ASSESSMENT OF THE ENERGY SECTOR

A. Introduction

1. The objective of this evaluation report is to provide an independent assessment of Asian Development Bank (ADB) assistance to the energy sector in Tajikistan for the country assistance program evaluation (CAPE) period from August 1998 to October 2013 and to identify areas for improving the effectiveness of ADB’s interventions. The sector assistance program evaluation was conducted by ADB’s Independent Evaluation Department (IED). In conducting its analysis, it reviewed all the ADB loan, grant, and technical assistance (TA) projects undertaken during the period, as well as the lessons learned. The findings fed into the broader CAPE for Tajikistan. In attempting to determine ADB’s contribution in the country’s energy sector, the evaluation identified issues and lessons for consideration in the preparation of the next country partnership strategy (CPS). The evaluation drew on a combination of interviews, field visits, desk reviews, project documents, and primary data collection.

B. Sector Context

1. Electricity Sector in Tajikistan

2. Tajikistan has an abundance of hydropower resources and hydropower plants (HPPs) generate about 98% of all electricity in the country. The current installed capacity in the country is about 5,055 megawatts (MW), though many of the HPPs and the two thermal power plants are in dire need of rehabilitation and the capacity of many power stations has been derated.\(^1\) It is estimated that the effective available capacity of power generation facilities in Tajikistan as of 2012 was about 2,306 MW.\(^2\)

3. The electricity demand in the country had been rising with relatively strong economic growth. It peaked at about 17,340 gigawatt-hours (GWh) in 2007 before declining due to the global financial crisis. In 2012, Tajikistan’s power generation facilities, which include new HPPs Sangtuda 1 and 2, generated about 16,739 GWh after accounting for captive consumption at the generation facilities. The country also imported about 114 GWh from the Kyrgyz Republic and exported about 775 GWh to Afghanistan, Kazakhstan, and the Kyrgyz Republic. Net electricity entered in the Tajikistan power system in 2012 was about 16,078 GWh. The residential sector is the largest power consumers in the country accounting for some 44%, but aluminum smelting plant, TALCO, is a closed second, at 44%.

4. The power generation from HPPs is however very much dependent on water flows in the country’s major rivers, which declines sharply in cold winter months when water flow is low. It is estimated that winter hydrological conditions reduce generation capacity by about 1,250 MW.\(^3\) This resulted in a generation deficit of about 3,100 GWh, which is estimated to lead to an unmet demand for electricity of about 2,700 GWh or 24% of winter demand after accounting for system losses.\(^4\) It is estimated that in winter, energy generation is about 70% of the energy generated in summer. This causes substantial hardship on Tajikistan’s people, which predominantly depends on electricity to meet heating needs. The country’s economy suffers too and it is estimated by the World Bank that the winter shortage leads to an economic loss of some $200 million per year, which is about 3% of the gross domestic product (GDP). On the other hand, the Tajik power system generates excess power in summer

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\(^1\) This installed capacity comes from eight large plants, several smaller hydropower facilities (4,737 MW), and two fossil-fuel-fired combined heat and power plants (318 MW).


\(^4\) Barki Tojik’s total losses for the transmission and distribution system were estimated to be 22% (footnote 2).
because of high water flows and while some power is exported to Afghanistan and the Kyrgyz Republic, water is frequently spilled from reservoirs.

5. The government aims to increase electricity generation in winter by (i) developing new HPPs; (ii) rehabilitating and upgrading the existing schemes; and (iii) reducing technical, transmission, and distribution losses while seeking new power markets for exporting its surplus energy in summer.

a. Electricity Demand Forecasts and Planning

6. Demand for electricity is increasing in Tajikistan along with economic growth, but reliable forecasts are not available from Barki Tojik, the state-owned national electric utility. The World Bank has estimated that peak demand for electricity will increase from 3,500 MW in 2012 to 4,710 MW by 2020 and the winter energy demand will grow from 11,213 GWh to 15,181 GWh during the same period, and the winter energy deficit is estimated to be 6,800 GWh if no measures are taken to improve the situation.

7. An electricity master plan prepared under the Central Asia Regional Economic Cooperation (CAREC) forecasts much more modest growth in electricity demand and estimates peak demand to rise from 3,330 MW in 2011 to 3,775 MW in 2020 and 4,416 MW in 2030 (footnote 4). The study also forecasts total electricity demand in 2020 to be 20,831 GWh. This forecast appears to be very conservative about the economic growth prospects of the country.

8. The disparity is that these projections is in part due to the apparent lack of master plan for the development of the electricity sector in Tajikistan. This is needed to systematically examine generation, transmission and distribution expansion needs and options to meet important goals such as increasing energy security, reducing winter electricity deficit, maximizing exports of surplus power, and increased regional power trade. Barki Tojik and the Ministry of Energy and Water Resources (MEWR) principally plan for the electricity sector by identifying priority projects such as rehabilitation of generation and transmission assets. While this patchwork approach can be successful in ensuring that the system does not breakdown, but no attempt to prioritize projects based on an analysis of costs and benefits to achieve different strategy objectives.

