

ENERGY SECTOR ASSESSMENT

A. Dependence on Hydropower

1. Tajikistan depends on hydroelectric sources for 98% of its electricity needs. It operates a power system with an installed capacity of 5,055 Megawatts (MW), consisting of eight large and a few small hydropower plants (4,737 MW) and two fossil fuel-fired combined heat and power (CHP) plants (318 MW).

2. The Vakhsh hydropower cascade, comprising the Nurek reservoir and power houses at Nurek and Baipaza, with a combined installed capacity of 3,600 MW and generation capability of 15 billion kWh, is the most important generation asset. Sangtuda 1, a hydro power plant with a capacity of 670 MW, is jointly owned by the government (25% stake) and by a Russian utility, RAO-UES (75% stake) and is an effort by the government to bring foreign investors into the country's hydropower sector.

B. Energy Demand and Supply

3. Over the last decade, Tajikistan has had an annual electricity demand of 16 billion kWh to 17 billion kWh, reaching its maximum in 2007.¹ Demand has slowed since the 2008–2009 economic crisis and declined further to 16.1 billion kWh in 2011.² The industrial sector is the largest consumer of electricity, accounting for 39% of total electricity consumed in the country, followed by agriculture (23%) and households (19%). Tajik Aluminum Company (TALCO), a state-owned aluminum smelter which accounts for nearly 7% of the country's gross domestic product (GDP) and 40% of exports, consumes almost all of the electricity consumed by the industrial sector. During the summer, when river flows into the country's hydro power plants are at their maximum, a small amount of electricity surplus is exported to neighboring countries, mainly to Afghanistan. In 2011, Tajikistan exported 0.19 billion kWh of electricity during summer and imported 0.065 billion kWh during winter, but this amount of imports can meet only a small fraction of winter electricity deficit.³ Electricity imports and exports are severely limited by the national grid's isolation from the regional Central Asia Power System (CAPS) in 2009, which was effected due to excessive withdrawal of electricity from the regional grid system by Tajikistan causing shortages in neighboring countries connected to CAPS.

4. More than 96% of Tajikistan's households are connected to the electricity grid.⁴ However, about 70% of the population currently suffers from blackouts during winter. The World Bank estimates⁵ that Tajikistan's total electricity shortage during winter at the point of consumption is 2.7 billion kWh, which is about 24% of total winter supply requirement of 11.2 billion kWh. Due to intermittent availability of residential electricity in winter, households warm their homes by burning solid fuels, such as wood and coal, which cause indoor air pollution. The World Health Organization lists Tajikistan among the 20 worst-affected countries for diseases resulting from indoor air pollution.

¹ World Bank. 2012. *Tajikistan's Winter Energy Crisis: Electricity Supply and Demand Alternatives*. Washington DC.

² Agency on Statistics under President of Republic of Tajikistan (TAJSTAT). 2012. *Electricity Output, Trade and Consumption 1980–2011*. Dushanbe.

³ Agency on Statistics under President of Republic of Tajikistan (TAJSTAT). 2012. *Macroeconomic Indicators 2010–2011*. Dushanbe.

⁴ UNICEF, State Committee on Statistics, Republic of Tajikistan. 2009. *Tajikistan: Living Standards Measurement Survey 2007*. Dushanbe.

⁵ World Bank. 2012. *Tajikistan's Winter Energy Crisis: Electricity Supply and Demand Alternatives*. Washington, DC.

5. Barki Tojik, an open joint stock company, is a vertically integrated, state-owned, power monopoly utility responsible for the generation, transmission, and distribution of electricity in all regions of Tajikistan except Gorno-Badakhshan. Pamir Energy, a private utility, has taken over Barki Tojik's power generation, transmission, and distribution assets in the Gorno-Badakhshan region.

C. Electricity Tariffs in Tajikistan

6. Electricity has been subsidized by the government since independence. Household and industrial electricity tariffs are typically lower than full cost recovery. However, household tariffs were gradually raised from \$0.004/kWh in 2006 to \$0.023/kWh in April 2012. Similarly, industrial tariffs were gradually raised from \$0.0081/kWh in 2006 to \$0.056/kWh in April 2012.⁶ Nevertheless, the weighted average tariff of all types of consumers is still lower than weighted average cost. Electricity tariffs are supposed to be revised every six months until cost recovery levels are reached, but revisions do not happen regularly.

