity generation, transmission, and distribution), operates under the supervision and regulation of the cabinet of ministers. The Ministry of Finance sets electricity tariffs. The sector is corporatized with separate business units, and further restructuring of Uzbekenergo is expected. To enhance transparency, Uzbekenergo has adopted external auditing based on the International Standards on Auditing since 2011. Full consolidation of financial statements based on the International Financial Reporting Standards is under way. In July 2015, Uzbekenergo became a “joint stock company” removing “state” from its name. The key objective is to commercialize its utility operations and introduce market principles to enhance its competitiveness in its various business lines. Reforms are also under consideration for reorganizing the project management structure to ensure knowledge retention and strengthen project management capacity. Reforms are also under consideration for reorganizing the project management structure to ensure knowledge retention and strengthen project management capacity.

4. Further efforts to improve Uzbekenergo's performance are necessary. The utility needs to develop a strategy and build the capacity to become more commercially bankable and to attract private sector investment in the medium term. It needs to introduce a modern management system with performance accountability. Uzbekistan and Uzbekenergo will benefit from learning and adopting international best practices for tariff determination to improve efficiency and to

¹ This summary is based on Asian Development Bank (ADB) sector knowledge and operational experience in Uzbekistan.

² International Energy Agency. 2014. *Key World Energy Statistics*. Paris.

³ State-owned company Uzbekneftegaz is in charge of exploration, production, refining, processing, and distribution of petroleum and natural gas. Uzbekenergo is responsible for the power industry, with Uzbekugol (coal company) and Uzelektroset (transmission company) under its umbrella.

ensure full cost recovery. Uzbekenergo's information technology infrastructure needs improvements in management information system.

5. **Power generation.** The total installed capacity for power generation in the country is about 13,500 megawatts (MW) and the available capacity is less than 11,000 MW. In 2014, the country generated about 54,400 gigawatt-hours (GWh) of electric power, of which it exported 1,400 GWh or 2.6%. Uzbekenergo owns and operates 10 thermal power plants (TPPs) with total installed capacity of 11,500 megawatts (MW), of which three are cogeneration plants and 29 are hydropower plants (HPPs). TPPs represent about 85% of the total generation capacity.

6. Natural gas is used for 92.2% of thermal power generation. All TPPs run on steam turbine technology with an average efficiency of 31%, compared with 55% efficiency for advanced combined-cycle gas turbine (CCGT) technology. High reliance on gas for electricity generation is inefficient and entails a revenue loss to the country because the gas price for electricity generation is significantly lower than its export price. In the long term, the government plans to increase coal's contribution to electricity generation from 6.3% in 2014 to 15% in 2020. The government is also interested in diversifying the energy mix and increasing energy security through clean renewable energy such as solar and wind.⁴ Targeting up to 21% renewable energy by 2031, Uzbekistan plans to install at least 4 gigawatts of solar capacity.

7. Most power generation assets are 40–50 years old, in poor condition, and require replacement and/or rehabilitation. Since 1991, only three power capacity expansion projects have been completed: (i) rehabilitation of two 300 MW steam-cycle units at Syrdarya TPP, (ii) construction of an 800 MW steam-cycle unit at Talimarjan TPP, and (iii) construction of a 450 MW CCGT at Navoi TPP. Construction of CCGTs will reduce the use of natural gas per unit of electricity generated. The government also plans to construct small HPPs with capacity of about 330 MW to be operational by 2015.

8. **Energy pipeline and power transmission.** Uzbekistan exports 25% of its natural gas through its pipeline network of over 12,000 kilometers (km) and 250 gas compressor stations. Its main export market is the Russian Federation, with smaller volumes exported to Kazakhstan, the Kyrgyz Republic, and Tajikistan. Uzbekistan is a transit country for gas exported by Turkmenistan to the People's Republic of China and the Russian Federation.

9. **Power Transmission.** Uzbekistan's power transmission system consists of 1,850 km of 500-kilovolt (kV) lines, 6,200 km of 220 kV lines, and 15,300 km of 110 kV lines. The system has not been properly maintained and upgraded, affecting the delivery of reliable power supply to domestic customers, especially in the Fergana region and in the south of the country. Power assets are not strategically situated. About 70% of power generation occurs in the north while over 90% of gas production occurs in the south. To reduce gas and power transmission losses, CCGT power plants will be constructed in Talimarjan and Navoi in the south, close to gas fields. To improve the efficiency of dispatch operation and energy management, a modern and automated supervisory control and data acquisition system is needed.

10. Uzbekistan's power grid comprises the backbone of the Central Asia Power System—an integrated and synchronized high-voltage power transmission network linking the systems of Kazakhstan, the Kyrgyz Republic, and Tajikistan. The network's planning and operation is managed by the Coordinating Dispatch Centre in Tashkent. Afghanistan is joining the network to meet a part of its power demand with imports from the Kyrgyz Republic, Tajikistan, and Uzbekistan. Power trade is conducted bilaterally. A reliable and secure operational network to ensure efficient commercial trade of power is critical.