9. The long-run average incremental cost (LRAIC) of generation and capacity is not used as a guide to prioritize investment decisions. The World Bank has estimated the LRAIC of generation to be €11.7 per kilowatt-hour (kWh) without electricity exports and €10.4/kWh with electricity exports. This is very significantly higher than the average tariff in the country of about €2.25/kWh. The LRAIC for generation capacity has been estimated to be $2,000 per kilowatt (kW).

b. Aging Infrastructure and its Rehabilitation

10. Much of the infrastructure in the electricity sector in Tajikistan was installed in the Soviet era and though significant efforts have been made over the past 15 years to rehabilitate old facilities and build new infrastructure, it is estimated that about 74% of generation assets are over 30 years old and are in urgent need for rehabilitation. This could have serious implications for the future of the power sector in the country. The CAREC master plan estimated that investments of about $1.29 billion would be needed during the 10-year 2013–2022 period to rehabilitate the country’s existing HPPs.

11. The World Bank estimated that much of the HPPs have been in operation for 45–50 years without major rehabilitation and recognized that the government should prioritize the rehabilitation of these assets to ensure energy security. The World Bank estimates that about 60% of HPPs need to be rehabilitated by 2020 (at a cost of some $1.1 billion) and 80% of assets by 2030. Without this

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rehabilitation, the available capacity could drop from 2,100 MW to 760 MW by 2030. The rehabilitation of HPPs thus appears to be a clear and urgent priority for the Government of Tajikistan and for the development partners supporting the government.

2. **Regional Cooperation in Energy**

12. The electricity sector in Tajikistan was under the Soviet era an integral part of the Central Asia Power System (CAPS), which up till the year 2000 was in synchronized operation with the Integrated Power System/Unified Power System of Russia. HPPs were designed to generate power in excess of demand in the summer to meet regional electricity needs of the integrated system and thermal plants in Uzbekistan and Turkmenistan supplied winter power. The HPPs in Tajikistan were used for frequency regulation and to supply peak load. This system remained in place even after the breakup of the Soviet Union but started to get frayed due to various reasons. By 2010, Tajikistan was out of the CAPS. This has put a substantial burden on Tajikistan and has left it to deal with the difficult problem of power shortages in winter and surpluses in summer (para. 4).

13. **Export of surplus power.** On average, Tajikistan reportedly has a surplus of some 4,200 GWh in summer. A portion of this is being exported to neighboring countries but given the lack of adequate markets, water is routinely spilled at the reservoirs.

14. Tajikistan reported summer electricity sales to the Kyrgyz Republic (167 GWh), Kazakhstan (14 GWh), and Afghanistan (594 GWh) in 2012. The transmission links to Kazakhstan and the Kyrgyz Republic are older links established when Tajikistan was a part of the CAPS.

15. The country has a power purchase agreement with Afghanistan for the supply of firm power during summer via a new 600 MW double circuit 220-kilovolt (kV) transmission line built during 2009–2010 with ADB support. The new line links the Sangtuda 1 HPP with substations in Afghanistan. Tajikistan also has an older 110-kV transmission link through which it can export surplus power to Afghanistan.

16. The export of surplus power does not place a burden on the peak load and can be readily met in the summer months when water flows are high and the HPPs were originally designed with higher capacity than required to meet the summer electricity demand of Tajikistan.

17. ADB has supported regional projects including the Regional Power Transmission Interconnection Project which constructed a 220 kV transmission line between Tajikistan and Afghanistan to enable export of up to 600 MW of surplus power in summer. ADB also agreed to finance a transmission link between Tajikistan and Uzbekistan, but this was later cancelled since the two countries could not reach on a power trade agreement. ADB’s ongoing Regional Power Transmission Project supports interchange of power with Afghanistan, the Kyrgyz Republic and Uzbekistan.

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6 The CAPS was originally design in the 1970’s and connected the former Soviet Union republics of Kazakhstan, the Kyrgyz Republic, Tajikistan, Uzbekistan, and Turkmenistan.

7 Including about 2,700 GWh surplus power from Sangtuda-I HPP. ADB. 2006. Report and Recommendation of the President to the Board of Directors: Proposed Loans, Technical Assistance Grants, and Administration of Loan by the OPEC Fund for International Development to Afghanistan and Tajikistan for the Regional Power Transmission Interconnection Project. Manila (Loans 2303–2304).


10 Footnote 7; ADB. 2002. Report and Recommendation of the President to the Board of Directors: Proposed Loans to Tajikistan and Uzbekistan for the Regional Power Transmission Modernization Project. Manila (Loan 1977); ADB. 2010. Report and Recommendation of the President to the Board of Directors: Proposed Grant to Tajikistan for the Regional Power Transmission Project. Manila (Grant 0213).
18. Regional trade in energy is very much consistent with the objectives of the CAREC program, which development partners including the ADB support.

3. Institutional Arrangements

19. There are several institutions involved with electricity sector in Tajikistan. The Department of Industry and Energy in the President’s office is the nodal agency responsible for overall policy guidance and planning for the energy sector in the country. MEWR is the principal policy making institution for the energy sector and has oversight over the public electric utility, Barki Tojik. The Ministry of Economic Development and Trade develops investment plans for the energy sector in coordination with the MEWR and Barki Tojik. The Anti-monopoly Committee is the de-facto regulator for the electricity sector and reviews and approves tariffs in consultation with the MEWR and the Department of Industry and Energy in the President’s office.

20. The implementing agency in the electricity sector is Barki Tojik, a vertically integrated state owned enterprise (SOE) which is responsible for generation, transmission, distribution and retail sales of electricity in the country.

