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PROJECT PERFORMANCE ASSESSMENT REPORT



TAJIKISTAN

# Energy Loss Reduction Project

**Report No. 151202**

JULY 27, 2020

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**Report No: 151202**

**PROJECT PERFORMANCE ASSESSMENT REPORT**

**TAJIKISTAN**

**ENERGY LOSS REDUCTION PROJECT  
(IDA-40930, IDA-H1780, IDA-H7570,TF-96573)**

July 27, 2020

Financial, Private Sector, and Sustainable Development

*Independent Evaluation Group*

## Currency Equivalents (annual averages)

*Currency Unit = Tajik somoni (SM)*

2015	\$1.00	SM 4.76
2017	\$1.00	SM 8.80
2019	\$1.00	SM 9.63

## Abbreviations

CASA-1000	Central Asia-South Asia Regional Electricity and Trade Project
ELRP	Energy Loss Reduction Project
FMIP	financial management improvement plan
HEP	hydroelectric project
HPP	hydropower plant
IDA	International Development Association
IEG	Independent Evaluation Group
SECO	Swiss Development Cooperation Office
SM	somoni (Tajik currency)
TALCO	Tajikistan Aluminum Company
TTG	Tajiktransgas (formerly Tajik Gas)

*All dollar amounts are US dollars unless otherwise indicated.*

## Fiscal Year

Government: July 1–June 30

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## **Preface**

This is a Project Performance Assessment Report prepared by the Independent Evaluation Group (IEG) for the Energy Loss Reduction Project in Tajikistan (P089244).

The project was approved on June 30, 2005, for a cost of \$30.0 million, including an International Development Association credit of \$17.9 million. The project cost increased to \$48 million after restructuring and additional finance of \$18.0 million. The project closed on December 31, 2014, two and a half years later than the originally scheduled date of June 30, 2012.

This assessment is based on a review of relevant documentation, interviews with World Bank staff at headquarters and in the country office, and the findings of an IEG mission that visited Tajikistan between August 19 and 23, 2019. IEG discussed project performance in interviews with officials of the Ministry of Energy and Water Resources, the electricity utility Barqi Tojik, the gas utility Tajiktransgas (formerly Tajik Gas), and representatives of other lending agencies (Asian Development Bank, European Bank for Reconstruction and Development, and the Swiss Development Cooperation Office). Appendix F lists the persons met during the mission. The mission is grateful to the officials of the government and lending agencies for making time for detailed and insightful discussions on the project experience and the larger sector context.

Following standard IEG procedures, a copy of the draft Project Performance Assessment Report was sent to government officials and implementing agencies for their review and comments. The response received from them is attached in appendix G.

## Summary

The original project objective was, “to assist [Tajikistan] in reducing commercial losses in the electricity and gas systems, and to lay the foundation for the improvement of the financial viability of the electricity and gas utilities in a socially responsible manner.” In 2012, the project objective was expanded to include, “to assist in the viability assessment of the proposed Rogun HEP [hydroelectric project] in Tajikistan.”

To achieve its objectives, the project sought to install new electricity and gas meters, implement a financial management improvement plan (FMIP), introduce an automated billing system, and provide technical assistance for raising tariffs in a socially responsible manner. These actions were expected to reduce unaccounted-for electricity and gas and improve bill collection, thus improving cost recovery and the utilities’ financial viability. The Rogun Hydroelectric Project (HEP) assessment studies were to evaluate the benefits, risks, and overall viability of the project and identify measures to address potential impacts. The World Bank limited its intervention to financing for execution of the assessment studies as an input to decision-making on a possible future project. Thus, it purposefully excluded financing of construction for the Rogun HEP.

The project focused on the most binding element of nonmonetary poverty in a highly mountainous, connectivity-constrained, postconflict country (more than one-half of the territory is above 9,800 feet in altitude, and more than two-thirds of the population lives in remote and rural locations) with extreme weather conditions in winter (temperatures) and spring (floods and other natural hazards). The Energy Loss Reduction Project (ELRP) was prepared and designed in an environment of severe financial constraints, collapsing infrastructure, a dysfunctional institutional superstructure, and considerable capacity constraints.

The final project cost was \$44.4 million against the planned \$48 million. The project was approved in April 2005 and closed in December 2014, 18 months later than scheduled.

## Results

Electricity and gas meters were installed as planned. The project installed 215,835 electricity meters and 144,000 gas meters, as planned. The meters are generally in good working order, though the gas meters have been unused since the end of 2012, after the discontinuation of gas imports from Uzbekistan (Tajikistan’s main source of gas).

Barqi Tojik and Tajiktransgas’ (TTG; formerly Tajik Gas) accounting systems largely transitioned to international financial reporting standards, but some activities remained incomplete. Activities for valuation of assets and assessment of receivables and payables remain incomplete, and other ongoing World Bank projects are pursuing these.

Automated billing systems for the energy utilities were not made operational. The automated billing system that the Swiss Development Cooperation Office financed was installed in Barqi Tojik and TTG but could not be made operational. Updating the billing systems is continuing under ongoing projects.

Billed sales and cash collections of billed sales are close to targeted levels. Despite the billing systems not being operational, electricity sales billed in Dushanbe increased from 1,910 gigawatt-hours in 2011 to 2,495 gigawatt-hours in 2018, close to the target of 2,569 gigawatt-hours. Collections in cash as a percentage of billed consumption in Dushanbe were on track to reach 90 percent in 2019, as targeted. Collections in cash for gas billed was 100 percent by 2012, after which gas supply was discontinued.

There has been little or no progress regarding unaccounted-for electricity and gas. Unaccounted-for electricity in the Dushanbe system increased from 14.5 percent in 2011 to 15.3 percent in 2019. This is attributed to the electricity system overloading when electric heating partially replaced gas heating after gas imports from Uzbekistan ceased. Unaccounted-for gas in the country decreased from 25 percent in 2004 to 10.3 percent in 2010, the last year for which these data are available.

Financial viability indicators have largely deteriorated in the years after project completion. For instance, net losses in Barqi Tojik have almost doubled, from Tajik somoni (SM) 1.72 billion to SM 3.31 billion in 2018. Net equity dropped from SM -2.75 billion to SM -9.09 billion during the same period. In the gas sector, TTG's net losses decreased from 13.0 percent of revenue to 6.5 percent by 2012.

Electricity tariffs were significantly lower than targets at project completion in 2014 and 2019. At project completion, the average electricity tariff was 2.04 cents per kilowatt-hour (kWh), 15 percent below the targeted 2.40 cents per kWh. In 2019, it was 1.89 cents per kWh, 23 percent below the targeted 2.45 cents per kWh. Budget entities continue to lag in payments, principally the aluminum smelter Tajikistan Aluminum Company, which consumes more than 40 percent of electricity produced in Tajikistan.

Electricity tariff subsidy programs were not adequately targeted to poor households. The marginal willingness to pay for reliable electricity supply in Tajikistan was about 7 cents per kWh in 2011 prices, which was substantially higher than the average tariff of 2.04 cents per kWh prevailing in 2014. Households in rural areas, urban areas outside Dushanbe, and in Dushanbe spent 14 percent, 19 percent, and 9 percent of their incomes annually on energy, respectively (including sources such as coal, wood, and other fuel to compensate for inadequate electricity supply), which are among the highest rates in Europe and Central Asia. World Bank studies showed that the government of Tajikistan's subsidy programs need to be better targeted to assist poor households; the

present tariffs provide an across-the-board subsidy to electricity consumers, regardless of actual need on affordability grounds.

The Rogun HEP assessment studies were completed. The Rogun HEP assessment studies (techno-economic, and environmental and social assessments) provided inputs for decision-making on viable power generation options for Tajikistan and for regional policy, given the cross-boundary nature of the Rogun HEP's potential operations.

The Nurek Hydropower Plant (HPP) studies conducted under this project provided the basis for a new project. The studies on sedimentation, rehabilitation, and dam safety measures at the Nurek HPP dam site led to the ongoing Nurek Hydropower Rehabilitation Project Phase I, funded by a consortium made up of Asian Infrastructure Investment Bank, International Development Association, and Eurasian Development Bank.

## **What Worked, and Why?**

The project provided continuity to the World Bank's engagement with Tajikistan's energy sector and promoted synergy among development partners. The World Bank has engaged with Tajikistan's energy sector for about two decades, and ELRP (2005–15) provided continuity from the Pamir Private Sector Project (2002–11) to the ongoing Central Asia-South Asia Regional Electricity and Trade Projects and the Nurek HPP rehabilitation Phase I projects. The World Bank supported the development of a comprehensive plan for the energy sector, which the government of Tajikistan formalized in 2005 in its Letter of Energy Sector Development Strategy. This facilitated the complementarity of the World Bank's efforts with its development partners: Asian Development Bank, European Bank for Reconstruction and Development, and the Swiss Economic Cooperation Office, among others.

The World Bank's convening power and reputation for ensuring high international standards facilitated the completion of the Rogun HEP assessment studies that were acceptable to all riparian countries and international partners. The task was challenging because of the complex technical, social, and environmental issues involved, and the need to get buy-in from the governments of five riparian countries that the project would affect and from the international diplomatic community. Several of the key stakeholders (the European Union, the Russian Federation, the United Kingdom, the United Nations, and the United States) acknowledged the inclusiveness of the preparation process and the high quality of the studies that met international best practices. The assessment studies helped the government raise finance through Eurobonds for commencing work on Rogun HEP, and two of its six planned turbines were commissioned as of September 2019. However, raising finance for the rest of units remains a challenge for the country.

The foundation laid by ELRP, including the strategically important studies, led to the initiation of critical follow-up engagements for the World Bank and other development partners, including the construction and rehabilitation of the country's two largest hydropower plants.

## **What Did Not Work, and Why?**

Risk assessment at appraisal shows a major omission in not anticipating or addressing uncertainties arising from Tajikistan's near total dependence on Uzbekistan for natural gas imports. This is a major omission given that periodic disruptions in gas supplies from Uzbekistan to neighboring countries, including Tajikistan, appear to have been well known at the time. Tajikistan's growing arrears in payments for gas supplies and political differences with Uzbekistan that might also affect gas supplies were also well recognized and understood, but these were not reflected in the appraisal document and thereby in the design of the project, especially for risk-mitigation options.

Even as the signs of uncertainties in gas imports increased during project implementation, supervision documents did not reflect any need for supporting Tajikistan in revisiting the strategy for the gas subsector in the context of overall energy sector strategy. Gas imports were tied up with other outstanding political issues between Tajikistan and Uzbekistan, including Uzbekistan's concerns about the Rogun project as a downstream country, and the World Bank appears to have been reluctant to engage in these matters. The World Bank completed a report, *Tajikistan's Winter Energy Crisis: Electricity Supply and Demand Alternatives*, close to the project's original closing date, but even this report did not address gas sector issues directly.

The interruption of gas imports began during implementation (around 2010), affecting the productive use of outputs from project components related to gas sector metering and billing for several years. There were no periodic disruptions of gas supply from Uzbekistan in the years before the ELRP appraisal, but during project implementation, there were clear signs of mounting uncertainties relating to gas imports from Uzbekistan, starting in about 2010. The activities for the project's components and subcomponents related to the gas sector continued as originally planned and were mostly completed by about this time. Given the unavailability of gas in the TTG's network, the gas meters and billing system have not been used since 2012. As a result, nearly \$12 million in scarce International Development Association funding—about 25 percent of the final project cost—were effectively rendered unproductive until gas supplies resumed to some extent in 2018. However, it is not clear to what extent various customer segments are receiving gas supply compared with the time when supply disruptions began.

Most actions under the project that were geared to improving Barqi Tojik's financial viability fell short of expectations, further worsening the electric utility's financial health since project completion. Electricity tariffs have remained consistently below cost recovery and target levels. Tariff targets were lowered during the years immediately after project completion and set back to project completion levels only by 2019. Raising electricity tariffs is a politically charged issue in a time of low incomes and uneven economic growth. Unaccounted-for electricity in Dushanbe, which is a significant share of national domestic and commercial electricity consumption, has remained at the same level as at project commencement.