⁴ A draft law on the use of nontraditional and renewable energy sources is under preparation.

11. **Power distribution.** Uzbekenergo distributes power from 14 regional distribution centers. Its customer base is composed mainly of residential and small commercial clients (5 million connections), agricultural consumers (21,000 connections), and large industrial entities (16,000 connections). Industry consumes about 45% of electricity. Residential consumers account for 25% of total power consumption, agricultural consumers for 23%, and commercial entities for 5%. Annual per capita electricity consumption averages 1,940 kilowatt-hours (kWh).

12. System losses are officially reported at 18% with distribution losses at 14%. Revenue collection rate is at 80% or less. These reported losses may be understated because of Uzbekenergo's inability to accurately collect information about the amount of electricity supplied and to monitor the revenue collection under its current system. The introduction of an advanced electricity metering system that accurately measures losses will allow Uzbekenergo to focus on feeders with the highest losses. The advanced electricity metering will also strengthen the governance at the level of distribution enterprises as it will improve transparency and accountability of power distribution.

13. **Energy tariffs.** Uzbekistan's electricity tariff has been low in absolute terms. This is primarily driven by the low domestic cost of natural gas relative to international prices (the domestic gas price is about \$66 per 1,000 cubic meters, which is substantially lower than its export price). This has given an inappropriate pricing signal and discouraged demand-side energy efficiency improvements.

14. The government is committed to maintain tariffs at a level that covers operation and maintenance, and capital cost. Since 2004, the nominal tariff of electricity has been revised semiannually and increased by 18%–20% per year. As a result, the retail tariff per kWh has increased from SUM20/kWh in 2004 to SUM155/kWh in 2015. Continued tariff increases of more than 10% above the inflation rate have enhanced the power utility's financial performance and avoided the need for direct subsidy.

2. Government's Sector Strategy

15. Energy security, affordability, and efficiency are key priorities of the government's energy strategy. The government has adopted policy and legal frameworks with clear goals to reduce energy intensity and losses, and step up sector investments and institutional change. The government aims to (i) maximize savings through rational use and application of clean energy technology, (ii) integrate energy efficiency into national planning, (iii) improve sector performance by commercializing utility operations, (iv) attract private sector participation, and (v) increase energy exports on a commercial basis. Energy plans leading to 2020 and 2030 have been announced, but are not yet in the public domain.

16. The government's \$4.8 billion power sector development plan for 2015–2019 covers physical and nonphysical aspects to ensure (i) uninterrupted and reliable power supply to all customers in Uzbekistan; (ii) security and reliability of the Central Asia Power System; (iii) equal access to the transmission system; (iv) investment for reconstruction, modernization, and expansion of power generation, transmission, and distribution systems; (v) diversification of the fuel mix for power generation; and (vi) management, operation, and performance improvement of utilities based on commercial principles. On 30 September 2009, a law on the electric power industry came into effect, paving the way for private investment in power generation and distribution in the medium to long term. Further institutional and regulatory reforms will create an enabling environment for greater private sector participation. The government also has a \$19.4 billion investment plan for the oil and gas sector to develop new production and modernization projects, 85% of which are expected to be financed through foreign direct

investment and external loans.

17. Uzbekistan is a conduit of power trade for neighboring countries, and a power supplier to Afghanistan. It uses its fossil-fuel-based generation capacity to make up for winter shortages in countries rich in hydro resources, such as the Kyrgyz Republic and Tajikistan. Uzbekistan also exports natural gas to these countries. In the medium term, Uzbekistan wants to diversify its electricity exports to new markets such as Pakistan.

18. Uzbekistan is an active participant in the Central Asia Regional Economic Cooperation (CAREC). In 2008, CAREC members announced their long-term strategy for developing the region's energy sector to ensure energy security through balanced development of the region's energy infrastructure and institutions, and stronger integration of the region's energy markets to make available adequate volumes of commercial energy in a reliable, affordable, financially sustainable, and environmentally sound manner.⁵ In 2009, CAREC members agreed to a framework action plan to strengthen and expand the regional power transmission network collectively to increase regional power trade.⁶ The Asian Development Bank (ADB) and other multilateral institutions participating in CAREC agreed to support diagnostics studies, capacity development, and investments in the sector. Under this framework, Uzbekistan started exporting power to Afghanistan (up to 150 MW) in 2009.