21. In addition to Barki Tojik there are two major generation companies—Sangtuda 1 which is a joint venture collaboration of Government of Tajikistan with the Government of the Russian Federation and RAO Unified Energy System of Russia; and Sangtuda 2, with the Government of Iran. These companies sell their entire generation to Barki Tojik under the terms of a power purchase agreement.

4. Barki Tojik, the Electric Utility

22. Barki Tojik has a good technical skills among its staff but suffers from weak operational and financial management systems and a worsening financial position. This severely impacts its ability to undertake its critical functions of planning, implementing, and supplying good quality reliable power to the consumers of Tajikistan. A 2013 ADB review of Barki Tojik conducted under sector operational performance improvement program of the Regional Power Transmission Project, has made a bleak assessment of the utility and identified several critical weaknesses (footnote 2). These related to the organizational structure, the financial reporting systems, the accounting systems and its audit, the utility’s debts, the metering billing and collections system, the commercial and technical losses, business planning process, management information systems, and its human resources management.

a. Commercialization of Barki Tojik

23. The ADB review report indicated that a restructuring of Barki Tojik called for in a 2011 government decree was not on track and the actions that had been taken in support of this had not been effective. This was despite the support of many TA programs of the ADB and other developmental partners. The principal objective of the long-term restructuring plan adopted in 2011 was to undertake a commercialization process to create functional business units with independent charge of generation, transmission and distribution functions, improve accountability, efficiency, and transparency in Barki Tojik.12

24. The report showed that there is a need to reinforce the objectives of restructuring and commercializing the utility such that it can manage its operations and improve its financial

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performance. The commercialization was planned as a pre-cursor to the eventual unbundling of the presently vertically integrated utility and perhaps leading to even partial or full privatization of some or all business units. But the Tajikistan Final Assessment Report indicates that the utility is far from achieving the objective of creating fiscally independent business units with strong financial and management accounting systems.

25. A principal challenge for Barki Tojik to achieve functional unbundling of business units is the lack of separation of accounts especially for the transmission and distribution functions. Generation functions are more distinct since the power plants maintain their own books. The World Bank's ongoing project for loss reduction at Barki Tojik will help address some of the issues by identifying fixed assets at Barki Tojik, which will be a first step towards separation of accounts for the business units.

b. Accounting System at Barki Tojik

26. Despite past efforts to introduce international accounting standards (IAS) at the utility, Barki Tojik has not yet fully adopted IAS and external auditors have not provided an opinion on the accounts due to lack of adequate and reliable data and information. This is concerning since Barki Tojik has been supported for the past several years to introduce IAS including through grant TA projects funded by the ADB. The ADB assessment report found that there is inadequate documentation and controls for internal controls and the utility has failed to effectively introduce International Financial Reporting Systems (IFRS) and train its accounting staff, though some progress has been made, as acknowledged even by Deloitte, the external auditors to the firm hired by the World Bank. It is now reported that Barki Tojik will introduce IFRS by the end of December 2014.

c. Tariffs and Revenue Collections at Barki Tojik

27. Tariffs in Tajikistan have been historically low and were initially designed during the Soviet era when individual utilities did not have to be financially viable business units. Tajikistan remains one of the poorest countries in the Central Asian region and there has been a reluctance to increase tariffs on relatively poor customers who rely on electricity to meet their primary energy needs. Tariffs increased by 44% in 2009 and 21% in 2010. This improved the operating revenues of Barki Tojik and even led to an operating profit for 2010 (footnote 11). This however has not sustained and there were operating losses in 2011 due to higher costs.

28. Tariffs were last increased in April 2012 by 22% for general consumers and by 25% for TALCO, the aluminum smelting company. The impact on the operating revenues and profits can only be determined when audited statements become available.

29. The rate of collections has also been low with significant arrears due to past non-payment by TALCO. Since TALCO is also a SOE, the government makes book transactions to offset receivables from SOEs against taxes payable by Barki Tojik and its debt to the generation companies Sangtuda 1 and Sangtuda 2. This further weakens the cash position of Barki Tojik.

30. Barki Tojik is also unable to prepare aging analysis on its receivables due to a weak billing system and perhaps due to a practice of overstating receivables in favor of reporting higher technical and commercial losses. The poor collections rate was estimated to be about 50% in 2011, even excluding TALCO arrears. This forces the utility to rely on the government support, high interest

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13 The 2013 assessment report said, “Although Talco had an excellent payment history in 2011, its payments during the first half of 2012 paled in comparison, probably due to the seasonality of its operations. (Barki Tojik’s) accountants report that the receivable from Talco as of 31st December 2011 amounted to 31.3 million Somoni which comprises of receivables of 151.6 million Somoni at the beginning of the year, plus billings of 419.4 million Somoni, less payments of 539.7 million Somoni. It should be noted however that the payments included 143.7 million Somoni in offsetting settlements and therefore (Barki Tojik) only received 396 million Somoni in cash.”
working capital loans from Orienbank, grants and deferred loans from international finance institutions. The recent consultant assessment indicated that as of October 2012, Barki Tojik’s customers owed about $140 million, which is very significant, and Barki Tojik had no assessment of how much of the debt was collectible.