The World Bank could have coordinated early with SECO to ensure that the automated billing systems for the energy utilities would meet Barqi Tojik's cost considerations. The automated billing systems financed by SECO could not be completed mainly because of Barqi Tojik's concerns about the high annual fee associated with the SAP system, given Barqi Tojik's weak financial standing. In retrospect, a comprehensive life cycle cost analysis for various billing system options should have been done to select a better option, for which early coordination with SECO would have helped. Ideally, the billing system should have been modernized before new metering was installed to get the best results out of metering, but implementation did not occur in this sequence.

The FMIP implementation experienced delays that could have been partly avoided through better planning. In retrospect, there were several features at project commencement that the World Bank should have considered carefully in planning and implementing the FMIP. These included the divergence of the existing national standards for accounting and financial reporting from international financial reporting standards, staff capacity and readiness to be trained, and the complexity of dealing with the multiplicity of utility branches and financial management systems.

## Lessons

- **The development effectiveness of the World Bank's continuous sectorwide engagement in a country can be diminished significantly if the risk analysis at project appraisal is not comprehensive and candid and if prompt course corrections are not made during implementation when a major risk is realized.** In this project, the appraisal document did not identify risks relating to the gas sector, which was vulnerable to disruptions in imports from Uzbekistan. This had clear implications for energy security and the winter energy needs of rural and lower-income beneficiaries. When risks to the gas sector were realized during project implementation, there was no clear response evident from supervision documents or in project restructuring.

- **The World Bank should proactively ensure that a project component that is crucial to achieving the project development objective and is funded through parallel financing arrangements is designed and implemented in an effective and complementary manner.** The planned automated billing and collection system (that the Swiss Economic Cooperation Office financed in parallel) was crucial to improving the energy utilities' financial viability. The project could not complete this system because it could not be adapted readily to the existing arrangements and capacity, and the consultant engaged was not qualified for the task. Earlier and continuous World Bank engagement with SECO might have prevented this situation.
- **The World Bank's convening capacity can contribute to resolving politically complex and technically demanding development issues that cut across national boundaries, by creating a transparent and inclusive consultative process, and marshaling globally recognized expertise.** To prepare the techno-economic and environmental and social assessments for the Rogun HEP, the World Bank built appropriate platforms for consultation and engagement across the riparian states, international stakeholders, civil society and local communities. Engagement of eminent global experts and transparent communication of discussions ensured that the studies were credible and acceptable to all stakeholders.

José C. Carbajo

Director, Financial, Private Sector, and Sustainable Development

Independent Evaluation Group



# 1. Background and Context

1.1 Tajikistan is a landlocked, low-income country in southeast Central Asia with a population of 8.5 million and a gross national income per capita of \$990 in current US dollars (calculated using the World Bank Atlas method). After a downturn in economic growth during 2014–15, gross domestic product growth recovered to 6.9 percent in 2016 and 7.1 percent in 2017.

## Sector Context

1.2 As of 2019, installed electricity capacity in Tajikistan was 6,577 megawatts, consisting of 5,858 megawatts (90 percent) from hydropower and 719 megawatts (10 percent) from coal-fired power plants. By contrast, Tajikistan has an estimated hydroelectric potential of 40,000 megawatts. The electricity sector accounts for about 5 percent of gross domestic product and is the most investment-intensive sector in the economy. The largest consumers of electricity were Tajikistan Aluminum Company (TALCO), an aluminum smelter that used about 43 percent of total power supply, followed by households with 28 percent and the irrigation sector with 12 percent.

1.3 Tajikistan experiences significant electricity surplus in the summer given its abundant hydropower resource during the season, but the country struggles to fully meet the demand for electricity in the winter. The demand in winter, when hydrological conditions are less favorable, accounts for 60 percent of annual demand. The thermal power units, with higher generation costs relative to hydroelectricity, are operated in winter to augment electricity and heat.

## Sector Institutions

1.4 **Electricity sector.** Tajikistan's electricity sector consists of the vertically integrated government-owned energy company Barqi Tojik, three independent power producers, and a concession in Gorno-Badakhshan Autonomous Oblast (GBAO) combining power generation and distribution. Barqi Tojik owns most of the electricity generating plants and is responsible for electricity transmission, dispatch, and distribution services to about 8 million people in all regions of the country except for the GBAO.

1.5 The 3,000-megawatt Nurek Hydropower Plant (HPP), with a seasonal reservoir, is the largest generating plant in operation. Two of the independent power producers—Sangtuda-1 and Sangtuda-2 HPPs—supply electricity to Barqi Tojik under 20-year power purchase agreements. The third independent power producer, Rogun Hydroelectric Project (HEP), has a planned capacity of 3,600 megawatts, and it launched

two of its six planned turbines by the end of 2019.<sup>1</sup> When completed, Rogun HEP is expected to end power shortages in Tajikistan while allowing the country to boost energy exports to its neighbors, including Afghanistan, Pakistan, and Uzbekistan.

1.6 Tajikistan's power system has been operating in isolation from the Central Asia grid since 2009, after it was desynchronized from the Soviet-era Integrated Central Asia Power System. Currently, Barqi Tojik exports about 2,500 gigawatt-hours (GWh) of electricity per year, including to Uzbekistan, but exports could be increased significantly if Tajikistan were synchronized with the Uzbek network.

1.7 **Gas sector.** The gas sector utility Tajik Gas was restructured in 2009 to form Tajiktransgas (TTG) at about the time when significant interruptions in the gas supply also occurred. TTG was assigned to operate the southern and northern gas transmission systems, while the gas distribution pipelines were transferred to 13 local distribution companies. TTG supplied gas to the distribution companies and the large industrial consumers—TALCO, Tajik Cement, the Dushanbe Combined Heating Plant, and a fertilizer plant. However, at the end of 2012, gas imports from Uzbekistan (that supplied 98 percent of Tajikistan's natural gas demand) stopped, effectively halting TTG's operations.

## Salient Sector Issues

1.8 Tajikistan's power system faced three key challenges at appraisal: financial distress, low institutional capacity of Barqi Tojik, and the deteriorating condition of most power assets. The Barqi Tojik's financial distress resulted from severe cost recovery challenges from low tariff levels, insufficient metering, and excessive technical energy losses, among other reasons. Low institutional capacity was reflected in a lack of planning of investments and expenditures and gaps in accounting and financial reporting. The condition of most power assets had deteriorated, including the largest 3,000-megawatt Nurek HPP, resulting in the unavailability of about 20 to 25 percent of installed capacity, which greatly reduced the reliability of electricity supply.

1.9 Tajikistan's production of petroleum products, including natural gas, is insignificant compared with its imports. The country's accessible oil and gas reserves are almost entirely exhausted. Most of the potential gas reserves will require complex boring to a depth of 5 to 7 kilometers (Bakhtdavlatov 2019).

1.10 In January 2008, it became apparent that Tajikistan's existing sources of energy would be insufficient to meet the increased winter demand. The Nurek reservoir on the Vaksh River experienced dramatic drops in its water levels, and by the end of February 2008, the Nurek HPP was gravely exposed to the risk of a shutdown. With the severe

winter conditions in the region, Tajikistan's neighbors were unable to increase electricity exports to meet the country's demand.

1.11 The energy situation deteriorated further in April 2012 with significant interruptions in gas imports from Uzbekistan, and imports ceased completely by the end of 2012. In 2012, Tajikistan received one-tenth of its estimated annual gas requirements of 1.2 billion cubic meters, barely enough to operate one Tajikistan power plant. Ultimately, gas imports from Uzbekistan halted completely by the end of 2012. Uzbekistan cited a shortage of its own domestic supplies, contractual obligations with China, and mounting payment arrears from Tajikistan as the reasons, among others.

1.12 The gradual reduction and ultimate stoppage of gas imports from Uzbekistan occurred at a time when the two countries had growing differences on Tajikistan's intention to proceed with the construction of Rogun HEP. Soviet engineers initially proposed Rogun HEP in the 1950s, but the dissolution of the Soviet Union in 1991 postponed construction. Tajikistan saw Rogun HEP as a way to achieve energy independence and earn revenue from exporting surplus power to neighboring nations. However, Uzbekistan, as a downstream nation, had concerns about the proposed Rogun dam affecting the water supply to its economically important cotton fields.

1.13 The project focused on the most binding element of nonmonetary poverty in a highly mountainous, connectivity-constrained, postconflict country (more than one-half of the territory is above 9,800 feet in altitude, and more than two-thirds of the population lives in remote and rural locations) with extreme weather conditions in winter (temperatures) and spring (floods and other natural hazards). The Energy Loss Reduction Project was prepared and designed in an environment of severe financial constraints, collapsing infrastructure, a dysfunctional institutional superstructure, and considerable capacity constraints.

1.14 More recently, in 2018, Uzbekistan has resumed delivering limited natural gas to neighboring Tajikistan, ending a six-year hiatus caused by diplomatic differences. In 2018, Uzbekistan started to deliver 126 million cubic meters of gas, which appears intended mostly—if not entirely—to provide for the needs of the TALCO aluminum plant and its employees in the western Tajik town of Tursunzoda.<sup>2</sup>

## **Social Impacts**

1.15 The discontinuation of gas imports from Uzbekistan in 2012 led to severe load shedding in the winter. Customers received electricity only three to seven hours per day in every region except for the capital Dushanbe and in the GBAO. Only about 10 percent of the population lives in the capital city Dushanbe, but it consumes almost 40 percent of the total residential electricity consumption in the country.

1.16 Energy deprivation and affordability especially affected poor rural households, which spend a large share of their total consumption expenditure on energy. Rural households have fewer available coping strategies than households have in urban areas and are disproportionately affected negatively by the limited supply of electricity in the winter for lighting and other basic needs. Electricity shortages in rural areas affected the quality of social service delivery. A World Bank study suggests that until 2014, these problems continued to affect Tajikistan's rural population (World Bank 2014).

## The World Bank's Role in Tajikistan's Energy Sector

1.17 The World Bank has engaged with Tajikistan's energy sector continuously since the late 1990s. The World Bank supported the country's energy sector through investment projects and development policy lending, accompanied by advisory services and analytics (appendix D, table D.1). It supported the government of Tajikistan in formulating a development strategy for the energy sector and later played an important role in regional approaches to energy and energy-linked water issues that were central to Tajikistan's long-term sectoral and overall development strategies.

1.18 **Completed projects** have supported private investment for augmenting electricity generation capacity, initiating crucial policy and institutional reform, and meeting emergency needs for power shortages in the winter seasons, with mixed results (table 1.1).<sup>3</sup>

1.19 The World Bank supported a comprehensive energy utility reform review to guide policy and planning in the sector and provided the basis for reforming social assistance policy through analytical work, including the 2011 report, *Delivering Social Assistance to the Poorest Households*, a 2009 poverty assessment, and World Bank (2014).

**Table 1.1. World Bank Projects in Tajikistan’s Energy Sector**

Project ID and Name	Duration (fiscal years)	Project Cost (\$, millions)	IEG ICR
			Review Rating (closed projects)
P075256 Pamir Private Power Project	2002–11	31	Satisfactory
P089244 Energy Loss Reduction Project	2005–15	44	Moderately satisfactory
P074889 Programmatic Development Policy Grant 1–3	2006–10	27 <sup>a</sup>	Satisfactory
P110555 Energy Emergency Project	2008–13	21	Moderately satisfactory
P126042 Tajikistan Programmatic Development Policy Grant 4–6	2010–11	55 <sup>a</sup>	Moderately satisfactory
P145054 Central Asia-South Asia Regional Electricity and Trade Project (CASA-1000)	2014–23	591	n.a.
P150816 Nurek Hydropower Rehabilitation Project: Phase I	2018–24	350	n.a.
P165313 CASA-1000 Community Support Project for Tajikistan	2019–23	26	n.a.