3. ADB Sector Experience and Assistance Program

19. ADB approved the Talimarjan Power Project, the first ADB-financed project in the energy sector, in May 2010.⁷ ADB approved its second energy sector loan, the Advanced Electricity Metering Project, in September 2011.⁸ In November 2013, ADB approved the Samarkand Solar Power Project.⁹ In October 2014, ADB approved the Takhiatash Power Plant Efficiency Improvement Project.¹⁰ Development partners active in the energy sector include the Islamic Development Bank, Japan International Cooperation Agency (JICA), and the World Bank.

20. Consistent with the government's strategy, ADB assistance to Uzbekistan's energy sector focuses on energy efficiency and renewable energy, which underpins the country's energy security and its capacity for trade. Support for the modernization of metering systems will reduce losses, encourage efficient use of electricity, and improve financial sustainability and competitiveness. New generation and transmission projects will contribute to more reliable power supply, while generating a power surplus for exports, and support energy efficiency improvement. Renewable energy development through solar power will contribute to energy diversification and reduction of carbon emissions. ADB's support to Uzbekistan for the establishment of an International Solar Energy Institute, promoting solar energy development and increase solar technology expertise in the country. Another aspect of ADB's support for capacity development in the energy sector is its assistance to strengthen Uzbekenergo's corporate and financial management, and its safeguards and gender consideration capacity.

⁵ CAREC. 2008. *Strategy for Regional Cooperation in the Energy Sector of CAREC Countries*. Approved by the 7th Ministerial Conference of CAREC. Baku, Azerbaijan. 21 November.

⁶ CAREC. 2009. *Energy Action Plan Framework*. Approved by the 8th Ministerial Conference of CAREC. Ulaanbaatar, Mongolia. 16 October.

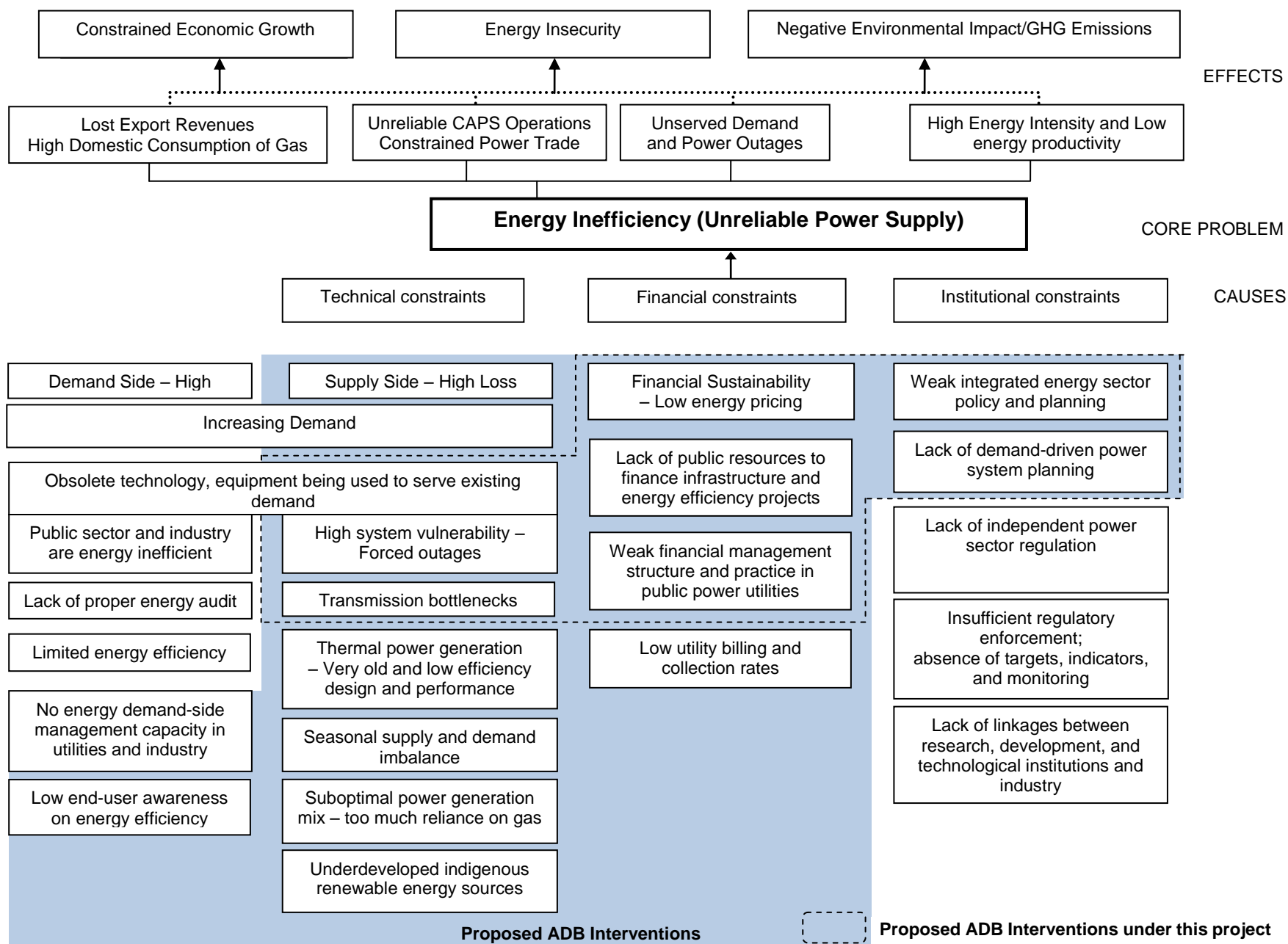
⁷ ADB. 2010. *Report and Recommendation of the President to the Board of Directors: Proposed Loan to the Republic of Uzbekistan for Talimarjan Power Project*. Manila. The project was cofinanced with Japan International Cooperation Agency (JICA). The associated transmission facilities are financed by the World Bank.