31. Barki Tojik faces many significant challenges to increasing tariffs and improving its revenue base. Barki Tojik prepares tariff applications on an ad hoc basis and submits applications to the anti-monopoly committee, which in turn reviews the applications and accepts or revises the tariff application based on various metrics of electricity sector operations. The final decision on tariffs is apparently however made by the energy and industry department at the President’s office and is not a transparent process. This is a major weakness in the tariff setting process which is not easily rectified given the lack of independence provided to line agencies, the need for social tariffs that are sensitive to the energy needs of a poor populace, and the prevalent political process.

5. Private Sector in the Electricity Sector of Tajikistan

32. Although the electricity sector in Tajikistan is dominated by state-owned facilities, the government of Tajikistan has developed the Sangtuda-1 HPP in a joint venture with the Government of the Russian Government and RAO Unified Energy System of Russia, the Russia utility, which have 75% share in the project with the remaining 25% owned by the Tajikistan Government. The government has also developed the Sangtuda-2 HPP with support from the Government of Iran and the north-south transmission link with support from the People’s Republic of China, but these are not privately owned facilities.

33. The only successful fully privately owned utility in Tajikistan is Pamir Energy, which has a concession from Barki Tojik to supply electricity to the Gorno-Badakshan Autonomous Oblast (GBAO), which is in the eastern region of the country and is not connected to the Barki Tojik grid due to its remotesness and high altitude terrain. Pamir Energy, is an affiliate of the Aga Khan Foundation for Economic Development, and was developed with the support of the World Bank, the Switzerland’s State Secretariat for Economic Affairs), and International Finance Corporation. Summary information on Pamir Energy is provided in Box 1.

**Box 1: Pamir Energy**

Pamir Energy is an innovative public private partnership between the Government of Tajikistan, Aga Khan Foundation for Economic Development, and the International Finance Corporation. The project was developed with an initial investment of $26.4 million to rehabilitate several hydropower plants and the transmission and distribution system and support the management of the power utility of the Gorno-Badakhshan Autonomous Oblast (GBAO).

Pamir Energy is set up as a special-purpose company and manages the 28 megawatts utility system in GBAO under a 25-year concession from Barki Tojik. Pamir Energy has introduced innovative utility management systems following best practice. The Swiss agency provides subsidies to make up the difference between the cost of supply and the government approved uniform retail tariff. The project has improved the living conditions of the very poor population of GBAO by providing reliable and sustainable access to electricity.

About 74% of Pamir Energy’s consumers receive uninterrupted power supply and the remaining 26% receive 8–16 hours of electricity all year round, including winter. Previously, consumers received electricity for only about 3 hours a day in winter. Pamir Energy has reduced losses from 39% in 2006 to 14% in 2012 and electricity sales have increased from 125,000 megawatt-hours in 2002 to 158,000 megawatt-hours in 2012. Collections have improved from 62% to 100%.

C. ADB’s Sector Strategies and Portfolio

34. ADB has developed three strategy documents for Tajikistan along with associated updates since 1998. Table 1 shows their principal focus in the energy sector. The strategies espoused in the documents are consistent in their approach to support reform of the electricity sector to help establish a functional and autonomous electric utility system, ensure sustainability through improved financial performance of the utility, rehabilitate the crumbling infrastructure and promote private sector participation and investments. The strategy for the period 2004–2008 emphasized assistance to increase exports of surplus electricity energy to central Asian countries as an avenue to improve the financial stability of the utility, but the strategy recognized that this would require establishing an efficient utility system based on transparent regulations, prudent pricing policies and modern infrastructure. The most recent CPS for the period 2010–1014 again focuses on rehabilitation, reform and regional cooperation in energy.

35. ADB’s strategies are consistent with the government’s own priorities and strategies, which are to promote economic growth and improve the living standard of the poor through structural reform of SOEs. The government’s poverty reduction strategies recognize that development of the energy sector requires institutional and economic reforms in the energy sector, reduction in losses, revision in tariffs, investment in rehabilitation of facilities, and more effective use of available resources and promotion of regional energy trade.

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<td>In the energy sector, the power subsector was the focus of assistance, and the strategy was to assist with sector reforms and rehabilitation of deteriorating energy infrastructure. The focus was on (i) establishing efficient policy and regulatory framework; (ii) fostering privatization and commercialization of energy focused SOEs; (iii) encouraging private sector involvement in energy production and delivery services; (iv) increasing funding by phasing out electricity subsidies, improving collection of electricity payments, and installing meters for all energy consumers; (v) rehabilitating existing infrastructure and improving maintenance operations; (vi) developing the necessary human skill; and (vii) strengthening government institutions to achieve good governance.</td>
<td>The goals of the strategy were to utilize the hydropower export potential, improve efficiency, and achieve financial sustainability to promote new investments in the sector. The strategy recognized that the prerequisites for viable cross-border energy trade included (i) a practical hydropower sector strategy; (ii) an unbundled efficient electricity industry; (iii) a transparent and credible regulatory framework; (iv) a nondiscriminatory pricing framework; and (v) modern infrastructure for transmission, distribution, metering, and settlement.</td>
<td>The strategy identified the following priorities: (i) rehabilitation of existing hydro-plants and transmission lines; (ii) construction of new, clean, and renewable energy plants; (iii) promotion of private sector participation, including PPPs; and (iv) support for institutional and tariff reforms.</td>
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The Asian Development Bank strategy is to target public and private sector investments, and promote capacity building, sector reform and regional cooperation in the framework of the CAREC program. The strategy recognizes that lack of power in rural areas and electricity shortages in winter have been a serious obstacle for development and impose hardship on people, and the problem is exacerbated by high domestic system losses, poor financial management, and an unsustainable tariff regime.