D. Policy and Regulatory Setup

7. The Fuel and Energy Department in the Office of the President has overall responsibility for the energy sector in Tajikistan. The Ministry of Energy and Industry is responsible for coordinating the government's energy policy. The Ministry of Economic Development and Trade regulates the prices of electricity, natural gas, and district heat. The Committee for Anti-Monopoly and Promotion of Small Enterprises in the Ministry performs the price setting function and reports directly to the Office of the President. An Advisory Energy Commission, headed by the Prime Minister, meets as necessary to formulate policy and provide input to major decisions involving the sector. The Ministry of Environmental Protection is responsible for environmental regulation of energy operations. The Committee on State Property exercises ownership functions over state-owned assets and the State's interest in joint ventures and state owned corporations.

E. Winter Energy Deficit

8. Tajikistan's power system currently cannot meet its demand, leading to significant shortages in winter months. These electricity shortages are due to high demand for heating in winter,⁷ a sharp reduction in imports of electricity and gas since 2009, and dependency on a hydropower system with diminished capacity in winter due to freezing of rivers. As indicated earlier, total electricity shortage during winter is about 24% of total winter supply requirement (para. 4). This shortage corresponds to a shortage of 1,250 MW in installed power generation capacity.⁸

9. Since 1990, both production and consumption of electricity has declined. Due to inadequate capital investment in the energy sector, the obsolete infrastructure systems left from the former Soviet Union era have not been properly maintained or replaced. Consumption of on-grid energy has declined by a third, primarily as a consequence of non-availability of grid

⁶ UNDP. 2011. *Energy and Communal Services in Kyrgyzstan and Tajikistan: A Poverty and Social Impact Assessment*. Bratislava; Barqi Tojik data.

⁷ Tajikistan's import of natural gas from its neighbors has reduced sharply since 2009 and hence, electricity (instead of gas used in neighboring countries) is widely used for room heating in winter.

⁸ World Bank's energy shortage estimates are based on data on unserved demand for electricity, which is determined by the amount of power outages, in 2006 (the last year when such data is available for Tajikistan) and demand growth projections until 2009.

electricity. In the winter, there is a large deficit amounting to 24% of winter electricity demand, because rivers freeze and cause reservoir levels to decline. In rural areas, where 73.5% of the population lives, power is supplied for only 4–6 hours every day in winter. In recent years, power cuts have become frequent even in large cities. The winter deficit not only causes human suffering, but is also a significant impediment to economic growth and development

F. Transmission and Distribution Losses

10. Tajikistan's transmission network's capacity is insufficient to carry the full volume of potential export electricity from Tajikistan in the summer period. The World Bank estimates that about 3 billion kWh of electricity (18.5% of current total generation) can be exported to neighboring countries if sufficient transmission capacity is built and re-integrated with CAPS. Another problem facing the electricity sector is the relatively high level of transmission and distribution losses, which was 17.2% of generated electricity in 2011, over 11% of which was attributable to technical losses.⁹ These losses have increased in the last decade due to: (i) a shift in consumption structure; (ii) use of electricity for space heating, thus overloading the network; and (iii) limited maintenance of the network. The remaining losses are due to non-technical causes such as theft, defective metering, and billing and collection deficiencies.

G. Inefficient Energy Consumption (Demand-side Inefficiencies)

11. Energy intensity in Tajikistan is almost twice the world average, and three times higher than most developed countries, which means that Tajikistan needs three times more energy to produce one unit of GDP than highly developed countries.¹⁰ Energy efficiency potential in Tajikistan is assessed by the Ministry of Energy and Industry as 30% reduction in current power consumption. Some estimates put potential savings much higher; recent UNDP research has found that houses in rural areas lose 50-60% of the heat generated.¹¹

12. The winter power deficit is exacerbated because a great amount of electricity is necessary to heat living quarters with poor energy efficiency or inadequate maintenance.¹² Nearly 40% of the country's multifamily housing units are in a decrepit state, with 50–80% of them in need of immediate renovation.¹³ More than 50% of the country's housing (covering more than 500,000 households) was built in the 1960s and 1970s. These housing units need improvements such as the replacement of windows, doors, and roofs) to increase energy efficiency. With such renovations, residents can decrease the amount spent on electricity (if the