Note: CASA-1000 = Central Asia-South Asia Regional Electricity and Trade Project; IEG = Independent Evaluation Group; n.a. = not applicable.

a. Covers several sectors besides energy.

1.20 Ongoing projects relate to developing the Central Asia-South Asia Regional Electricity and Trade Project (CASA-1000) electricity transmission mechanism, rehabilitation of the Nurek HPP, and a review of the utility reform for the energy sector.

- The ongoing CASA-1000 (2014–23) facilitates electricity trade in the CASA regional electricity market (with Afghanistan, the Kyrgyz Republic, and Pakistan) by putting in place the commercial and institutional arrangements and transmission infrastructure. The CASA-1000 Community Support Project (2019–23) aims to have communities situated along the high-voltage CASA-1000 transmission line share in the benefits expected from the CASA-1000 project.
- The Nurek HPP Rehabilitation Project (2018–24) seeks to rehabilitate and restore the generating capacity of three power-generating units of Nurek HPP, improve their efficiency, and strengthen the safety of the Nurek dam through a donor consortium of Asian Infrastructure Investment Bank, International Development Association (IDA), and Eurasian Development Bank.

## Project Design and Financing

1.21 **Original project development objective.** The project objective was “to assist in reducing the commercial losses in the electricity and gas systems, and to lay the foundation for the improvement of the financial viability of the electricity and gas utilities in a socially responsible manner.”

1.22 **Revised objective.** In 2012, the project objective was expanded to include “to assist in the viability assessment of the proposed Rogun HEP in Tajikistan” in response to a request from the government for financing a techno-economic assessment study and environmental and social impact assessments, to assess the overall design, operations and economics of the Rogun HEP.<sup>4</sup>

1.23 **Project cost and financing.** The final project cost was \$44.4 million against an original estimate of \$48 million equivalent (\$30 million for the original project and \$18 million from additional finance). The project was financed with an original IDA credit for special drawing rights 10 million (\$15 million equivalent; from here on, all US dollar figures are in equivalent terms), an IDA grant of \$3 million, an additional financing IDA grant of \$18 million, and a cofinancing grant of \$4.1 million from the Swiss Development Cooperation Office (SECO). SECO also provided another \$4.22 million through direct parallel financing for the design, procurement, and installation of billing systems in Barqi Tojik and TTG. An amount of \$6.08 million was canceled from the IDA credit, and \$0.29 million was canceled from the SECO cofinancing. Barqi Tojik and TTG disbursed \$1.8 million and \$1.66 million, respectively, against the appraisal targets of \$2.05 million each. The government made no direct financial contribution to the project.

1.24 **Dates.** The project was approved in June 30, 2005, and became effective in December 2005 as originally scheduled. There was an 18-month extension of the closing date, and the project closed in December 31, 2014.

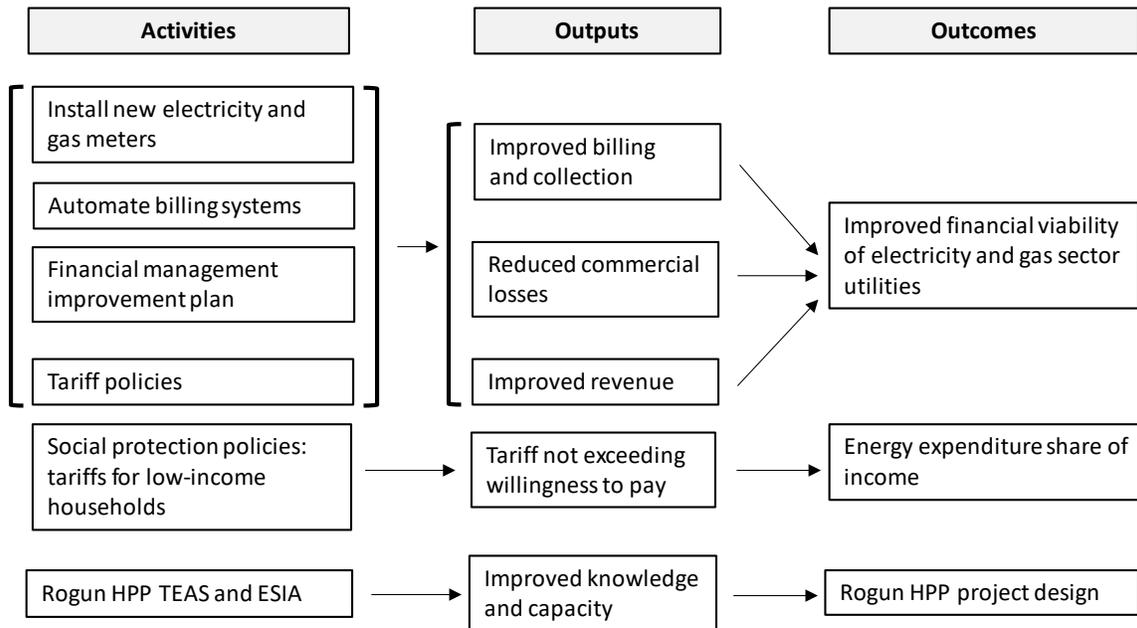
1.25 The project had four restructurings between December 2011 and October 2014: adding a component for Rogun assessment studies, provision of additional finance for the studies, a retroactive extension of the administration agreement and grant agreement with SECO, and changes to the financing agreement for the additional financing.

1.26 The project’s theory of change for the revised objective was distributed over three outcomes: improving financial viability of the electricity and gas sectors, acceptable energy expenditure share of income for low-income households, and developing an economically and socially sustainable project plan for Rogun HEP (figure 1.1).

1.27 The implied theory of change was that installing new electricity and gas meters and automated billing systems, together with implementing a financial management improvement plan (FMIP), would improve billing and collection and reduce commercial losses. Tariff policies would gradually increase tariffs to cost recovery levels. Together, these intermediate outcomes would result in improved financial viability of Barqi Tojik and TTG. Social protection policies would ensure that tariffs for low-income and

vulnerable households would not exceed willingness to pay. The additional element of supporting the proposed Rogun HEP’s viability assessment would help develop an economically, environmentally, and socially sustainable design for the hydropower facility.

**Figure 1.1. Energy Loss Reduction Project: Theory of Change**



Note: ESIA = economic and social impact assessment; TEAS = techno-economic assessment study.

1.28 The project components can be classified under the electricity subsector, gas subsector, and energy sectorwide technical assistance. Both the electricity and gas sectors had components that involved installation of meters, implementing an automated billing system and an FMIP, and advisory services for energy transactions. The component for sectorwide technical assistance covered tariff policies, social protection policies for energy reforms, monitoring and evaluation for Barqi Tojik and TTG performance, and interaction on regulation issues between energy consumers and relevant borrower’s agencies. Table B.4 provides details on the original and revised components.

## 2. Results

2.1 Generally, electricity and gas meters were installed as planned. The project installed 171,904 electricity meters by project completion in the Dushanbe Electricity Network against a revised target of 215,835 electricity meters. The remaining meters were installed by 2015, about a year after project completion. The project installed nearly 144,000 new gas meters, as targeted. Of these, IDA financed 93,000, and the rest were financed with TTG’s internally generated funds. The Independent Evaluation Group

mission visited a selected sample of meters in household and retail situations, and the users confirmed that the meters were in good working condition, though gas meters were not in use because of the lack of gas supply since the end of 2012 (appendix C).

2.2 Barqi Tojik and TTG's accounting systems largely transitioned to international financial reporting standards, but some activities are still incomplete. The project helped modernize Barqi Tojik and TTG's accounting systems, which were largely manual at project appraisal. Under the FMIP, both utilities strengthened their financial management staffing through recruitment and training, and modern accounting software was installed at the Barqi Tojik and TTG offices. The accounting systems began producing statements in accordance with international financial reporting standards reporting requirements. Audit reports to the government could meet the 180-day deadline for the first time, but some FMIP-related activities pertaining to valuation of assets and assessment of receivables and payables remain incomplete. These are being continued through advisory support under the Winter Energy Program (P153966) and the ongoing CASA-1000 and Nurek Rehabilitation Phase I projects.

2.3 The automated billing system was not made operational. The SAP software-based billing system that SECO financed in parallel was installed in Barqi Tojik and TTG, but it was not made operational because the new system was quite sophisticated compared with the existing arrangements and staff capacity, and the consultant that had been selected for the task was not qualified to execute it. As a result, the utilities continue to use the existing billing systems. Work on updating the billing systems is continuing under the ongoing CASA-1000 and the Nurek Rehabilitation Phase I projects.

2.4 Data made available to the Independent Evaluation Group mission show that the billed sales and cash collections of billed sales for electricity are close to targeted levels. There was no activity regarding the gas sector since the end of 2012.

- Electricity sales billed in Dushanbe are close to targeted levels. Electricity sales billed in Dushanbe increased from 1,910 GWh in 2011 to 2,343 GWh in 2014 (meeting the target of 2,330 GWh for the year) and to 2,495 GWh in 2018, slightly lower than the target of 2,569 GWh.
- Cash collections of billed electricity consumption have increased in Dushanbe after project completion. Collections in cash as a percentage of billed consumption in Dushanbe increased from 54 percent in 2004 to 85.1 percent in 2014 against a target of 89 percent. Updated figures from Barqi Tojik indicate that the billing collection is on track to reach 90 percent in 2019 after dipping to 77 percent in 2014.

- Collections in cash for billed gas. Collections in cash for gas billed was achieved 100 percent by 2012. No data are available beyond that year after Uzbekistan stopped supplying gas to Tajikistan in 2012, effectively shutting down the country's gas supply system.

2.5 There has been little or no progress regarding unaccounted-for electricity and gas.

- The share of unaccounted-for electricity in Dushanbe remains almost the same as the revised baseline in 2011. Unaccounted-for electricity in the Dushanbe system increased from a baseline of 14.5 percent in 2011 to 17.8 percent in 2013–14, and it dropped only marginally to 15.3 percent in 2019. This is attributed to the high demand and subsequent overloading of the electricity system when electric heating partially replaced gas heating after gas imports from Uzbekistan began declining in 2010–11 and ultimately stopped by the end of 2012.
- Unaccounted-for gas and collections in cash for billed gas. Unaccounted-for gas in Tajikistan's gas sector decreased from 25 percent in 2004 to 10.3 percent in 2010 against a target of 6 percent. No data are available beyond that year.

2.6 The impact of not completing the automated billing system is not clear from the results for billed sales, cash collections, and unaccounted-for gas and electricity. The automated billing system was essentially a computerized information technology system that would accord with the new meters and be integrated with the necessary hardware, including the use of handheld meter reading units. The expected gains in efficiency and accuracy from the new system were not realized.

2.7 Most indicators of financial viability have deteriorated in the years after project completion. Net losses increased from Tajik somoni (SM) 1.72 billion to SM 3.31 billion in 2018. Net equity dropped sharply from SM -2.75 billion to SM -9.09 billion during the same period. The current ratio decreased from 0.29 to 0.12 between 2014 and 2018, though the operating ratio improved somewhat from 154 percent to 111 percent between 2014 and 2018.

2.8 Although the gas sector was still operating, various outputs in the gas sector contributed to improved financial viability. The gap between operating expenses to operating revenue declined from -6 percent in 2010 to less than 2 percent in 2012, and net losses decreased from 13 percent of revenue to 6.5 percent.

2.9 Compliance was poor on financial covenants for tariffs and reducing arrears. All financial covenants in the original project were dropped at the 2012 restructuring. The covenant relating to "financing of annual capital expenditure from its own resources"

could not be met, attributed to “diverse changes in its business conditions,” which acknowledged the deteriorating financial situation of both Barqi Tojik and TTG. The covenant relating to “contribution to investment” was dropped because of difficulties in reliable estimation of the indicator set at appraisal.

2.10 Two new covenants were added during restructuring that called for the government to take all necessary actions, including increases in tariffs to enable Barqi Tojik to reach short-term cost recovery for 2013 on and ensure full payments by budget entities for electricity purchases. The project did not comply with either covenant consistently.

