

## SECTOR ASSESSMENT (SUMMARY): ENERGY

### Sector Road Map

#### 1. Sector Overview and Performance

##### 1.1 Introduction

1. The Kyrgyz Republic enjoys abundant hydropower resources, but less than 10% of this potential has been utilized. The country has only modest petroleum and natural gas resources and ranks 81 and 90 in the world in reserves of these two energy sources, respectively. In 2008, total primary energy supply was 2.86 million tons of oil equivalent, of which 70% was supplied by imported oil, coal, and gas, and 30% by domestic hydro sources. The Kyrgyz Republic is a net energy importer but a net exporter of electricity. The sector overall is characterized by energy intensity and carbon dioxide emissions that are below average. This reflects its lightly industrialized economy and a power sector based on hydroelectricity. Apart from hydropower, the country's principal energy resource is coal. Reserves are estimated at 27 billion tons and proven reserves are quoted as 1.3 billion tons.<sup>1</sup>

2. Its untapped hydropower resources give the country its large potential for renewable energy development. Among the members of the Commonwealth of Independent States, the Kyrgyz Republic stands behind only the Russian Federation and Tajikistan in hydroelectricity generation potential. It also has good prospects for developing other renewable energy resources such as solar, wind, and biomass. A 2008 law on renewable energy calls for mechanisms to stimulate the development of renewable technologies.<sup>2</sup>

##### 1.2 Institutional Structure

3. Energy sector governance is carried out by the government through the State Property Fund and the Ministry of Energy and Industry (MOEI). The State Property Fund acts as the owner and manager of state-owned power companies. The MOEI is responsible for strategic planning, policy development, sector regulation, technical standards, and forecasting.

4. Energy and electricity laws passed by the country's parliament in 1996 and 1997 allow for private sector ownership and a competitive market in electricity. In 2001, Kyrgyzenergo, the then state-owned, vertically-integrated utility was unbundled into a generation company, a transmission company, four electricity distribution companies, and one district heating company. This unbundled sector structure remains in effect today. Various privatization initiatives have resulted in only limited privatization of hydro power assets (1% of total) and the sale of Severelectro Distribution Company in early 2010. The government nationalized Severelectro later in 2010 following public unrest. Thermal energy in Bishkek and Osh cities is supplied by the generating company created by the 2001 unbundling and distributed by separate district heating companies. Practically all assets are government-owned.

5. The importation, distribution, and sale of gas are handled by a state-owned monopoly. The 30 companies in the coal mining industry are owned both privately and by the state.

---

<sup>1</sup> Government of the Kyrgyz Republic, Ministry of Energy. 2009. *Short Term Energy Sector Development Strategy and Priorities for 2009–2012*. Bishkek.

<sup>2</sup> The Law on Renewable Energy of 31 December 2008 regulates the development and use of decentralized renewable energy technologies.

6. The Kyrgyz Republic is a participant of the Central Asia Regional Economic Corporation (CAREC) program.<sup>3</sup> In 2003, the country ratified the Kyoto Protocol to the United Nations Framework Convention on Climate Change. It is also a signatory to the Energy Charter Treaty.<sup>4</sup>

### 1.3 Power and Thermal Sector

7. Total installed generation capacity is 3,863 megawatts, of which 81% comes from hydroelectric power plants (HPP) and 19% from thermal combined heat-and-power plants (CHPPs). HPPs are in need of upgrade and modernization. The two thermal CHPPs, fueled by imported gas, oil and coal, are in need of complete rehabilitation or replacement.

8. Over 1.1 million customers are connected to the grid, and the electrification rate approaches 100%. Network assets are near the end of their life and in need of major rehabilitation and augmentation. This results in reduced reliability and high technical losses

9. Thermal power facilities generate about 3,500 gigawatt-hour (GWh) of thermal power annually, two-thirds of which come from the Bishkek CHPP. Losses due to poor technical conditions are high, at about 20% of thermal output. Financial performance of the thermal sector is poor. Losses were Som588 million in 2008 and Som343 million in 2009.

10. Before the country gained independence from the former Soviet Union in 1991, five Central Asia republics were interconnected electrically in the Central Asian Power System (CAPS), which was designed to facilitate seasonal power and water exchange. Turkmenistan withdrew from CAPS in 2003 and Tajikistan has operated in island mode since 2010. The Kyrgyz Republic, Kazakhstan, and Uzbekistan remain interconnected. The Kyrgyz Republic is an important member of CAPS, being the largest net exporter and provider of frequency regulation services for the CAPS system from the Toktogul HPP.

