SECTOR ASSESSMENT (SUMMARY): ENERGY

1. Sector Performance, Problems, and Opportunities

1. Sector overview. Reliable and adequate power supply is essential to Uzbekistan’s economic growth and development. Uzbekistan has rich coal, oil, and gas reserves, and natural gas exports have underpinned its sustained economic development, contributing 25% of commodity exports. Domestic gas prices are low compared with international prices, and this has discouraged energy efficiency improvements, making Uzbekistan one of the most energy- and carbon-intensive economies in the world. Demand for power in Uzbekistan has been increasing, keeping pace with high economic development, but the aging power infrastructure and insufficient investment have increasingly widened the demand–supply gap and led to unreliable supply. Power outages occur occasionally even in urban areas and are particularly severe in rural areas during the cold season (November–March)—from 6 hours a day to a few weeks in some villages. Unreliable supply disrupts local business operations and adversely affects households’ quality of life, economic activity, and delivery of social services.

2. Power generation. The country’s total installed capacity for power generation is about 14,000 megawatts (MW), but available capacity is less than 11,000 MW. In 2018, the country generated about 63,000 gigawatt-hours of electricity; almost 85% came from thermal fossil fuels and the rest from hydropower. Natural gas is the primary fuel for thermal generation, accounting for 93.5% of total thermal generation. Most power generation assets are 40–50 years old, are in poor condition, and require replacement and/or rehabilitation as they run on steam turbine technology with a weight average efficiency of 33%, compared with more than 55% efficiency for advanced combined-cycle gas turbine technology. Uzbekistan could save a significant amount of natural gas by using more efficient plants and generate additional electricity by improving generation efficiency. Modernizing the power generation assets will add capacity to meet growing power demand and to retire the old inefficient units. Importing excess electricity from hydropower-rich neighbors during summer and daily trading during winter months (November–March) can create economic savings and defer new capacity addition.

3. Significant losses in transmission and distribution network. Uzbekistan has more than 230,000 kilometers of transmission and distribution lines, with the distribution line for 35 kilovolts and below spanning 213,400 kilometers. On average, the transmission and distribution lines have been operating for more than 30 years, and 30% of substation transformers require urgent replacement. System losses are reported at 18% and distribution losses at 14%, but they vary widely depending on the region. The revenue collection rate is at 80% or less. These reported losses may be understated because of the limited ability of Uzbekenergo (the vertically integrated power utility of Uzbekistan) to accurately collect information on the amount of electricity supplied and monitor revenue collection under its system. Installation of advanced electricity meters will strengthen revenue collections and improve transparency and accountability. Despite significant investments in the rehabilitation and construction of new lines, the power grid still requires substantial additional investments to meet growing demand and improve supply reliability. Besides, Uzbekistan needs to consider adopting innovative technologies and modern design standards to improve demand-side energy efficiency and system flexibility.

4. Limited diversification in energy mix. Natural gas is the dominant fuel in Uzbekistan’s electricity generation mix, contributing 86% of total electricity produced in 2017. Uzbekistan needs to meet fast-growing power demand, which the government estimates will double by 2030. Meeting demand growth by burning fossil fuels, notably natural gas, will increase greenhouse gas emissions. Considering that 90% of the country’s carbon dioxide emissions is from the energy sector, diversification is needed to reduce the emission level.
sector, the bigger challenges of environmental sustainability and climate change responsiveness will remain critical bottlenecks. As part of its investment prioritization, the government should start planning to diversify the country’s generation mix to reduce dependence on natural gas and use it for higher-value exports, improve supply reliability, and reduce the sector’s vulnerability to climate change. Apart from power trade opportunities with neighboring countries, the government could consider alternatives to gas-fired generation. Given abundant renewable energy resources, Uzbekistan needs to unlock and scale up its renewable energy development, such as wind and solar, as part of its energy source diversification strategy.

5. **Sector sustainability.** To meet fast-growing electricity demand and, at the same time, replace and modernize aging critical infrastructures, the government needs to invest more than $11 billion by 2030. Sector investments have historically been publicly funded, but increasing the burden on the public budget will not be feasible and is not a sustainable economic strategy. The government will need to explore such options as strengthening the sector’s capacity to generate more cash and attract private investments. Continued tariff increases of more than 10% above the inflation rate have enhanced the power utility’s financial performance and reduced the need for direct subsidy. However, foreign exchange liberalization and the depreciation of the local currency in September 2017 raised the cost-recovery level tariff. The tariff of $0.03 per kilowatt-hour is inadequate to recover operation and maintenance costs and raise investment financing.