- Electricity tariffs were significantly lower than targets at project completion in 2014 and 2019. At project completion, electricity tariff was 2.04 cents per kilowatt-hour (kWh), or 85 percent of the target of 2.40 cents per kWh. Updated data from Barqi Tojik shows that tariff targets were lowered to 1.73 cents per kWh by 2016, before being increased to 2.45 cents per kWh by 2019. In comparison, the actual tariff in 2019 was significantly lower at 1.89 cents per kWh.
- The government adjusted gas prices and accounted for increases in import prices, but TTG’s prices were still short of full cost recovery levels at the end of 2012, when imports from Uzbekistan had stopped.

2.11 The Independent Evaluation Group mission was informed of a shift from barter to monetary repayment, and TALCO’s payment record is improving, but overall, it appears to have made little or no impact on overall financial indicators since project completion.

2.12 Electricity tariff subsidy programs were not targeted adequately to poor households. The marginal willingness to pay for reliable electricity supply in Tajikistan was about 7 cents per kWh in 2011 prices, which is substantially higher than the average tariff of 2.04 cents per kWh prevailing in 2014 (World Bank 2011). However, a World Bank study estimated that households in rural areas, urban areas outside Dushanbe, and in Dushanbe spent 14, 19, and 9 percent of their incomes annually on energy, respectively (including other sources such as coal, wood, and other fuel to compensate for inadequate and unreliable electricity supply). This is among the highest rates in Europe and Central Asia (World Bank 2014).

2.13 A \$5 million grant obtained under an earlier project from SECO was used for subsidizing electricity payments for targeted customers in the GBAO, which is the poorest region in Tajikistan. However, more generally, the government’s subsidy programs need to be better targeted to assist poor households. The present tariffs

provide an across-the-board subsidy to electricity consumers regardless of actual need on affordability grounds.

2.14 The Rogun HEP assessment studies were completed successfully, and after project completion, the studies helped the government raise finance and begin construction of the hydroelectric facility. The techno-economic assessment study and the environmental and social impact assessments for Rogun HEP were completed by August 2014. Both studies included consultations among the principal stakeholders at each stage of the process, from design through dissemination of the findings. Their structure and contents were the outcome of detailed deliberations, including evaluations by the panel of experts that the World Bank convened. Particular attention was paid to environmental and social safeguards issues, including possible resettlement policies and impacts.

2.15 Feedback from Barqi Tojik and government officials suggests that outputs from the Rogun HEP assessment process helped the government make the case for raising finance through Eurobonds in 2017 for starting work on the Rogun HEP and launching the first two of its six planned turbines by the end of 2019. However, raising finance for the rest of the stages remains a challenge. The World Bank opted out of financing Rogun on the basis that “the government had a number of choices on how to proceed with Rogun and they... wanted to accelerate the process and it was felt that the World Bank would be more helpful supporting other investments in the energy sector.” The “other investments” were the financing for refurbishing the Nurek power plant.<sup>5</sup>

2.16 The Nurek HPP studies provided the basis for a new rehabilitation project. They evaluated the sedimentation and need for rehabilitation and further dam safety measures at the Nurek HPP dam site. The studies were completed in 2015, several months after project completion. These studies laid the foundation for the ongoing Nurek Hydropower Rehabilitation Project Phase I (P150816; 2018–24), which is funded by a donor consortium of Asian Infrastructure Investment Bank, IDA, and Eurasian Development Bank.

### **3. What Worked, and Why?**

3.1 The project provided continuity to the World Bank’s engagement with Tajikistan’s energy sector and promoted synergy with development partners. The World Bank has engaged with Tajikistan’s energy sector for about two decades, and the Energy Loss Reduction Project (2005–15) provided continuity from the Pamir Private Sector Project (2002–11) to the ongoing CASA-1000 projects and the Nurek HPP Rehabilitation Phase I. At project appraisal, the World Bank supported the government in developing a comprehensive plan for the energy sector, which the government formalized in its Letter

of Energy Sector Development Strategy dated March 18, 2005, thus forming the basis for assistance from the World Bank and other development partners. Officials from Asian Development Bank, European Bank for Reconstruction and Development, and SECO confirmed that the World Bank's convening role helped prioritize issues for Tajikistan's energy sector and facilitated complementarity of their collective efforts. These efforts have led to the ongoing World Bank and other donor-supported Nurek Rehabilitation Phase I Project, the CASA-1000 projects, and the commencement of the Rogun HEP construction with government-led financing.

3.2 The World Bank's convening power and reputation for ensuring high international standards helped facilitate the successful completion of a techno-economic assessment study and an environmental and social impact assessment for Rogun HEP. During project implementation, the government approached the World Bank for support in establishing the feasibility of Rogun HEP. The task was challenging because of the complex technical, social, and environmental issues involved, and the need to get buy-in from the international diplomatic community and the governments of five riparian countries that the project would affect. Several of the key stakeholders (the European Union, the Russian Federation, the United Kingdom, the United Nations, and the United States) acknowledged the inclusiveness of the preparation process,<sup>6</sup> which covered the riparian countries, civil societies, and local communities. They also acknowledged the high quality of the studies that met international best practices and helped put the technical, environmental, and social parameters for Rogun HEP on a sound footing.

3.3 The foundation laid by the Energy Loss Reduction Project—including the strategically important studies—led to the initiation of critical follow-up engagements for the World Bank and other development partners, including the construction and rehabilitation of the country's two largest hydropower plants.

## **4. What Did Not Work, and Why?**

4.1 Risk assessment at appraisal shows a major omission in not anticipating or addressing uncertainties arising from Tajikistan's near total dependence on Uzbekistan for natural gas imports. The Project Appraisal Document (2005) did not contain any discussion of risks facing the gas sector, especially uncertainties in the import of natural gas from Uzbekistan or any mitigating measures. This is a major omission given that periodic disruption in gas supplies from Uzbekistan to neighboring countries, including Tajikistan, appears to have been well known at about that time. Growing arrears in payments for gas supplies on the part of Tajikistan and political differences that might also affect gas supplies were also well recognized and understood but were not reflected

in the appraisal document and thereby in the design of the project, especially for risk-mitigation options.

4.2 Even as the signs of uncertainties in gas imports increased during implementation, supervision documents did not reflect any need for supporting Tajikistan in revisiting the strategy for the gas subsector in the context of overall energy sector strategy. The World Bank does not appear to have noted emerging uncertainties in the gas sector in its supervision documents. At that time, gas imports were tied up with other outstanding political issues between Tajikistan and Uzbekistan, including concerns that Uzbekistan, as a downstream country, had about the Rogun project, and the World Bank appears to have been reluctant to engage in these matters. The World Bank completed a report, *Tajikistan's Winter Energy Crisis: Electricity Supply and Demand Alternatives*, close to the project's original closing date, but even this report did not address gas sector issues directly (World Bank 2012).

4.3 The interruption of gas imports began during implementation (around 2010), affecting the productive use of outputs from project components related to gas sector metering and billing for several years. There were no periodic disruptions of gas supply from Uzbekistan in the years before project appraisal, but during project implementation, there were clear signs of mounting uncertainties relating to gas imports from Uzbekistan, starting in about 2010. The activities for the project's components and subcomponents related to the gas sector continued as originally planned and were mostly completed by about this time. Given the unavailability of gas in the TTG's network, the gas meters and billing system have not been used since 2012. As a result, nearly \$12 million in scarce IDA funding—about 25 percent of the final project cost—were effectively rendered unproductive until gas supplies resumed to some extent in 2018. However, it is not clear to what extent various customer segments are receiving gas supply compared with the time when supply disruptions began.

4.4 Most actions under the project that were geared to improving Barqi Tojik's financial viability fell short of expectations, further worsening the utility's financial health from project completion to the present. Electricity tariffs have remained consistently below cost recovery and targeted levels. Tariff targets were lowered during the years immediately after project completion and set back to project completion levels only by 2019. One of the reasons for not achieving the electricity tariff targets was exogenous: the substantial depreciation of the Tajik somoni against the US dollar. There have been no tariff reductions. Raising electricity tariffs is a politically charged issue in a time of low incomes and uneven economic growth. These sensitivities were exacerbated after gas imports from Uzbekistan ceased at the end of 2012, and people had to use relatively more expensive electricity for heating instead of gas in the winter months (because of greater recourse to thermal power generation in the winter months, when

less expensive hydroproduction is lower). There does not appear to have been any significant reduction in arrears from TALCO (which consumes more than 40 percent of the electricity produced in the country) and from pumping stations since project commencement. Unaccounted-for electricity in Dushanbe, which is a significant share of national domestic and commercial electricity consumption, has remained at the same level as at project commencement, partly because of technical losses in transmission and distribution.

4.5 The World Bank could have coordinated early with SECO to ensure that the automated billing systems for the energy utilities would meet Barqi Tojik's cost considerations. The automated billing systems financed by SECO could not be completed mainly because of Barqi Tojik's concerns about the high annual fee associated with the SAP system, given Barqi Tojik's weak financial standing. In retrospect, comprehensive life cycle cost analysis for various billing system options should have been done to select a better option, for which early coordination with SECO would have helped. Ideally, the billing system should have been modernized before new metering was installed to get the best results out of metering, but implementation did not occur in this sequence.

4.6 The FMIP rollout experienced delays that better planning could have prevented, at least partly. The improvements made under the FMIP took much longer than anticipated. Progress slowed because of staff turnover in Barqi Tojik and the local consultancy firm and the prolonged absence of the selected international consultant (caused by payment disputes). In retrospect, the World Bank should have carefully considered several features in planning and implementing the FMIP at the start of the project. For instance, the effort needed in bridging the divergence from international standards of the existing national standards for accounting and financial reporting should have been estimated better. Staff capacity and readiness to be trained was a constraint. Additionally, the World Bank did not adequately anticipate the complexity of dealing with the multiplicity of utility branches and the variety of the financial management systems in use.

## 5. Lessons

5.1 **The development effectiveness of the World Bank's continuous sectorwide engagement in a country can be diminished significantly if the risk analysis at project appraisal is not comprehensive and candid and if prompt course corrections are not made during implementation when a major risk is realized.** In this project, the appraisal document did not identify risks relating to the gas sector, which was vulnerable to disruptions in imports from Uzbekistan. This had clear implications for

energy security and winter energy needs of rural and lower-income beneficiaries. When risks to the gas sector were realized during project implementation, there was no clear response evident from supervision documents or in project restructuring.

**5.2 The World Bank should proactively ensure that a project component that is crucial to achieving the project development objective and is funded through parallel financing arrangements is designed and implemented in an effective and complementary manner.** The planned automated billing and collection system (that SECO financed in parallel) was crucial to improving the energy utilities' financial viability. The project could not complete this system because it could not be adapted readily to the existing arrangements and capacity, and the consultant engaged was not qualified for the task. Earlier and continuous World Bank engagement with SECO might have prevented this situation.

**5.3 The World Bank's convening capacity can contribute to resolving politically complex and technically demanding development issues that cut across national boundaries, by creating a transparent and inclusive consultative process, and marshaling globally recognized expertise.** To prepare the techno-economic and environmental and social assessments for the Rogun HEP, the World Bank built appropriate platforms for consultation and engagement across the riparian states, international stakeholders, civil society and local communities. Engagement of eminent global experts and transparent communication of discussions ensured that the studies were credible and acceptable to all stakeholders.

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<sup>1</sup> For more information, see, "Tajikistan Launches Second Turbine at Rogun Megaproject" at <https://www.reuters.com/article/us-tajikistan-hydro-rogun/tajikistan-launches-second-turbine-at-rogun-megaproject-idUSKCN1VU178>.

<sup>2</sup> For more information see, "Uzbekistan Resumes Gas Deliveries to Tajikistan" at <https://eurasianet.org/uzbekistan-resumes-gas-deliveries-to-tajikistan>.