11. The Toktogul HPP and its downstream cascade are located in the country's South while the demand for electricity is mainly in the North. The transmission system connects the South to the North via one 500 kilovolt line that is entirely within the country. A separate 500 kilovolt line reaches the northern region via Uzbekistan and Kazakhstan. The dependency on this regional transmission line for system operation requires continued interconnection of the Kyrgyz Republic's system with the systems in the two neighboring countries. This country's dependency on these foreign transmission systems is an energy security concern.

12. Toktogul reservoir provides a multiyear storage facility for irrigation in the downstream countries. Water releases are subject to annual intergovernmental agreements. Electricity generated by this release of stored water in the summer exceeds domestic demand and is exported to Kazakhstan, Tajikistan, and Uzbekistan. Due to limited releases of water in the winter and energy demand in the country that is twice that in summer, oil, coal, and gas need to be imported to fuel the CHPPs. Trade in electricity is therefore interconnected with water release agreements. It is also complicated by the seasonality of regional electricity prices and operational challenges imposed by the fact that the water releases vary from year to year.

13. Net supply to the domestic market was 14.7 terawatt-hour in 2012, but total sales were 11.1 terawatt-hour, implying a system loss of 25% of supply.<sup>5</sup> Assuming technical losses of

---

<sup>3</sup> The CAREC program is a partnership of 10 countries and 6 multilateral institutions working to promote development through cooperation, leading to accelerated economic growth and poverty reduction. <http://www.carecprogram.org>

<sup>4</sup> The Energy Charter Treaty is an international agreement that provides a multilateral framework for energy trade, transit, and investments. [http://www.encharter.org/fileadmin/user\\_upload/document/EN.pdf](http://www.encharter.org/fileadmin/user_upload/document/EN.pdf)

<sup>5</sup> Ministry of Energy and Industry.

15%, the remaining 10% are commercial losses. While system losses declined from over 30% during 2001–2010, commercial losses remain high and unsustainable.

14. Tariffs are set for six different customer classes. Tariffs do not reflect costs and are based on affordability and social considerations. In 2010, tariffs were doubled to Som1.5 per kilowatt-hour (kW/h). Following social unrest in 2010 that was partly attributable to this tariff increase, tariffs were reduced to Som 0.7 per kWh for households and Som1.327 per kWh for all other customer classes. With tariffs below cost, an increasing cost base as capital expenditure increases, and high losses, the sector's financial performance is poor. Annual financial losses have been growing since 2007. Average collections improved from 86% in 2007 to 95% in 2009, but debt accumulated during earlier poor collection periods remains a problem.

15. The restructuring of the energy sector in 2001 is not viewed as a success. Objectives of private sector participation, a competitive market, and improved supply have not been met. The choice of four distribution companies for a 1 million customer market is under question.

#### **1.4 Coal, Oil, and Gas Sectors**

16. Coal production in 1979 was 4.5 million tons. Production dropped to 321,000 tons in 2006, but increased to 558,000 tons in 2010. Coal imports, at 1.1 million tons in 2010, exceeded domestic production. Thermal plants are the largest users of coal. Due to technological constraints, the Bishkek CHPP uses imported coal. Significant amounts of coal are burned by households not connected to the district heating networks.

17. In 2008, crude oil production was 200,000 tons and natural gas production was 660 terajoules, compared with total consumption of 1.25 million tons of oil and 29,000 terajoules of natural gas. In 2008, production of refined products at the country's Jalal-Abad refinery, built in 1997, was 130 thousand tons, or 30% of domestic consumption. The Kyrgyz Republic imports oil from Russia and Kazakhstan, and gas from Uzbekistan and Kazakhstan.

18. Tariffs for coal, oil, and gas are market-based. The price of gas imported from Uzbekistan rose from \$100 to \$240 per thousand cubic meter during 2007–2009, while the price of wholesale coal increased by 150% during 2006–2010. Gas consumption dropped as consumers switched to cheaper subsidized electricity and thermal heating.

#### **1.5 Sector Issues**

19. The energy sector is characterized by (i) aging assets that are beyond their economic life, (ii) high commercial and technical losses, (iii) below-cost electric tariffs and market-based coal and gas tariffs that provide distorted signals, (iv) poor financial performance, and (v) operational constraints caused by linkage between water release and energy production. These issues cause poor energy supply and reduced energy access by poor households.

20. In a regional power sector study financed by ADB, generation and transmission investment needs for 2012–2022 were estimated at \$1.9 billion for domestic needs, rising to \$7.3 billion when government export projects were considered.<sup>6</sup> Financing for these investments, which do not address the distribution sector, has not been addressed.

---

<sup>6</sup> ADB. 2010. *Technical Assistance for Central Asia Regional Economic Cooperation: Power Sector Regional Master Plan*. Manila.