36. The sector strategies were implemented through five projects, with a total approved value of $234.27 million, and seven TA operations, with a total approved value of $4.42 million. Summary information on the projects and TA operations is provided in Appendix 1.

37. The principal focus of the projects was on rehabilitating crucial energy infrastructure which included rehabilitating substations and building new transmission lines to strengthen the power system and enable export of surplus power to neighboring countries, and developing micro hydropower plants to provide power to rural areas, especially in winter.

38. The first ADB project to support the electricity sector in Tajikistan was the Power Rehabilitation Project, which included rehabilitation of distribution lines and transformers in the Khatlon region, rehabilitation of some facilities at the Nurek HPP and associated transmission facilities; rehabilitating substations to improve power supply reliability in the Dushanbe region; and bulk metering of power supply. The project aimed at improving the reliability and quality of power and increasing the availability of electricity to poor consumers and improving sector efficiency. The project was only partly implemented due to a lack of funds to undertake all the planned activities. The second project was the Community Based Rural Power Supply Project, which identified viable micro-hydropower sites in rural areas and constructed two plants of 260 kW and 60 kW capacity, which were then maintained by local community based organizations. The third project was the Regional Power Transmission Interconnection Project which constructed a 220 kV double-circuit transmission line to link hydropower stations located on the Vakhsh River in Tajikistan with substations in Afghanistan to enable export of up to 300 MW of surplus power in summer. The fourth project was the Nurek 500 kV Switchyard Reconstruction Project and was under implementation during the CAPE. This project is designed to build a new 500 kV switchyard at the Nurek HPP to replace a 30-year old substation, which was in imminent need for replacement. The latest project under implementation during the CAPE is the Regional Power Transmission Project designed to build two new 220 kV single-circuit transmission lines connecting critical substations and rehabilitating in whole or part six transmission substations at various locations in Tajikistan. The envisaged outcome of the project is to expand and modernize high-voltage transmission network for regional trade. The project will also put in place a Supervisory Control and Data Acquisition (SCADA) system to improve power dispatch and manage the country’s power system network. This last project also includes a sector operational performance improvement program targeting Barki Tojik and comprising the following activities: (i) development of program strategic and business plans and corporate governance changes; (ii) commercial, operating and financial plans; (iii) project management and training; (iv) preparation of accounting and management information systems; and (v) preparation of technical or operational performance audits. An earlier project which was approved and later cancelled was the Regional Power Transmission Modernization Project which was designed to improve the reliability and the operation of the Central Asian power transmission system, enhance inter-country power trading, and establish the foundation for a future wholesale regional power market. This $20 million project was cancelled since Tajikistan and Uzbekistan could not reach agreement on a Power Trade Agreement despite the efforts of stakeholders including the ADB.

39. The TA operations focused principally on supporting the planning of the power sector and hydropower development in Tajikistan and support for improving the management, accounting and financial reporting systems at Barki Tojik, and one TA was designed to implement micro-hydropower plants to improve electricity supply in rural areas.

40. The first TA, Improving Barki Tojik’s Billing and Collection System, which was designed to (i) develop a computerized billing and collection system to help improve Barki Tojik’s customer management; (ii) implement the improved system on a pilot basis in a selected large electricity...
distribution subsidiary of Barki Tojik; and (iii) prepare recommendations for replicating the billing and collection system in all of Barki Tojik’s subsidiaries and for customers at all voltage levels. The objective was to assist Barki Tojik in reducing accounts receivable among customers in Dushanbe and develop staff competencies through training and user-friendly computer systems.

41. The second TA is for Introducing International Accounting Standards at Barki Tojik, with the objective of supporting the implementation of a market-based road map for the eventual corporatization and commercialization of Barki Tojik. The TA was designed to (i) introduce modern financial management and accounting policies, practices and procedures; (ii) develop training programs and operation manuals to support implementation of new accounting principles; (iii) prepare corporate accounts for 2001, using IAS; and (iv) install appropriate computer hardware and software for the overall implementation. Another TA also in support of reforms at Barki Tojik was Improving the Accounting and Financial Management System of the utility’s subsidiaries. It was intended to roll out the IAS and IFRS to 31 subsidiaries of Barki Tojik to ensure uniformity in accounting and financial reporting systems and (i) establish a training center to provide an accessible facility to strengthen and modernize the accounting, financial management, and reporting procedures and systems in line with IAS and IFRS; and (ii) implement a computerized and automated system for financial reporting by enabling subsidiaries to closely monitor and facilitate maintaining accounts receivables and inventories at optimal levels.