2. **Government’s Sector Strategy**

6. 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. On 1 February 2019, the government created the Ministry of Energy to (i) unify energy policy aimed to ensure energy security and meet growing needs; (ii) delineate the segmented regulatory functions and improve the legal and institutional framework to formulate market-oriented policies to attract private sector investment; (iii) improve sector performance by commercializing utility operations; and (iv) through rationalized use of energy, reduce energy intensity and carbon emissions. As part of the reform actions, major state energy utilities, including Uzbekenergo, will be subject to time-bound restructuring action plans.

7. Guided by international development partners, including the Asian Development Bank (ADB), Uzbekistan embarked on an ambitious reform program in 2019 to cultivate a competitive environment in the energy sector and attract private investment. Reforms include the unbundling of Uzbekenergo to create a market that will operate primarily as a single-buyer scheme where the dispatch company purchases wholesale power from the generation companies and contract transmission services. While the newly unbundled thermal generation company, transmission and distribution company remain state-owned, the government will gradually introduce private energy generators through public-private partnerships to improve efficiency and reduce overall power system costs.

8. The government’s $4.8 billion energy 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 (CAPS); (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 energy mix in power generation; and (vi) management, operation, and performance improvement of utilities based on commercial principles.
9. Uzbekistan has embarked on the program of rehabilitation and construction of hydropower plants. With the successful implementation of this program to develop 18 hydropower projects and modernize 14 units, hydropower will account for 15.8% (from current 12.7%) of the energy mix after 2025. The government has also announced its plan to develop nuclear energy, starting with making two 1,000 MW-sized reactors operational by 2028. This nuclear program is expected to save 3.7 billion cubic meters of natural gas yearly and contribute to the diversification of the generation mix. The government will prioritize private sector investments in renewable energy development on public–private partnership basis.

10. 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 hydropower resources, such as the Kyrgyz Republic and Tajikistan, and exports natural gas to these countries. In the medium term, Uzbekistan will export electricity to such new markets as Pakistan and, at the same time, import electricity to reduce overall system costs.

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

11. **Long-standing largest development partner.** ADB is the largest financing partner in Uzbekistan’s energy sector with a direct investment of more than $1.6 billion since 2010, covering the whole energy value chain. Other active development partners in the sector are the Agence Française de Développement, the Asian Infrastructure Investment Bank, the Islamic Development Bank, the Japan International Cooperation Agency, and the World Bank. In 2018, the European Bank for Reconstruction and Development recommenced operations in Uzbekistan. To maximize development impact and harmonized support for the government’s strategy, development partner coordination meetings are held regularly and, whenever possible, cofinancing opportunities are explored.

12. **Sector investment program aligned with government strategy.** ADB assistance to Uzbekistan’s energy sector addresses challenges in the whole value chain of power supply, focusing on improved energy efficiency and supply reliability. Investment programs to modernize power generation assets—the two phases of the 900 MW Talimarjan combined-cycle power plant\(^1\)\(^2\) and the Takhiatash Power Plant Efficiency Improvement Project\(^3\)—have improved power supply reliability with new capacity addition. These programs will help reduce carbon intensity and greenhouse gas emissions. Improved energy efficiency in power generation will also free up natural gas for export or downstream value addition.

13. **New transmission infrastructure that will serve the Takhiatash power plant is expected to improve electricity service in the northern and western regions of the country and reduce losses from the congestion in existing lines. Enhancement and construction of the transmission infrastructure will help reduce congestion and overloading, improve supply reliability, and reduce losses. ADB’s two-phased advanced metering projects will enable Uzbekenergo to (i) improve fault detection in the distribution system, contributing to improved electricity quality; (ii) reduce nontechnical losses; and (iii) encourage efficient electricity use. Reduction of nontechnical losses will further contribute to the sector’s financial sustainability through improvement in the collection

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\(^1\) ADB. 2010. *Report and Recommendation of the President to the Board of Directors: Proposed Loans and Administration of Loan to the Republic of Uzbekistan for the Talimarjan Power Project.* Manila.

\(^2\) ADB. 2017. *Report and Recommendation of the President to the Board of Directors: Proposed Loan and Administration of Technical Assistance Grant to the Republic of Uzbekistan for the Power Generation Efficiency Improvement Project.* Manila.