21. The structure of the electricity sector is not optimal. It has a large number of distribution companies but no competition in generation. Regulation is not independent and tariff rulings do not reflect costs. Power sector revenues are disbursed by the MOEI based on short-term sector needs rather than in accordance with approved tariffs.

## 2. Government's Sector Strategy

22. The National Sustainable Development Strategy and the government's power sector strategy aim for reliable and uninterrupted energy to be provided to the country's consumers by (i) increasing energy security by developing domestic energy resources, (ii) effective demand management and loss reduction measures, (iii) reform of tariff policy, (iv) improvement in financial performance of sector entities, (v) attracting private sector development, and (vi) expanding regional power exports.<sup>8</sup> The government envisages a range of domestic and export power sector projects totaling \$5 billion during 2013–2015, representing more than 15% of gross domestic product per annum.

## 3. ADB Sector Experience and Assistance Program

23. ADB's past undertakings in the sector are the 1996 Power and District Heating Rehabilitation Project, the 2010 Power Sector Improvement Project,<sup>9</sup> and the 2012 Power Sector Rehabilitation Project.<sup>10</sup> Bilateral donors include the KfW, the United States Agency for International Development, the People Republic of China, and the Russian Federation.

24. Projects that provide reliable energy supply bring substantial benefits to women and reduce the time they must spend on gathering fuel and other household chores. Electricity is also likely to improve security for women and provide them with additional options for home-based income-generating activities. However, since ADB's program will focus on physical assets and business systems, opportunities for gender design features will be limited.

25. ADB supports the government's strategy to improve the performance of the energy sector. ADB's strategy is to build on the current portfolio and to focus on the power subsector where greatest impact on poor households can be realized. ADB's assistance program during the CPS period will be designed to meet several objectives:

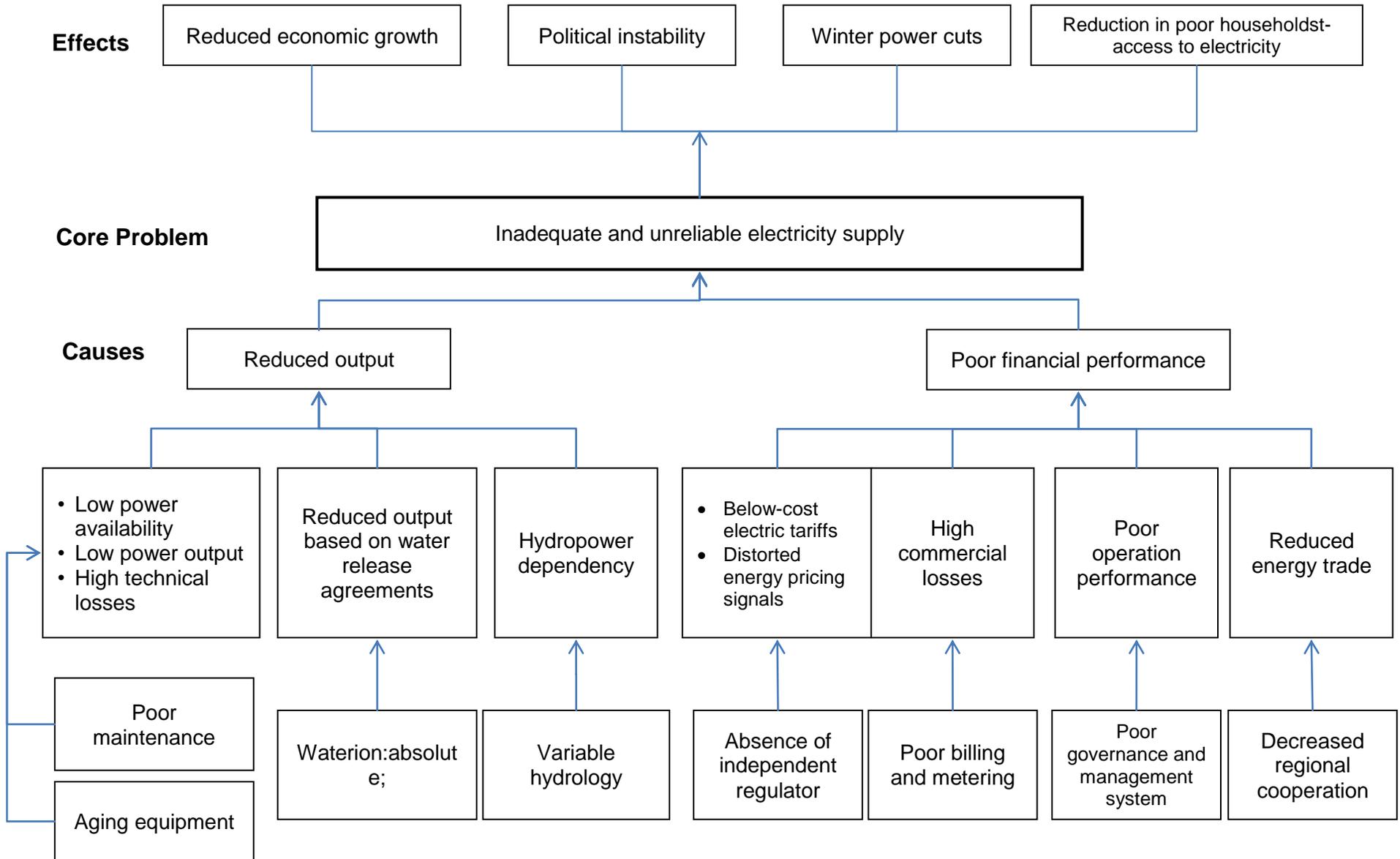
- i. **Better supply and systems.** ADB will seek to improve energy supply and performance for domestic customers. It will provide support to rehabilitate existing assets and/or build new assets in the generation, transmission, and distribution subsectors.
- ii. **Improved sector financial performance.** The program will introduce business systems and management reforms to improve financial results and reduce losses.
- iii. **Tariff reform.** ADB will help the government and the regulator introduce tariffs that reflect costs while protecting poor and vulnerable customers.
- iv. **Increased regional power trade.** ADB will assist the government in developing regional projects when they are commercially justified and enhance energy security.
- v. **Effective development partner coordination.** Through the development partners' working group chaired by ADB and the CAREC Energy Sector Coordinating Committee, ADB will ensure coordination on sector investment and provision of sector policy.