42. A fourth TA, Strengthening Corporate Management of Barki Tojik, was initially designed to establish procedures to improve the overall managerial capability and technical and financial efficiency of Barki Tojik by providing institutional and corporate governance support through the development of a management contract, and involved (i) developing a work plan for restructuring Barki Tojik with detailed steps for the first 3–5 years, (ii) developing pre-qualification documents and bidding documents for the management contractors, and (iii) conducting and evaluating the bids. The objectives were changed midway to undertake (i) a review of the organizational structure and prepare terms of reference for key departments of Barki Tojik, (ii) propose a structure regarding the corporate governance of Barki Tojik including the formation of a Board of Directors and the preparation of codes of conduct, fiduciary duties and related functions and rules, and (iii) defined performance criteria benchmarking against similar utilities around the world. The actual output of the TA was thus an updated plan to restructure Barki Tojik.

43. Two TA operations supported planning of the electricity sector. A TA to help the government prepare a hydropower development strategy for the country by reviewing past power sector studies and the government policies, developing load forecasts, considering new hydropower projects, developing financing plans, and training stakeholders to undertake such planning exercises. A TA for development of an energy conservation program was approved to review the legal framework of the energy and energy conservation law, examine power consumption of customer categories and prepare a plan for implementing the energy law and undertake energy conservation programs. ADB also approved a TA for developing community-based micro-hydropower supply in remote rural areas which was designed to develop an efficient, financially and operationally viable model of rural and off-grid generation through pilot micro-hydro projects managed by community based organizations and dissemination of the outcomes of the project.

D. Evaluation of ADB Assistance

44. The evaluation of ADB assistance in the energy sector is made on six criteria: strategic positioning, relevance, effectiveness, efficiency, sustainability and development impacts.
1. Strategic Positioning

45. Overall, the strategic positioning of ADB’s support to the energy sector is rated satisfactory. The strategy for supporting the development of the energy sector adopted in the economic report and interim operational strategy (ERIOS) and the ADB strategies and strategy updates for 2004–2009 and 2010–2014, all shown in Table 1, was clearly consistent with the needs of the country and the Government of Tajikistan’s strategy for developing the energy sector. The government’s primary objective in its poverty reduction strategy documents for the corresponding periods is to improve sector governance, promote sector reforms, private participation and regional cooperation to spur greater economic growth, and reduce the burden on poor people by making available good quality and reliable electricity to meet the energy needs. The ADB strategies for the sector had continuity and coherence, and built on previous efforts to reform the energy sector and expand stakeholders’ capacity. These strategies were ambitions, however, and not all targets were met, particularly true of the ERIOS.

46. The government recognizes the critical need to transition the country to a free market system through sector reforms at energy SOEs especially given that the government does not have the resources to develop the sector through public spending. The government also recognizes the criticality of enabling private investments in the sector through systematic changes in the implementation approach. The key challenge that remains, however, is for the government to be politically committed and to follow through on the reform agenda by actually taking necessary action.

47. Other key development partners supporting the energy sector in the government, such as the World Bank, United States Agency for International Development, and KfW, have also been supporting the reform agenda, the rehabilitation of infrastructure and regional trade in the energy sector. ADB’s strategy has consistent with these efforts, but, several of these stakeholders told the CAPE mission that there is insufficient coordination between development partners and ADB on energy sector reform efforts, in which ADB plays a major role. They said that this has led to differences in views between partners on energy sector reform. Many development partners expressed the view that the road map for reform is slow and lenient, and more tangible results could be achieved through joint efforts, including through investments in distribution projects and private sector investment in the energy sector by successfully instituting structural reforms. Also expressed was some stakeholder dissatisfaction with the role and functions of the consultants engaged for the sector operational performance improvement component under the Regional Power Transmission Project, who are currently supporting reform at Barki Tojik. Some stakeholders felt that much of the assessment of Barki Tojik was already known to development partners engaged in the sector. They said that this was a major project of deep interest to all the country’s development partners, while they also recognized that partners have their own strategic interests to pursue.

48. While the ADB strategies for the sector are broadly consistent with the government’s strategy, there appears to be an emphasis on cross border trade. Cross border trade clearly could be beneficial to the country and help it meet energy demand in a cost effective manner. However, given the political realities of the region it will take concerted and sustained regional efforts to address governments at the highest level to break the current logjam and reelect Tajikistan into the CAPS power system. Meanwhile, the country continues to suffer economically due to lack of power during winter months. The ADB strategies should prioritize meeting the country’s electricity needs through programs that can be readily implemented through internal decision making not subject to achieving accord with neighboring countries, while continuing to promote regional trade in electricity. The 2010 CPS appears to strike this balance between promoting interventions that improve the ability to meet internal demand including in winter and promotion of exports in support of CAREC.

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2. Relevance

49. The program is rated less relevant to the ADB and government strategic priorities. ADB through its projects and TA operations funded during the evaluation period has supported, and continues to support, rehabilitation of energy infrastructure, reform of the electricity sector, strengthening the operational and financial management systems of Barki Tojik, and promoting exports of surplus electricity in summer. These efforts were consistent with the focuses of ADB’s strategy documents during the period. However, the program was generally assessed less relevant to the government’s strategic priorities due to the shortcomings of ADB’s Regional Power Transmission Project.17 This project constitutes over 50% of the energy program portfolio over the CAPE period and includes components that are rated less relevant. The project report and recommendation of the President (RRP) does not justify the rationale for the components or the inherent risks in undertaking these components. Thus the overall portfolio of projects and TA operations have been assessed less relevant to the Government of Tajikistan though the projects supported by ADB are consistent with CPS sector strategies.