⁹ ADB. 2012. *Central Asia Regional Economic Cooperation (CAREC): Power Sector Regional Master Plan (Technical Assistant Consultant's Report)*. Manila

¹⁰ Lilit V. Melikyan, Hasmik Ghukassyan. 2011. *PSIA Energy Tajikistan: Poverty and Social Impact Assessment: Energy Sector in Tajikistan*. Supported by UNDP. Dushanbe

¹¹ Lilit V. Melikyan, Hasmik Ghukassyan. 2011. *PSIA Energy Tajikistan: Poverty and Social Impact Assessment: Energy Sector in Tajikistan*. Supported by UNDP. Dushanbe.

¹² Since 1995, when the Law on Housing Privatization was approved, nearly 93% of the country's housing units have been privatized. With privatization, the responsibility of repair and maintenance was transferred from the government to private households, without provision of access to financing for housing repairs and improvements. United Nations Economic Commission for Europe (UNECE). 2011. *Country Profiles on the Housing Sector: Tajikistan*. New York and Geneva. MFIs have recently begun to offer housing improvement loans, but need additional funding and technical assistance to meet the demand.

¹³ United Nations Economic Commission for Europe (UNECE). 2011. *Country Profiles on the Housing Sector: Tajikistan*. New York and Geneva.

home is on-grid) or solid fuels (if not).¹⁴ In rural areas, most newly constructed houses are single-family units that are built without proper planning and consideration for energy efficiency.

H. Institutional and Governance Issues

13. The power sector has been subject to institutional and organizational weaknesses that have affected, among others, the decisions on investments and electricity tariff determination. While the technical capacity of Barqi Tojik as the vertically integrated government-owned utility is sufficient, its capabilities in planning, power system operations, financial management, and monitoring of social safeguards and environmental mitigation measures are weak.

14. Governance has emerged as an increasingly important issue in the power sector. In recent years, worsening problems in this area have had a major impact on utility performance and have hindered the effectiveness of the power sector. Specifically, Barqi Tojik's weak capabilities in corporate governance, capital allocation, asset management, performance measurement, and risk management have resulted in inefficient utility operations, power theft, illegal power supply, reduced billing and tariff collections, problems paying for winter power imports, and unaccounted sales of summer power.

I. Government's Strategy

15. Ensuring a dependable, year round, uninterrupted electricity supply, especially to poor and rural households, is a stated policy goal of the government.¹⁵ The government's strategy to achieve this goal includes developing national renewable energy sources, negotiating commercial trading arrangements with Tajikistan's neighbors, and attracting foreign investment to develop solar, wind, coal, gas, and additional hydroelectric power. In addition to hydro power, Tajikistan has high potential for developing solar energy and also, to some extent, wind energy. Tajikistan has the highest horizontal solar irradiance in Central Asia, with over 300 sunny days per year. Good wind potential exists in some highland regions and near Khudjand in Northern Tajikistan. However, the government's current focus is on building larger-scale hydro power projects.

16. In order to improve the efficiency and profitability of Barqi Tojik's operations, the government has a restructuring plan for the company which includes splitting the company's activities into three separate entities, each involved in power generation, transmission, and distribution. The government also has a medium-term plan to privatize Barqi Tojik which is planned for the 2015-2018 period.

17. Improving the energy efficiency of buildings has also been part of the government's agenda since 2002. In 2009, the President issued a decree on achieving energy efficiency in housing and communal services by 2020.¹⁶

¹⁴ Source: Agency for Construction and Architecture, Government of Tajikistan. Heat losses through buildings' exterior walls account for 20–60% of overall heat consumption and up to 95% of non-productive heat losses occur due to poor operation of buildings, amenities, and utility systems.

¹⁵ Government of Tajikistan. 2010. *Poverty Reduction Strategy of the Republic of Tajikistan for 2010–2012*. Dushanbe.

¹⁶ Presidential Decree, "On Additional Measures for Economical Energy Use and Energy Saving" (No. 653 of April 24, 2009). Available at: <http://cis-legislation.com/document.fwx?rgn=28116>.