<sup>3</sup> The World Bank and International Finance Corporation collaborated for the Pamir Private Power Project (2002–11) to support setting up the Pamir Energy Company as a joint stock company (owned 70 percent by the Aga Khan Fund for Economic Development and 30 percent by International Finance Corporation) in a country and region where it has been difficult to attract private investors. The project helped raise power availability from 3 hours to 24 hours per day for 70 percent of customers in the Gorno-Badakhshan Autonomous Oblast region, which has the lowest income levels in the country.

The Programmatic Development Policy Grant 1–3 (2006–10) supported the electricity sector restructuring by separating policy making from Barqi Tojik's commercial operations, implementing a schedule for electricity tariff adjustments, addressing the environment for

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private sector development for the energy sector, and implementing social protection measures for vulnerable groups to ensure access to a basic level of service and, among others, with overall satisfactory development outcomes. Programmatic Development Policy Grant 4–6 (2010–11) helped prepare financial management improvement plans by state electricity and gas monopolies and completion of an energy efficiency audit to identify options to increase energy efficiency, but implementation was uneven, with moderately satisfactory outcomes.

The Energy Emergency Project (2008–13) sought to increase the national energy supply’s volume and reliability, especially in the winter season. The project helped improve electricity availability in the country by 64 percent between the winter seasons of 2007–08 and 2009–10, but only by 2.5 percent between the winters of 2009–10 and 2010–11, which then declined in the two subsequent years to below the 2009–10 level. Equipment and materials were procured for the gas sector, and other measures helped decrease gas losses, but these measures became irrelevant when gas imports from Uzbekistan stopped at the end of 2012.

<sup>4</sup> The implications for the gas sector from this support are noted in relevant parts of this report.

<sup>5</sup> For more information, see, “World Bank Says Tajik Rogun Power Plant Financing off the Table” at <https://www.reuters.com/article/us-tajikistan-worldbank-rogun/world-bank-says-tajik-rogun-power-plant-financing-off-the-table-idUSKBN1JH0PD>.

<sup>6</sup> The Rogun Hydroelectric Project received support from the United Nations Secretary-General (statement dated June 18, 2014) and the European Union (statement dated June 18, 2014).

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## Appendix A. Project Ratings

Indicator	ICR	ICR Review	PPAR
Outcome	Moderately satisfactory	Moderately satisfactory	Moderately unsatisfactory
Risk to development outcome	Moderate	Modest	High
Bank performance	Satisfactory	Satisfactory	Unsatisfactory
Borrower performance	Moderately satisfactory	Moderately satisfactory	Moderately unsatisfactory

*Note:* The Implementation Completion and Results Report (ICR) is a self-evaluation by the responsible Global Practice. The ICR Review is an intermediate Independent Evaluation Group product that seeks to independently validate the findings of the ICR. PPAR = Project Performance Assessment Report.

### Relevance

Based on the overview provided in section 1 and the following discussion, the relevance of objectives is rated **high**, and relevance of design is rated **substantial**.

### Relevance of Objectives

The original and revised project development objectives were highly relevant to the challenges in Tajikistan’s energy sector that are outlined in the Salient Sector Issues in chapter 1. The objectives were clear, realistic, and relevant regarding Tajikistan’s two-track energy strategy for improvement of the domestic energy sector, and development of large-scale projects to generate electricity for export.

The scope of the project objectives reflected a sequenced approach to addressing the multiple challenges facing Tajikistan’s energy sector. The World Bank’s experience in some other countries in the region showed the difficulty in proceeding with several reform elements concurrently: financial viability, unbundling, and privatization. Improving financial viability was appropriately taken up as a first step before considering any necessary restructuring of the utilities. The project scope also avoided overlap with the efforts of Asian Development Bank and other lenders, who were already financing investments in the electricity generation and transmission sectors, and complemented their efforts.

The project objectives remain consistent with the fiscal years 2019–23 Country Partnership Strategy, which recognizes Tajikistan’s priorities for energy security and reliable electricity supply for improved economic opportunities and private sector-led economic growth. Under its focus area 2, public institutions and sustainability, the strategy notes that the energy utilities’ financial sustainability is essential to achieve the expected development impacts from the large investments in the sector.

## Relevance of the Design

The links between the inputs, outputs, and project development outcomes were clear. The project design at appraisal was geared appropriately to the outcome of improving the financial viability of Barqi Tojik and Tajiktransgas (TTG; formerly Tajik Gas). As outlined in the theory of change (chapter 1, figure 1.1), the project would improve the commercial and financial viability of Barqi Tojik and TTG by providing the necessary tools: metering, billing, and collections systems; financial accounting and reporting improvements; and relevant associated technical assistance in these areas. The project design provided for technical assistance to the government to improve capacity for procurement and to monitor and facilitate project implementation based on a needs assessment for these areas.

The project design should have paid attention to the sequencing of billing improvements and metering. In retrospect, billing improvements should have preceded the metering effort to obtain the greatest impact from the latter.

The objective relating to Rogun Hydroelectric Project (HEP) studies, introduced during the second half of project implementation, was not related directly to the original objective, which focused on the energy utilities' financial viability. By itself, the causal link between the Rogun HEP studies and improved knowledge and capacity for the government and Barqi Tojik to initiate financing and construction of the project was straightforward.

Rogun HEP is a partially completed structure initiated in the 1970s, when Tajikistan was a republic of the Soviet Union. A large, technically complex project, it was conceived as part of a cascade system to serve irrigation and energy generation purposes in a regional system without national borders. The World Bank limited its intervention to providing an unbiased, impartial, and transparent evaluation of the benefits and risks according to international standards and input to decision-making on a possible project.

However, adding a largely unrelated element (the Rogun HEP studies) to an ongoing effort for improving the energy utilities' financial viability that was not progressing as planned put the latter under greater risk. It also led to reallocation of administrative and financial resources that may have affected the implementation of the original objective.

## Efficacy

The revised project objective (which includes the original objective) is evaluated in terms of the following subobjectives:

**Objective A:** To assist in reducing commercial losses and laying the foundation for the improvement of financial viability *in the electricity system* in a socially responsible manner

**Objective B:** To assist in reducing commercial losses and laying the foundation for the improvement of financial viability *in the gas systems* in a socially responsible manner

**Objective C:** To assist in the viability assessment of Rogun HEP

Objective A, to assist in reducing commercial losses and laying the foundation for the improvement of the financial viability *in the electricity system* in a socially responsible manner, is rated **modest**.

## Outputs

- Electricity meters were installed as planned. The project installed 171,904 meters by project completion in the Dushanbe Electricity Network, against a revised target of 215,835 electricity meters. The remaining meters were largely installed by 2015.
- Electricity tariffs remain significantly below targets. Electricity tariffs were significantly lower than targets at project completion in 2014 and in 2019. At project completion, electricity tariff was 2.04 cents per kilowatt-hour (kWh), 85 percent of the target of 2.40 cents per kWh. Updated data from Barqi Tojik shows that tariff targets were lowered to 1.73 cents per kWh by 2016 before being increased to 2.45 cents per kWh by 2019. In comparison, the actual tariff in 2019 was significantly lower at 1.89 cents per kWh in 2019 (table A.1). One of the reasons for not achieving the electricity tariff targets was exogenous: the substantial depreciation of Tajik somoni against the US dollar. There have been no tariff reductions.
- Barqi Tojik and TTG's accounting largely transitioned to international financial reporting standards. Under the financial management improvement plan (FMIP), both utilities have strengthened their financial management staffing through recruitment and training, and modern accounting software was installed at the Barqi Tojik and TTG offices. The accounting systems started producing statements in accordance with international standards reporting requirements. However, some FMIP-related activities pertaining to valuation of assets and assessment of receivables and payables remain incomplete. Some of the remaining FMIP activities have been continued through advisory support under the Winter Energy Program (P153966), the ongoing Central Asia-South Asia

Regional Electricity and Trade Project (CASA-1000), and the Nurek Rehabilitation Phase I projects.

- The automated billing system was not made operational. The SAP software-based billing system that the Swiss Development Cooperation Office (SECO) financed in parallel was installed but not made operational because the new system was quite sophisticated compared with the existing arrangements and staff capacity, and the consultant that had been selected for the task was not qualified to execute it. Work on updating billing systems is continuing under the ongoing CASA-1000 and Nurek Rehabilitation Phase I projects.
- Analytical work was conducted on the social considerations of tariff increases. The project supported several studies and analyses that covered the social impacts of tariff increases.<sup>1</sup> A SECO grant for \$5 million obtained under an earlier project from SECO was used to subsidize electricity payments for targeted customers in the Gorno-Badakhshan Autonomous Oblast, which is the poorest region in Tajikistan.

## Intermediate Outcomes

On the positive side, electricity sales billed and cash collections of billed consumption are close to targeted levels.

- Electricity sales billed in Dushanbe are close to targeted levels. Electricity sales billed in Dushanbe increased from 1,910 gigawatt hours (GWh) in 2011 to 2,343 GWh in 2014, meeting the target of 2,330 GWh for the year, and to 2,495 GWh in 2018, somewhat lower than the target of 2,569 GWh.
- Cash collections of billed electricity consumption have increased in Dushanbe after project completion. Collections in cash as a percentage of billed consumption in Dushanbe increased from 54 percent in 2004 to 85.1 percent in 2014, against a target of 89 percent. Updated figures from Barqi Tojik indicate that the billing collection is on track to reach 90 percent in 2019 after dipping to 77 percent in 2014 (table A.1).
- The implementation of the FMIP has improved accounting standards. The project helped modernize Barqi Tojik's accounting system, which was largely manual at project appraisal. The transition to international financial reporting standards has largely been made. Barqi Tojik currently employs specialists who are well acquainted with international financial reporting standards. An unconditional legacy of the project is that over the past five years, international independent auditors are issuing opinions based on the results of audits of Barqi

Tojik's financial statements. For the first time, audit reports to the government were able to meet the 180-day deadline.

However, there has been little or no progress regarding unaccounted-for electricity, tariff increases, and reducing arrears from budget entities.

- The share of unaccounted-for electricity in Dushanbe remains almost the same as the revised baseline in 2011. Unaccounted-for electricity in the Dushanbe system increased from a baseline of 14.5 percent in 2011 to 17.8 percent in 2013–14 and dropped only marginally to 15.3 percent in 2019. This is attributed to the high demand and subsequent overloading of the electricity system when electric heating partially replaced gas heating after gas imports from Uzbekistan ceased in 2010.
- Compliance with financial covenants for tariffs and reducing arrears was poor. All financial covenants in the original project were dropped at the 2012 restructuring,<sup>2</sup> and two new covenants were added that called for the government to take all necessary actions, including increases in tariffs, to enable Barqi Tojik to reach short-term cost recovery for 2013 on, and ensure full payments by budget entities for electricity purchases. The project did not comply with either covenant consistently. The Independent Evaluation Group mission was informed of a shift from barter to monetary repayment, and Tajikistan Aluminum Company's (TALCO) payment record is improving, but pumping stations continue to be highly indebted, and overall financial indicators have deteriorated since project completion (table A.2).