50. While the projects and TA operations are generally relevant to the CPS and government strategy for the sector with the exception as noted above, there is an opportunity to strengthen their relevance to the needs of the country. Reflecting the CPS strategy as discussed above, projects place too much emphasis on cross border electricity trade and are justified on this basis as opposed to prioritizing meeting domestic electricity demand especially in the winter months. While increased regional electricity trade is a laudable and desirable objective, and is consistent with country and other development partner objectives, it is more important to focus first on projects that reduce the shortage of power in the winter months when the system generates only about 70% of the power generated in summer. The generation shortfall in winter causes considerable hardship to people including in rural areas and significantly impacts the countries’ economic growth—about $200 million a year or 3% loss in GDP as indicated earlier. Energy security and reliable electricity supply should be the principal drivers for projects to be supported. The export of surplus power is no doubt desirable and important and should continue to be promoted given their potential to fully utilize the capacity of HPPs, avoid water spills and improve the financial condition of the utility through sale of power at prices higher than the average tariff. Projects designed with the additional objective of improving cross border electricity trade should ensure that the revenues from such power sales are retained by Barki Tojik and available for operation and maintenance and/or capital expenditures.18

51. The CAPE found that even the ADB projects that were justified principally in RRP on the basis of promoting power exports were equally needed to strengthen the country’s power system and improve reliability. This aspect of project design should be emphasized and described better and should indeed be the basis of justification for the project and its viability demonstrated in the economic and financial analysis. For instance, the Regional Power Transmission Project is designed to improve the capacity to export power to neighboring countries including to Uzbekistan, the Kyrgyz Republic, and Afghanistan, among other objectives. The strategic relevance of these component of the project is not entirely clear. For instance, the completed Regional Power Transmission Interconnection Project has installed a transmission line with a capacity to export 600 MW of power to Afghanistan and is currently underutilized. It was pointed at the CAPE that strengthening the capacity for export of power to Afghanistan was an important objective and the project would provide an alternative path for power export. The RRP however did not make this case and it is not clear why this aspect of the project component takes priority. Another component of the project is to rehabilitate the Regar 500 kV substation, which as the RRP stated, is the major 500 kV substation connecting Tajikistan to the CAPS where technical problems had an impact on the entire CAPS. Surprisingly, however, the RRP for this

17 ADB. 2010. Report and Recommendation of the President to the Board of Directors: Proposed Grant to Tajikistan for the Regional Power Transmission Project. Manila (Grant 0213).
18 It was reported to the CAPE team during mission that excess cash flows from SOEs are transferred to the treasury and the SOE is allocated a budget for its operations.
project which was prepared in July 2010 (and appraised in August 2010), failed to mention the fact that Tajikistan has been excluded from CAPS since the beginning of 2010. The RRP also does not recognize this breakdown in the CAPS regime as a risk to export of power to Uzbekistan and propose any mitigation action. This further brings to question the relevance of the project and its ability to achieve its objectives.

52. The design monitoring frameworks (DMFs) of some projects do not appear to be well developed and it is not clear how some of the planned outcomes can be measured or inferred from the indicated data sources and reporting mechanisms. While the physical outputs of projects are readily measurable, some of the performance targets for project outcomes appear to be unrealistic and poorly considered. For instance, one of the performance targets for the power transmission project presently under implementation is the export of at least 700 GWh of power to Central Asian countries and to Afghanistan by 2015. Total electricity exports in 2012 were already about 775 GWh, supported largely by the new transmission lines built to Afghanistan under the Regional Power Transmission Interconnection Project. Similarly, one of the performance targets in the DMF for the Nurek 500 kV Switchyard Reconstruction Project is the financial viability of Barki Tojik by 2011, which clearly is an unrealistic target. The DMF should present realistic targets for indicators where the counterfactual can be readily baselined and monitored to track progress and achievement of objectives.

53. Some of the TA operations supported by ADB do not appear to have been designed based on close consultations with stakeholders, which in one case led to a complete revision in scope of the project. The lack of capacity at sector institutions, which have seen high attrition of staff and frequent changes in management was widely acknowledged during the CAPE as a drawback to continuity and improved sector operations. It would appear that this lack of absorptive capacity of the stakeholders has not been fully considered in designing some TA operations. Thus, TA operations even when consistent with the government and CSP priorities and strategies may not be relevant if the stakeholder agencies are unable to fully benefit from it. The TA supporting planning for hydropower and energy efficiency, for example, suffered from this drawback since they did not build the capacity of stakeholders as planned.

3. Effectiveness

54. Overall, the effectiveness of ADB’s support to the electricity sector is rated effective. Most of the projects were successful in achieving their intended physical outputs, though the realization of planned outcomes is less certain. The TA operations in general have not achieved their intended output though the completion reports all indicated the projects achieved their objectives.

55. **Achievement of physical outputs of project components.** Three of the projects supported by ADB have been completed. The scope of the first, the Power Rehabilitation Project, was changed significant and the project outputs were scaled down due to budget constraints and poorly anticipated need and scope of some project components. For instance, the project was initially designed to rehabilitate the switchyards at Nurek HPP, but it was later realized that cost of replacing the substations was far higher than anticipated. Electricity supply to a collective farm was also dropped since it was later found that the facility had adequate supply. These changes point to poorly prepared project feasibility studies. Two other completed projects have achieved their planned outputs—the Regional Power Transmission Interconnection Project installed the planned transmission line to enable export of surplus power to Afghanistan. The Community Based Rural Power Supply Project installed two micro-hydropower plants though one project had a lower capacity that planned. Two projects are still being implemented and their effectiveness cannot be assessed yet, though they appear to be progressing well despite some delays.