⁸ ADB. 2011. *Report and Recommendation of the President to the Board of Directors: Proposed Loan to the Republic of Uzbekistan for the Advanced Electricity Metering Project*. Manila.

⁹ ADB. 2013. *Report and Recommendation of the President to the Board of Directors: Proposed Loans to the Republic of Uzbekistan for the Samarkand Solar Power Project*. Manila.

¹⁰ ADB. 2014. *Report and Recommendation of the President to the Board of Directors: Proposed Loan to the Republic of Uzbekistan for the Takhiatash Power Plant Efficiency Improvement Project*. Manila.

Problem Tree for Energy Sector



ADB = Asian Development Bank, CAPS = Central Asia Power System, GHG = greenhouse gas emission
Source: Asian Development Bank.

Sector Results Framework (Energy, 2012–2016)

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Country Sector Outcomes		Country Sector Outputs		ADB Sector Operations	
Outcomes with ADB Contribution	Indicators with Targets and Baselines	Outputs with ADB Contribution	Indicators with Incremental Targets	Planned and Ongoing ADB Interventions	Main Outputs Expected from ADB Interventions
Energy security and regional trade with neighboring countries increased	<p>Thermal power generation efficiency improved to 50% by 2016 (2009 baseline: 31%)</p> <p>Power exports to Afghanistan and neighboring countries increased to 3 TWh by 2016 (2009 baseline: 1 TWh)</p>	Energy infrastructure expanded, improved, and efficiently managed	<p>2,412 MW of additional thermal power generation added by 2016 (2010 baseline: 10,664 MW)</p> <p>1,011 km of 110–500 kV transmission grid developed or rehabilitated from 2012 to 2016</p> <p>50 MW of new solar energy developed by 2016</p> <p>Distribution losses reduced to 5% by 2016 (2010 baseline: 20%)</p>	<p>Planned key activity areas</p> <p>Power generation plants (37% of funds)</p> <p>Solar power (23% of funds)</p> <p>Energy efficiency and distribution loss reduction (14% of funds)</p> <p>Electrical power transmission (25% of funds)</p> <p>Policy and regulation (1% of funds)</p> <p>Pipeline projects with estimated amounts</p> <p>Advanced Electricity Metering Phase 4 (\$300 million)</p> <p>Northwest Region Power Transmission Line Project (\$150 million)</p> <p>Regional Energy Development Project (\$210 million) and PPTA (\$800,000)</p> <p>Solar Power Development II (\$100 million) (stand by) and PPTA (\$1.5 million)</p> <p>Ongoing projects with approved amounts</p> <p>Talimarjan Power Project (\$350 million)</p> <p>Advanced Electricity Metering Project (\$150 million)</p> <p>Samarkand Solar Power Project (\$110 million)</p> <p>Takhiatash Power Plant Efficiency Improvement Project (\$300 million)</p>	<p>Planned key activity areas</p> <p>Upgrading of energy generation infrastructure</p> <p>Strengthening transmission and distribution</p> <p>Energy efficiency and solar power development</p> <p>Pipeline projects</p> <p>460–500 MW of thermal capacity modernized</p> <p>100 MW of solar energy generation capacity developed</p> <p>364 km of 220 kV transmission line constructed and 3 substations rehabilitated</p> <p>Ongoing projects</p> <p>2 CCGT units of 400–450 MW are operational by 2016</p> <p>AEM system developed for 1 million users in the targeted regions by 2018</p> <p>Uzbekenergo's corporate and financial management capacity improved</p> <p>A 100 MW solar photovoltaic power plant is operational by 2017</p> <p>2 CCGT units of 230–280 MW are operational by 2020</p>

ADB = Asian Development Bank, AEM = advanced electricity metering, CCGT = combined-cycle gas turbine, km = kilometer, kV = kilovolt, MW = megawatt, PPTA = project preparatory technical assistance, TWh = terawatt hour.

Source: Asian Development Bank.