**Table A.1. Project Intermediate Indicators: Electricity Sector**

Year	Unaccounted-for Electricity in Dushanbe (percent)		Posted Electricity Tariff in Tajikistan (cents per kWh)		Collection in Cash for Electricity Consumption in Dushanbe (percent) <sup>b</sup>		Electricity Sales Billed in Dushanbe (GWh) <sup>c</sup>	
	Target	Actual	Target	Actual	Target	Actual	Target	Actual
2004	13.0	—	0.60	—	54.0	—	—	—
2005	12.5	18.9	0.69	0.58	58.0	—	—	—
2006	12.0	21.1	0.69	0.58	71.0	—	—	—
2007	11.5	19.1	0.83	0.64	76.0	—	—	—
2008	11.0	19.1	1.00	1.43	81.0	—	—	—
2009	10.0	19.0	1.21	1.62	87.0	—	—	—
2010	16.2	19.0	1.45	2.00	90.0	81.0	—	1,820
2011 <sup>a</sup>	—	18.2	1.90	1.90	83.0	—	1,910	—
2012	17.0	17.7	2.20	0.415	85.0	89.1	1,920	2,189.7
2013	17.1	17.8	2.30	0.456	87.0	83.7	1,930	2,214.5
2014	17.0	23.7	2.40	0.608	89.0	85.1	2,330	2,343.0
2015	18.0	18.5	1.87	0.875	100	81.7	2,509	2,441.4
2016	17.7	17.9	1.73	1.022	100	83.6	2,485	2,328.6
2017	17.1	16.9	1.91	1.404	100	81.2	2,539	2,446.6
2018	15.4	15.5	2.08	1.709	100	77.1	2,569	2,495.5
2019	15.3	15.3	2.45	1.890	100	89.9*	1,706	1,694.0*

Note: GWh = gigawatt hour; kWh = kilowatt-hour; — = not available.

a. The original baselines were revised under the February 2011 restructuring.

b. Figures of actuals for 2005 to 2010 supplied by Barqi Tojik are not comparable with the 2004 baseline estimate because of differences in computing.

c. This is a new indicator added under the February 2011 restructuring.

## Outcomes

Most indicators of financial viability have deteriorated in the years after project completion. Net losses have increased from Tajik somoni (SM) 1.72 billion to SM 3.31 billion in 2018. Net equity dropped sharply from SM –2.75 billion to –9.09 billion during the same period. The current ratio decreased from 0.29 to 0.12 between 2014 and 2018, though the operating ratio improved somewhat from 154 percent to 111 percent between 2014 and 2018 (table A.2).

Low electricity tariffs kept the expenditures on electricity below an acceptable threshold for low-income households, but low reliability of electricity supply meant that overall expenditure on energy was the highest in the region. An important finding from the studies that the project supported was that electricity tariffs in Tajikistan are among the lowest in the region. In 2014, expenditures on electricity by the poorest 10 percent quartile in Tajikistan were below 5 percent of household expenditures, even in the

heating season when demand for electricity is higher. The marginal willingness to pay in Tajikistan was about 7 cents per kWh in 2011 prices, which is higher than the average tariff of 2.04 cents per kWh prevailing in 2014, indicating a willingness by households to pay higher prices for reliable electricity services. A World Bank study estimated that households in rural areas, urban areas outside Dushanbe, and Dushanbe, spent 14, 19, and 9 percent of their incomes annually on energy, respectively, which is among the highest rates in Europe and Central Asia (World Bank 2014).

**Table A.2. Barqi Tojik: Financial Indicators, 2009–18**

Indicator	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Revenues ( <i>SM, billions</i> )	0.77	1.02	0.97	1.10	1.23	1.31	1.53	1.69	2.11	2.68
Operating expenses ( <i>SM, billions</i> )	0.54	0.78	0.84	1.05	1.56	2.01	1.97	2.40	2.89	2.99
Total expenses ( <i>SM, billions</i> )	0.70	0.83	1.00	1.40	1.84	3.03	4.35	4.01	5.49	6.00
Net profit/loss ( <i>SM, billions</i> )	0.07	0.19	-0.03	-0.30	-0.61	-1.72	-2.82	-2.32	-3.38	-3.31
Current assets ( <i>SM, billions</i> )	1.84	1.01	0.89	1.20	1.87	1.31	2.14	1.09	1.31	1.53
Current liabilities ( <i>SM, billions</i> )	0.78	1.39	1.72	2.41	3.93	4.55	6.35	8.51	10.68	13.03
Medium and long-term liabilities ( <i>SM, billions</i> )	2.04	2.30	2.78	2.88	2.87	3.21	5.27	7.05	9.98	12.56
Equity ( <i>SM, billions</i> )	0.33	1.73	1.35	1.02	0.37	2.75	-0.06	-0.61	-5.98	-9.09
Operating ratio ( <i>percent</i> )	70	76	87	96	127	154	129	142	137	111
Current ratio	2.34	0.73	0.52	0.50	0.48	0.29	0.34	0.13	0.12	0.12
Collection ratio ( <i>percent</i> )	50	60	—	—	—	—	—	—	—	—
Debt-to-equity ratio	84:14	57:43	67:33	74:26	—	—	—	—	—	—

Note: Collection ratio is the ratio of collected revenues to billed revenues. Operating ratio is the ratio of operating expenses to operating revenues. Current ratio is the ratio of current assets to current liabilities. — = not available.

Objective B, to assist in reducing commercial losses and laying the foundation for the improvement of financial viability *in the gas systems* in a socially responsible manner is rated **modest**.

## Outputs

**Installing Gas Meters.** The project installed nearly 144,000 new gas meters, as targeted. The International Development Association financed 93,000 of these, and the remaining were financed using TTG's internally generated funds. Generally, testing equipment for calibrating the meters and materials for rehabilitating the gas network were supplied as targeted and on schedule. The Independent Evaluation Group mission visited a selected sample of meters in household and retail situations, and the users confirmed that the

meters are in working condition, though they are unused because of the lack of gas supply (appendix C).

**Gas Tariffs.** The government adjusted gas prices and accounted for increases in import prices, but TTG's prices were still short of full cost recovery levels at the end of 2012, when imports from Uzbekistan were stopped.

**Billing and Collection System.** Like Barqi Tojik, the SAP billing system that SECO financed in parallel was installed in TTG but not made operational.

## Intermediate Outcomes

**Unaccounted-for Gas and Collection in Cash for Billed Gas.** Unaccounted-for gas in Tajikistan's gas sector decreased from 25 percent in 2004 to 10.3 percent in 2010 against a target of 6 percent. Collections in cash for gas billed achieved 100 percent by 2012. No data are available beyond that year, which is after Uzbekistan stopped supplying gas to Tajikistan, effectively closing the country's gas supply system.

**Table A.3. Tajikistan Gas Sector: Project Intermediate Indicators, 2004–14 (percent)**

Year	Unaccounted-for Gas		Collection in Cash for Gas Billed	
	Target	Actual	Target	Actual
2004	25.0	—	83.0	—
2005	21.0	20.6	—	89.1
2006	15.0	19.3	88.0	86.7
2007	13.0	15.4	91.0	84.0
2008	10.0	16.3	94.0	89.5
2009	8.0	14.6	96.0	105.6
2010	6.0	10.3	—	104.1
2011	9.3	—	100.0	100.0
2012	7.9	n.a	100.0	100.0
2013	7.2	n.a	100.0	n.a
2014	6.6	n.a	100.0	n.a

Note: n.a = not applicable; — = not available.

## Outcome

Until the gas sector was operating, the various outputs in the gas sector contributed to improved financial viability. The gap between operating expenses to operating revenue declined from –6 percent in 2010 to less than 2 percent in 2012, and net losses decreased from 13 percent of revenue to 6.5 percent. However, after gas imports from Uzbekistan stopped by the end of 2012, there were no outcomes to be considered.

Objective C, to assist in the viability assessment of Rogun HEP, is rated **substantial**.

## Outputs

**Rogun HEP Studies.** The planned techno-economic assessment study and the environmental and social impact assessments were completed by August 2014. Both studies included consultations among principal stakeholders at each stage of the process, from design through dissemination of the findings. Their structure and contents were the outcome of detailed deliberations, including evaluations by the panel of experts that the World Bank convened. Particular attention was paid to environmental and social safeguards issues, including possible resettlement policies and impacts.

**Nurek Hydropower Plant (HPP) Rehabilitation Studies.** These studies evaluated the need for rehabilitation, further dam safety measures, and sedimentation at the dam site of the Nurek HPP and were completed in 2015, several months after project completion.

## Outcome

The Rogun assessment process helped the government make the case for raising finance and begin construction of the Rogun HEP. The Rogun studies have provided important input for decision-making regarding viable power generation options for Tajikistan and for regional policy, given the cross-boundary nature of the Rogun HEP's operations. The successful completion of the Rogun assessment process—the techno-economic assessment study and the environmental and social impact assessment and related activities, including consultations among riparian governments, with civil society, and within the international community, and the identification of key additional issues and potential win-win approaches in the World Bank report—is a strategically significant outcome with long-term implications both domestically and regionally. The Rogun assessment process was instrumental in the government raising finance through Eurobonds for starting work on the Rogun HEP and launching the first two of its six planned turbines by the end of 2019. When completed, Rogun HEP is expected to end power shortages in Tajikistan while allowing the country to boost energy exports to its neighbors, such as Afghanistan, Pakistan, and Uzbekistan. However, raising finance for the rest of the stages remains a challenge.

The Nurek HPP studies provided the basis for a new rehabilitation project. The techno-economic assessment of the rehabilitation of the Nurek HPP have effectively laid the foundation for the ongoing Nurek Hydropower Rehabilitation Project Phase I (P150816; 2018–24), which is funded by a donor consortium of Asian Infrastructure Investment Bank, International Development Association, and Eurasian Development Bank.

Within the project's framework, a Project Realization Group was established under Barqi Tojik, which currently successfully implements such strategic projects as the Nurek Hydropower Rehabilitation Project Phase I (World Bank, Asian Infrastructure Investment Bank, and Eurasian Development Bank) and rehabilitation of the Kairakkum HPP (European Bank for Reconstruction and Development).

## Efficiency

Efficiency is considered in terms of activities for the electricity sector, gas sector, and technical assistance for Rogun HEP studies.

The electricity sector program accounted for nearly half of the final project cost (46 percent). The project team estimated the economic internal rate of return for electricity sector-related activities to be 16 percent, slightly lower than the appraisal estimate of 18 percent. The final estimate was lower because the implementation period was longer than planned, and progress in reducing unaccounted-for electricity (losses) and billed electricity consumption in Dushanbe was slower than projected. The financial internal rate of return (calculated with and without the project using an estimated long-run average incremental cost of 2.1 cents per kWh) was estimated at 67.4 percent at appraisal and 49 percent at completion. Although this evaluation did not attempt to replicate these calculations, it is difficult to reconcile these high rates of return because the tariff, on average, was only 60 percent of long-run marginal cost, and the cost recovery was 75 percent at project completion.

The team did not attempt to assess the investments in the gas sector, which accounted for 26 percent of total actual project cost because TTG ceased normal operations from the end of 2012, when Uzbekistan stopped supplying natural gas to the country. Given that the investments in the gas sector have not been used, the efficiency for this portion is effectively zero.

The technical assistance program, including the Rogun and Nurek studies, accounted for 28 percent of the total project cost. The Rogun studies facilitated a consensus for the project among the riparian states and helped the government raise finance for the first two turbines of the six-turbine hydro plant. The Nurek studies led to the Nurek HPP Rehabilitation Phase I Project. Therefore, the outlay on both sets of studies was leveraged well to launch projects with large potential benefits. The other technical assistance activities (relating to tariff policies, social protection policies, and monitoring and evaluation) were not amenable to a comparative or absolute cost-effectiveness analysis.

There was a delay of approximately one year in completing the activities planned under the original project. Most activities supported by additional financing were completed

by the revised closing date of December 31, 2014, except for installing additional meters for Barqi Tojik; studies related to rehabilitation, dam safety, and sedimentation; valuation of assets; and assessment of receivables and payables. The billing system, financed by the Swiss grant, did not become operational partly because the consultant was not qualified to work with the SAP billing system.

On balance, efficiency is rated **modest**.

## Project Development Outcome

Relevance of objectives is rated **high**, and relevance of design is **substantial**. The first objective of reducing commercial losses and laying the foundation for the improvement of the financial viability in the electricity system in a socially responsible manner is rated **modest**. The key financial indicators for Barqi Tojik have deteriorated further since project completion while meeting social considerations caused by the low level of tariffs. The second objective of reducing commercial losses and laying the foundation for the improvement of financial viability in the gas systems in a socially responsible manner is rated **modest**, mainly because of the lack of activity stemming from the stoppage of imports from Uzbekistan since the end of 2012 until gas imports resumed to some extent in 2018. The third objective of viability assessment of Rogun HEP is rated **substantial** because of the successful completion of the techno-economic and environmental and social assessments, which the government has leveraged to raise finance for starting the project. Efficiency is rated **modest**. Overall project development outcome is rated **moderately unsatisfactory**.