<sup>8</sup> Government of the Kyrgyz Republic. 2012. *Mid-Term Power Sector Strategy for 2012–2017*. Bishkek.

<sup>9</sup> ADB. 2010. *Report and Recommendation of the President to the Board of Directors: Proposed Loan and Grant to the Kyrgyz Republic for the Power Sector Improvement Project*. Manila.

<sup>10</sup> ADB. 2012. *Report and Recommendation of the President to the Board of Directors: Proposed Loan and Grant to the Kyrgyz Republic for the Power Sector Rehabilitation Project*. Manila.

## Problem Tree for Energy



### Sector Results Framework (Energy 2013–2017)

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
Improved electricity supply for domestic and international customers based on commercial tariffs	<p>Domestic consumption increased to 8,500 GWh in 2019 (2010 baseline: 6,100 GWh)</p> <p>10-year average of net exports 2010–2019 maintained at 2001–2010 average of 2,000 GWh/year</p> <p>Income to be distributed to generation, transmission, and distribution companies, based on approved tariff (2012 baseline practice is for income to be distributed based on short-term financial requirements)</p>	Energy infrastructure and system expanded and improved	<p>% of time Toktogul HPP is available to generate reaches 90% in 2017 (2009 baseline: 80%)</p> <p>Electricity losses reduced to 20% in 2017 (2012 baseline: 25%)</p> <p>Tariff increased to cost recovery level by 2016 (2012 baseline below-cost recovery at less than \$0.02/kWh)</p> <p>Number of substation-related transmission faults resulting in system outages reduced to 30 times in 2017 (2009 baseline: 62 times)</p>	<p><b>Planned Key Activity Areas</b> Rehabilitate existing HPP (80% of funds) Business systems and management reforms (10% of funds) Distribution sector operations improvement (10% of funds)</p> <p><b>Pipeline Projects with Estimated Amounts</b> Power Sector Rehabilitation Project 2 and 3 (\$85 million, additional \$160 million cofinancing being sought)</p> <p>Improvement in Distribution Sector Operations Project (\$15 million)</p> <p><b>Ongoing Projects with Approved Amounts</b> Power Sector Improvement Project (\$44.8 million) Power Sector Rehabilitation Project (\$55 million)</p>	<p><b>Planned Key Activity Areas</b> Phase 1 of Toktogul HPP rehabilitated Wholesale electricity settlement center carries out settlement according to actual flow of electricity between the power utilities</p> <p>Transmission system rehabilitated and SCADA system installed</p> <p><b>Pipeline Projects</b> Operational improvement of distribution company/companies through management strengthening</p> <p><b>Ongoing Projects</b> Rehabilitation of generation and transmission infrastructure Wholesale metering and SCADA system installed</p>

GWh = gigawatt-hour; HPP = hydroelectric power plant; SCADA = supervision, control, and data acquisition.  
Source(s): Asian Development Bank