\(^3\) 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.
rates. ADB’s new transmission and distribution projects will contribute to more reliable power supply, generate power surplus for export, and support energy efficiency improvement. Addressing the technical system losses will also make available additional electricity for export.

14. **Sector reform for improved sustainability.** Reforms and institutional strengthening initiatives have been integrated into project lending. ADB has been supporting incremental sector reform and corporatization of utility companies through (i) corporate performance improvement, (ii) financial management and governance, and (iii) management information system. At the broader policy level, a tariff methodology reform and a power master plan study were complete with ADB technical assistance. In 2019, the government unbundled the monopoly power utility and implement reform actions plans to address emerging issues of reform. ADB together with other development partners is closing providing guidance for the government and leading the implementation of reforms of the distribution companies. ADB actively supports the government’s policy goal for a market-oriented energy sector with greater private investments and is currently advising the government to develop solar projects through private-public partnership, which is an essential first step toward larger sector reforms and will lower the burden on the national budget.

15. **Expanded regional power trade.** Uzbekistan is part of CAPS—the interconnected power systems of Kazakhstan, the Kyrgyz Republic, Tajikistan, Turkmenistan, and Uzbekistan. Despite good interconnection, little power was traded within CAPS following Tajikistan’s disconnection in 2009. Uzbekistan has small volume exports of power to Afghanistan and imports from the Kyrgyz Republic. Power trade with Tajikistan resumed in 2018, and trade volume is expected to grow. Increased power trade among CAPS countries will contribute to increased foreign revenue for Uzbekistan and optimized energy use within the region by allowing hydropower-rich countries, such as the Kyrgyz Republic and Tajikistan, to export their excess energy during summer to fossil fuel-based countries, such as Uzbekistan, and vice versa during winter. As part of supporting regional cooperation in energy trade, ADB plans to extend support for increasing power trade within CAPS by (i) introducing an energy management system to the Coordinated Dispatch Center to enable a safe increase of energy flow within CAPS; (ii) identifying and offering technical solutions to technical bottlenecks to the regional power trade, which may occur in any of the CAPS countries; and (iii) facilitating power trade within CAPS, expanding CAPS membership, and exploring additional energy markets to increase power trade potential.

16. **Meeting the climate change goal.** ADB will provide continued support for low-carbon initiatives, including renewable energy and energy efficiency, using new technologies, innovation, and knowledge products. ADB’s solar development initiative with explorative penetration studies and institutional development paved the way for large, private sector-led solar power projects. ADB’s future investment in hydropower will advocate greater and more efficient use of indigenous hydropower resources with improved awareness on the climate change impact. ADB will continue to explore innovative and integrated energy solutions, such as community-based mini and/or micro hydropower, mini and/or micro grids in remote areas, and application of information technology and automated systems to improve electricity services and reduce carbon emissions.

17. **ADB’s energy sector operations in Uzbekistan will focus on leveraging greater finance, exploring innovative modalities to address the country’s needs and promptly align with the government program, supporting reforms for sustained sector development, and creating an enabling environment for private sector investment in all energy sector segments.** It will also foster transfer of knowledge on technologies, policies, and best practices to Uzbekistan.

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5 Uzbekistan exported 1.85 billion kilowatt-hours of electricity—3% of total power generation—to Afghanistan in 2017.
Problem Tree for Power Sector

Reduced Socioeconomic Growth and Energy Security

The cost of energy losses is transferred to customers.

Limited access of rural population to public services widens urban–rural disparities.

The economy incurs high environmental costs.

Business activities are constrained by power interruption.

Electricity supply is unreliable and environmentally unsustainable.

Obsolete technology and aging infrastructure are used to serve demand.

Regular investment in infrastructure maintenance is not provided.

Tariff raise to recover the cost of investment is not sufficient.

A financial sustainable plan for replacing old assets is lacking.

Diversification of energy resources is limited.

Exploration of regional energy trade with hydropower-rich neighboring countries is limited.

Subsidized low gas prices discourages the use of new and renewable technology.

Awareness of the long-term climate change and mitigation strategy is lacking.

Linkages between research, development, and technological institutions and industry are missing.

Integrated energy sector policy and planning is weak.

Strategies and plans to retain and attract best talent are lacking.

Current infrastructure is insufficient to cover the growing demand.

Upfront financing for advanced technology and equipment is high.

Public funds for needed investments are lacking.

Market mechanism to attract private sector investment is underdeveloped.

Independent power sector regulation and audit capacity are lacking.

ADB Sector Interventions

ADB = Asian Development Bank.
Source: ADB.