## Risk to Development Outcome

The project development outcomes for Barqi Tojik and TTG face multiple risks regarding their financial viability, and the technical risks are low. Social considerations will need to be addressed systematically, when tariffs increase in the future. Maintaining the progress made so far on the Rogun HEP project depends on attracting the large scale of funding needed for the purpose.

**Financial Risk.** The financial risk is high for Barqi Tojik based on its deteriorating financial indicators since project completion. Improving billing and collection levels could help the financial situation to some extent, but tariff levels remain below cost recovery levels, and the political economy surrounding this issue makes it difficult to implement tariff increases. Operating costs, including costs of fuel for thermal plants, have been rising. TTG made good progress in improving its financial viability until 2012, when gas imports from Uzbekistan stopped. Afterward, TTG's financial situation deteriorated substantially. Progress toward reaching financial viability will depend on a

solution to restoring TTG's operations and raising tariffs progressively to cost recovery levels. For TTG, the risk remains high pending a resolution of the current situation regarding gas imports.

**Technical Risk.** The technical risk is assessed as **low**. Regarding the metering component, all the technologies introduced under the electricity and gas components are well established. Barqi Tojik and TTG have substantial experience in operating electric power and gas systems, respectively.

**Social Considerations.** As tariffs increase in the future, options for differential tariffs and targeted subsidies will need to be carefully designed and implemented for low-income and vulnerable beneficiaries, based on analytical work already prepared by the World Bank. The Donor Coordination Council is pursuing this matter, among other issues.

**Rogun HEP.** Tajikistan has begun work on the 3,600-megawatt Rogun HEP, with funding from a \$500 million Eurobond in September 2017 and its own budget resources. The first two of six turbines were commissioned as of the end of 2019. However, there is uncertainty in raising funds to keep up the project's pace. The World Bank has not committed any funds to Rogun.

Overall, the risk to development outcome is rated **high**.

## **Bank Performance**

### **Quality at Entry**

The project's design benefited from prior technical assistance from the World Bank to the government for preparing a development strategy for the energy sector, an energy utility reform review, and a regional electricity export potential study in Central Asia. The energy sector strategy was prepared in collaboration with Asian Development Bank, which was the leading lender to the sector at the time, and the International Monetary Fund, which was addressing quasi-fiscal deficits in the energy sector.

The World Bank conducted extensive assessments of Barqi Tojik and TTG regarding their commercial and financial operations, deriving useful analytical conclusions and performance indicators, including baseline values. However, the baseline values for some of the projected indicators needed to be updated and modified during project restructurings.

Several risks associated with the project were appropriately identified as relating to timely implementation of adequate electricity tariff adjustments; timely and adequate payments of dues by TALCO, other state-owned enterprises, and budget organizations;

and procurement and contracting risks. Institutional issues, including the envisioned implementation arrangements, were analyzed adequately, although in retrospect, there was some overestimation of the implementing agencies' capacity to overcome the identified risks. Environmental, social, and safeguard policies were treated adequately. The project design included measures to mitigate these risks based on experience gained from the World Bank's earlier and ongoing operations and sector work in Tajikistan. Despite this, the risks materialized to different extents during implementation.

However, the risk analysis did not anticipate or address uncertainties arising from Tajikistan's near total dependence on Uzbekistan for natural gas imports. The Project Appraisal Document did not contain any discussion of risks facing the gas sector, especially uncertainties in the import of natural gas from Uzbekistan or any mitigating measures. This is a glaring omission given that periodic disruptions in gas supplies from Uzbekistan to Tajikistan appear to have been well known at the time.

Overall, the World Bank's quality at entry is rated **moderately unsatisfactory**.

## Supervision

Project supervision was carried out regularly, usually in conjunction with supervision of the Energy Emergency Recovery Assistance Project until its closure, and 48 supervision missions were conducted, the frequency of which increased after the addition of the Rogun studies. Therefore, the Rogun studies received a relatively greater share of attention. The supervision teams had a good mix of staff from the World Bank headquarters and the Dushanbe office and included specialized consultants, especially for the Rogun studies.

The World Bank anticipated riparian concerns about the Rogun HEP assessment process that could exacerbate regional tensions and impede or delay the studies, posing a reputational risk for the World Bank and to regional stability more broadly. The government and the World Bank agreed to mitigation measures to assure stakeholders in Tajikistan and the region that the World Bank was committed to following international standards in the assessment process. These risk-mitigation measures were well considered and proved effective, as discussed in this report's Efficacy section.

There were several shortcomings during supervision. First, even as signs of uncertainties in gas imports increased during implementation, supervision documents did not reflect any need for supporting Tajikistan in revisiting strategy for the gas subsector in the context of overall energy sector strategy. Second, during implementation, the project task team missed the opportunity to restructure the components related to gas sector metering and billing, resulting in unproductive assets and training. Third, although the World Bank's team attempted to salvage the automated SAP billing systems for the

electricity and gas utilities (that SECO financed in parallel), they were unable to help make the systems operational.

The fiduciary specialists (procurement and financial management) communicated regularly with the implementing agencies to help resolve issues in procurement and implementing the FMIP. However, progress in these areas was slower than targeted, mainly because of weaknesses in the overall financial management of state-owned enterprises that capacity constraints and political economy conditions exacerbated.

The project did not have a separate Mid-Term Review because project reviews were undertaken for the restructuring and additional financing in 2011 and 2012.

The quality of supervision is rated **unsatisfactory**.

Based on a moderately unsatisfactory rating for quality at entry and unsatisfactory rating for supervision, the overall Bank performance is rated **unsatisfactory**.

## **Borrower Performance**

### **Government Performance**

The government remained committed to the project throughout and provided support and funds as needed. During project preparation, the government worked with the World Bank to prepare a development strategy for the energy sector that was incorporated in a Letter of Energy Sector Development Strategy. The government attempted to improve the situation in the electricity and gas sectors, including starting to gradually increase electricity tariffs and obtaining agreement from TALCO (the largest consumer of electricity in Tajikistan) to start paying its bills on time and in full. However, it could not make appreciable progress on either of these, resulting in little progress in improving financial viability.

The government took a number of supporting and facilitating actions for the preparation of the Rogun assessment studies, including proactive management of the studies by the World Bank and increasing budget allocations for the two studies based on the panel of experts' recommendations.

Government performance is rated **moderately unsatisfactory**.

### **Implementing Agencies Performance**

The implementing agency at project effectiveness in December 2005 was the Technical Support Group, housed in the Ministry of Finance. Three months later, Barqi Tojik and TTG were designated as the implementing agencies considering their specific expertise in dealing with the project's technical aspects. Barqi Tojik was responsible for

implementation of the electricity component and later for the Rogun studies component, with support on the technical aspects of the studies from the project management group set up by the government. TTG was responsible for the gas component.

Initial shortcomings in procurement caused by Barqi Tojik and TTG's lack of experience were progressively resolved by 2010. After some delays related to procurement and installation in the early years of project implementation, both Barqi Tojik and TTG significantly improved their procurement capability and completed the installation of the planned number of meters by project completion. However, occasionally, the inadequate pool of skilled persons in the country and turnover of trained personnel continued to affect the implementing agencies' capacity. For Barqi Tojik, project management capacities were stretched regarding the Rogun assessment studies until supplemented by resources through additional technical assistance.

Barqi Tojik and TTG officials noted the value added for their capacity from the exposure they received from working on the project and study tours. The successful management of large contracts for the techno-economic assessment study and environmental and social impact assessments for the Rogun HEP was a significant aspect of improved capacity in Barqi Tojik. Experience obtained under this project has also been helpful in working on projects funded by other donors such as European Bank for Reconstruction and Development and Asian Development Bank.

For TTG, the rate of progress in implementing its component and securing the planned outputs and outcomes was advancing well until the stoppage of gas imports from Uzbekistan since the end of 2012 affected its operations severely.

Overall, the implementing agencies' performance is rated **moderately satisfactory**.

Based on the moderately unsatisfactory performance rating for the government and moderately satisfactory rating for the implementing agencies, the overall borrower performance is rated as **moderately unsatisfactory**.

## Monitoring and Evaluation

**Monitoring and evaluation (M&E) design.** The monitoring indicators selected at project appraisal were relevant to the achievement of the original project development objectives. These included unaccounted-for electricity and gas, posted electricity tariff, and collections in cash as a percentage of billed consumption for both gas and electricity. After additional financing, electricity billed in Dushanbe was added as an intermediate outcome. During implementation, the original baselines set for some indicators (reduction in unaccounted-for losses and collections in cash against billed amounts) were updated after equipment used for generating this information was installed.

Additionally, the indicator for contribution to investment was dropped for both Barqi Tojik and TTG because of reduced relevance, and a new indicator (short-term cost recovery) was added for Barqi Tojik as a covenant.

With the addition of the Rogun HEP assessment studies as a project component, a monitoring mechanism was introduced at the Rogun HEP site to assure stakeholders that no new construction would take place until the studies and public consultations were completed in riparian countries. This mechanism included agreement between the government and the World Bank on a schedule of acceptable safety measures and expenditures that the implementing agencies summarized in monthly reports and World Bank experts monitored through on-site inspection.

**M&E implementation.** Barqi Tojik and TTG provided quarterly progress reports until, for TTG, M&E progressively declined after the stoppage of gas imports at the end of 2012. Initially, there were substantial weaknesses in both the timeliness and quality of the reporting. With the feedback and advice of the supervision team, both the quality and the timeliness of reporting improved over time, though there were some weaknesses at project closing in the completeness and consistency of information for cumulative project costs and financing.

Regarding the Rogun studies, monthly reports by the implementing agencies and monitoring through on-site inspection by World Bank experts achieved compliance with the schedule of acceptable safety measures and expenditures.

After completion of the Energy Loss Reduction Project, M&E of Barqi Tojik's performance is being done on a continuous basis through the donor coordination committee.

**M&E use.** Reporting on the performance indicators was used during project supervision to identify bottlenecks and discuss remedial actions. Cost savings identified in different components were reallocated to other essential items. Information from the M&E system, such as for short-term cost recovery for Barqi Tojik, was used to monitor compliance with covenants.

For the Rogun HEP studies, the World Bank's involvement helped ensure that the consultation process among the principal stakeholders—including the government, riparian states, consultants, a panel of experts, and the World Bank—was completed effectively, and the study reports were delivered in a timely manner.

The project's M&E is rated **substantial**.

## References

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<sup>1</sup> These studies were Fields and others (2012), World Bank (2014), and others under the Central Asia Energy Water Development Program that included "A Study on Tajikistan: Long Term Sustainable Energy Sector Strategy and Continuing Role of CAEDWP" (December 2014).

<sup>2</sup> Among the covenants that were eliminated, the covenant relating to "financing of annual capital expenditure from its own resources" could not be met, being attributed to "diverse changes in its business conditions." Furthermore, the covenant relating to "contribution to investment" was dropped because of difficulties in reliably estimating the indicator set at appraisal.

# **Appendix B. Fiduciary and Safeguards Aspects; Project Data**

## **Fiduciary and Safeguards Aspects**

### **Financial Management**

Financial management was an issue for a substantial part of the implementation period, particularly for Barqi Tojik, because of delayed audit reports (particularly entity audits), insufficient progress in addressing issues agreed to be resolved under the financial management improvement plan, deficiencies in the periodic financial management reporting, quantum of work involved because of dispersed subsidiaries, and turnover of trained staff. Although the quality of progress reporting and financial management reports improved over time, there were still deficiencies in reporting and in timely submission of reports.

### **Procurement**

**Procurement.** Procurement-related actions, such as preparation of bid documents, bid evaluation, contract negotiation, and signing, contributed to delays in implementation in the project's early years, caused partly by Barqi Tojik and Tajiktransgas' lack of experience with the World Bank's procurement procedures. For Barqi Tojik, a supply and install joint contract was broken up after criticism from bidders. The project engaged the services of a procurement specialist to help Barqi Tojik with procurement implementation, which helped improve the preparation and execution times. Ultimately, procurement under the project was performed in accordance with the World Bank's procurement and consultant guidelines, and standard bidding documents were used. For the Swiss Development Cooperation Office grant that provided direct financing, procurement was tied to Swiss sources. There were some delays in procurement that were progressively resolved with the help of technical assistance provided under the project.

### **Environmental and Social Safeguards**

The rating for environmental and social safeguards was satisfactory over the project implementation period. The recipient and the implementing agencies complied with the agreed safeguard policies under the original grant and the additional financing.

Originally, the project received an environmental category B (limited assessment) because no new installations were planned, and any impacts were largely temporary, localized, and restricted to the sites of the existing energy infrastructure. Under the

additional financing, the environmental category changed to A to reflect the potential impacts of the proposed Rogun Hydroelectric Project (HEP), for which assessment studies were undertaken under the project. The International Development Association credit, additional financing grant, and the Swiss Development Cooperation Office grant did not fund any construction activities relating to Rogun HEP under the project.

During project implementation, the Inspection Panel received a request from an environmental interest group in Uzbekistan that raised concerns about the downstream impacts of the construction, operation, and possible failure of the proposed Rogun HEP project. The Inspection Panel decided not to pursue the case, noting that the World Bank was not financing construction of a project but examining many of the same concerns the applicants raised. The Inspection Panel also observed that World Bank management had integrated feedback from consultations with riparian states into the terms of reference for the studies.

## Electricity Loss Reduction Project (P089244; IDA-40930, IDA-H1780, IDA-H7570, TF-96573)

**Table B.1. Key Project Data**

Financing	Appraisal Estimate (\$, millions)	Actual or Current	
		Estimate (\$, millions)	Actual as Percent of Appraisal Estimate
Total project costs	30.00	44.41	93
Loan amount	17.90	32.92	92
Cofinancing	n.a.	n.a.	n.a.
Cancelation	n.a.	n.a.	n.a.

**Table B.2. Cumulative Estimated and Actual Disbursements  
(\$, millions)**

Disbursements	FY06	FY07	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15
Annual	n.a.	2.07	5.63	5.37	1.11	2.12	1.69	2.94	4.24	3.23
Cumulative	0	2.07	7.70	13.07	14.18	16.30	17.99	20.93	25.17	28.40
Date of final disbursement: December 19, 2014										

**Table B.3. Project Dates**

Event	Original	Actual
Concept review	n.a.	12/16/2004
Board approval	n.a.	06/30/2005

**Table B.4. Original and Revised Project Components**

<b>Component</b>	<b>Original</b>	<b>Additions and Revisions</b>
Electricity subsector	160,000 electricity meters and related equipment for consumers in the Dushanbe Electricity Network; Automated billing systems for the Dushanbe Electricity Network; <i>and</i> Technical assistance to Barqi Tojik for engineering, management and supervision, financial management improvement program and independent auditing, industry-standard electricity exports contract, and financial and legal advisory services for hydropower plants for electricity exports	Quantity of electricity meters increased to 170,000
Gas subsector	160,000 gas meters and related materials; Laboratories for gas meter calibration, testing, and quality control; automated billing systems for Tajiktransgas; <i>and</i> Technical assistance to Tajiktransgas for engineering, management and supervision; financial management improvement program and independent auditing; and industry-standard gas imports agreement	Additional bulk meters, laboratory equipment, and chromatographs; Industry-standard gas import agreement was dropped
Sectorwide technical assistance	Electricity and gas tariff policies, social protection policies for energy reforms; Monitoring and evaluation for performance of Barqi Tojik and Tajiktransgas; <i>and</i> Streamlining interaction between energy consumers and borrower's agencies involved in technical and economic regulation of energy supply	Rogun Hydroelectric Project assessment studies: techno-economic assessment study, environmental and social impacts assessment

## Appendix C. Residential and Commercial Electricity Meters

The Independent Evaluation Group examined some randomly selected residential, commercial, and exterior locations in Dushanbe and found that that electricity meters installed during the Energy Loss Reduction Project are in good condition and working order. Photo C.1, panels a–c, shows some of the meters.

Figure C.1. Electricity Meters Installed during the Energy Loss Reduction Project

a. Panel title



c. Panel title



d. Panel title



Source: Independent Evaluation Group.

## Appendix D. World Bank Support for the Energy Sector in Tajikistan

Table D.1. World Bank Projects in the Energy Sector in Tajikistan

Project ID and Name	Objective	Duration (FY)	Project Cost (\$, millions)	Rating (closed projects)
<b>P075256:</b> Pamir Private Power Project	Through private sector involvement, to improve the reliability and enhance the quantity of supply of electricity in the Gorno-Badakhshan Autonomous Oblast region in a financially, environmentally, and socially sustainable way	2002–11	31	Satisfactory
<b>P074889:</b> Programmatic Development Policy Grant	To improve the environment for private sector development and to improve overall functioning of the public sector and the delivery of key public services	2006–7	10	Satisfactory
<b>P110555:</b> Energy Emergency Project	Urgently increase the volume and reliability of the national energy supply, especially in the winter season, by supporting the implementation of the recipient's Energy Emergency Mitigation Plan	2008–13	21	Moderately satisfactory
<b>P126042:</b> Tajikistan Programmatic Development Policy Grant 6	To protect basic services within a sustainable fiscal framework and to lay the foundation for postcrisis recovery and growth	2010–11	20	Moderately satisfactory
<b>P145054:</b> Central Asia-South Asia Regional Electricity and Trade Project (CASA-1000)	To create the conditions for sustainable electricity trade between the Central Asian countries of Tajikistan and the Kyrgyz Republic and the South Asian countries of Afghanistan and Pakistan	2014–23	591	n.a.
<b>P150816:</b> Nurek Hydropower Rehabilitation Project Phase I	To rehabilitate and restore the generating capacity of three power-generating units of Nurek Hydropower Plant, improve their efficiency, and strengthen the safety of the Nurek dam	2018–24	350	n.a.
<b>P165313:</b> CASA-1000 Community Support Project for Tajikistan	To increase the quality of and access to energy, social, and economic infrastructure services, and to contribute to the strengthening of local governance in communities in the project area	2019–23	26	n.a.

Note: CASA-1000 = Central Asia-South Asia Regional Electricity and Trade Project; FY = fiscal year; n.a.= not applicable.

## **Appendix E. Methods and Evidence**

This report is a Project Performance Assessment Report. This instrument and its methodology are described at <https://ieg.worldbankgroup.org/methodology/PPAR>.

## **Appendix F. List of Persons Met**

### **Government of Tajikistan and Energy Utilities Officials**

Mr. Jamshed Shoimzoda, Deputy Minister, Ministry of Energy and Water Resources

Parviz Atoev, Head of International Relations, Ministry of Energy and Water Resources

Mr. Asozoda Mahmaddumar, Deputy Chairman, Barqi Tojik

Mr. Ubaydullo Habibov, Head of Project Implementation Unit, Barqi Tojik

Mr. Khol Karim Ibrohim, General Director, Tajiktransgas

Mr. Pulod Mukhitdinov, Head of Rogun Project Management Group

Mr. Manucher Jalilzoda, Chairman of the Resettlement Unit

Mr. Rustam Saidzoda, Deputy Chairman of the Resettlement Unit

### **Multilateral and Bilateral Agencies**

Mr. Shuhrat Khojaev, Project Officer, Asian Development Bank

Mr. Jamshed Rahmonberdiev, European Bank for Reconstruction and Development

Mr. Ruslan Sadykov, Senior National Program Officer, Infrastructure: Swiss Cooperation Officer and Consular Agency

Mr. Makhmadamin Aminov, former Director, Project Management Unit

### **World Bank**

Arthur Kochnakyan, Senior Energy Specialist

Yuriy Myroshnychenko, Senior Energy Specialist

Takhmina Mukhamedova, former Senior Energy Specialist

Jan-Peter Olters, Country Manager, Tajikistan

Raghuveer Sharma, retired Chief Investment Officer, International Finance Corporation and Task Team Leader at project appraisal

## Appendix G. Borrower Comments

OJSHC “Barqi Tojik” comments on behalf of the Government:

“Tajikistan—Energy Loss Reduction Project” performance assessment report

June 30, 2020

Having reviewed the performance assessment report for the Tajikistan Energy Loss Reduction Project (ELRP), it should be mentioned that that the report covers and describes in detail all the components of the ELRP. In general, the findings of the Independent Evaluation Group are clear, however, we do not completely agree with the project evaluation since the analysis does not take into account some important aspects:

1. **Electricity metering.** The problem of electricity losses was partially addressed by replacing meters and introducing an adequate billing system. The meter only serves as a tool for measuring the consumed electricity, and acts as a device for determining areas where losses exceed established norms. For instance, the installation of active-reactive power meters for all subscribers authorized to connect to power grids with a capacity of over 60 kW [kilowatts] showed that the reactive energy used by these subscribers is above normal, which ultimately leads to large losses of electricity. The installation of electronic electric meters for subscribers, as well as at substations and transformer stations, gives the possibility for electric grids to make up a balance for the electricity supplied from the substation to the transformer station, and then to the subscribers. In general, we find the results of the metering component as overall satisfactory considering that without ELRP metering component, the losses would have been substantially higher. Moreover, you need to take into account that the power sector at the time of implementation of ELRP has been struggling with several major issues related to ensuring reliable electricity supply to consumers, considering the severe winter energy shortages, and that has required certain power dispatch solutions, which were not optimal and have resulted in larger losses.

2. **Gas metering component.** We disagree with the conclusion that the expenditures on the gas metering component can be considered as nonproductive and project design should have been changed because disruption in gas supply from Uzbekistan was predictable. Please note that Uzbekistan has been a reliable supplier for several years. The issues with disruption were nontechnical and were caused by political factors due to complicated relationship between countries starting from 2010. Until then, the implementation of the gas metering component was mostly completed and the Government could not react to those changes by changing the project design. Moreover, the ELRP could not have impacted decisions by Uzbekistan because those were beyond the Project's control.
3. **Electricity tariffs.** The authorities made progress with increasing of tariffs despite the fact that the final target was not achieved. You need to take into account that the earlier specified multiple/percent of tariff increase would have been achieved if the computation was done in Tajik somoni (TJS) versus US\$. The reason is that TJS depreciated against US\$ during implementation of the ELRP. That leads to lower US\$ tariffs even if local currency denominated tariffs were increasing.
4. **FMIP [financial management improvement plan].** Despite all challenges faced during implementation of this component, as the years went by, we may state with the high level of confidence that the funds spent on this Component were reasonably used. Currently, BT employs specialists who are well acquainted with IFRS and the fact that over the past 5 years, international independent auditors based on the results of the audit of BT's financial statements are issuing an opinion, is an unconditional legacy of the project.
5. It should be noted that the ELRP was new to the newly-created implementing agencies, and the Borrower did not have adequate experience, which led to certain delays at the initial stage of the Project; however, thanks to the coordinated actions of the Borrower, the [World] Bank Team and IAs, the Project was implemented in successful manner.

Because of the Project, via various trainings and workshop, the BT [Barqi Tojik] personnel has enhanced their capacity in the field of financial management; training subcomponent also covered technical personnel. Within the framework of the project, a Project Realization Group was established under BT, which currently successfully implements such strategic projects as "Rehabilitation of the Nurek HPP Phase-1 (WB, AIBB and EaDB)" and "Rehabilitation of the Kairakkum HPP (EBRD)."

Based on the experience acquired through the ELRP, a similar project was successfully implemented in Khujand city (the second largest city of the country).

Taking into account all the above factors, from our point of view, ELRP should be evaluated as moderately satisfactory given the financial capabilities.