56. **Achievement of project outcomes.** The achievement of project outcomes is more difficult to discern since some of the performance indicators for the outcomes to be achieved are somewhat
realistic or not easily monitored as discussed earlier. While the project completion reports (PCRs) indicate that outputs were satisfactorily achieved, the results are not evident in all projects. The PCR validation report for the Power Rehabilitation Project rated that achievement of outcomes less effective. Results reported from some projects such as the Regional Power Transmission Interconnection Project indicate that most of the planned project outcomes for Tajikistan have been met, including increased availability of 320 GWh by 2009 based on data cited for increase in power availability in the country from 2009 to 2010. It is however difficult to discern how much of this increase can be attributed to the project alone and not to other projects being concurrently undertaken in the electricity sector. A CAPE site visit to one of the two projects (260 kW plant at Dijik) installed by the Community Based Rural Power Project indicated the project was being successfully managed by local Community Based Organizations and about 200–250 households, four schools, and two hospitals in five villages are benefiting from the project and households are reportedly happy with the power availability in winter, which has increased from 4 to 24 hours per day, and benefit from water and irrigation supply.

57. Achievement of capacity development outcomes. ADB projects and TA have strongly supported the reform of the electricity sector, specifically of Barki Tojik, and have included sector reform indicators as covenants to projects. These persistent efforts have led to some success and the government has committed to reform of the electric utility, it has raised electricity tariffs multiple times, and it is supportive of increased collections from SOEs who are major debtors to Barki Tojik. Despite these positive outcomes, the recent assessment of the sector operational performance improvement consultants, as discussed earlier, has been negative and has pointed to significant weaknesses in the path to reform of the electricity sector.

58. The assessment report showed that pilot billings systems and the IAS and IFRS installed by earlier TA operations are not evident and Barki Tojik continues to seek assistance from development partners including ADB to support the development of such systems. ADB’s first TA was designed to install a pilot computerized billing system. It has never been used. The World Bank is now establishing a new billing system, which also is not being used. Two subsequent TA operations have undertaken to put in place IAS and IFRS, but these are not in use and the sector operational performance improvement component is also supporting preparation of accounting and management information systems at Barki Tojik. The TA operations which supported planning functions at the MEWR also appear to ineffective given that the country still does not have a master plan for the electricity sector and planning continues to be done on an ad hoc basis without prioritization of investments. The scope of one TA to support Barki Tojik was changed midway and the output was very different from the earlier planned output of developing a management contract for Barki Tojik. A TA to install two micro-hydropower plants in rural areas also failed to achieve planned outputs—one plant had to be derated because of a design based on poor knowledge of hydrology at the project site and the other plant became inoperable after an avalanche, which of course, was not something that could be controlled by the project.

59. The projects have in general achieved their human capacity development objective. Staff were trained in the operation and maintenance of the physical project components being installed. But the high turnover of staff at the Barki Tojik could have diluted this achievement—senior staff at Barki Tojik reportedly have changed four times in 6 years. The TA projects have however been less successful in achieving planned capacity development outcomes.

4. Efficiency

60. Overall, the efficiency of ADB’s projects and TA operations in support of the energy sector in Tajikistan is rated efficient. The EIRR of all projects was above the threshold of 12%. However, the PCR for some indicate that the actually EIRR was lower than at the design stage of the projects. For instance the RRP for the Power Rehabilitation Project estimated the EIRR to be 28%, which was later revised by the PCR to 13.2%. The project validation report (PVR) expressed reservations about the EIRR calculations
and suggested that the benefits from electricity sales should have been broken down by incremental and non-incremental benefits, and also that the project ignored consumption by the agricultural and commercial sectors which have low tariffs, and noted that operation and maintenance costs and transmission charges were not converted to economic costs. The EIRR for the Regional Power Transmission Interconnection Project was estimated to be 31.1% based on 300 MW of power exports to Afghanistan by July 2009 and additional benefits accruing to consumers in Tajikistan and Afghanistan. The actual sale of power was about 150 MW in 2012 with planned sales possible on completion of installation of 220 kV substations in Afghanistan. It is reported that in 2012 Tajikistan exported 630 GWh of power to Afghanistan. The EIRR for the ongoing Regional Power Transmission Project and the Nurek 500 kV Switchyard Reconstruction Project are estimated to be 31.4% and 36.7%, respectively. The EIRR estimates are based on planned outcomes and performance targets.

61. The portfolio performance of all projects is rated efficient. The Power Rehabilitation Project, was the first ADB project in the country and was substantially delayed by almost three years and there were cost overruns despite reduction in scope of implementation of project components. While some of the cost overruns were caused by rise in equipment prices, decline in the value of the dollar, and inexperience of the PIU with ADB guidelines, some of these factors, such as the higher costs due to the terrain in Tajikistan and the lack of capacity of the PIU should have been foreseen in the project design. Some loan covenants were not met despite repeated reminders by ADB review missions, and some important conditions were waived because the performance metrics could not realistically be met. The Community Based Rural Power Supply Project was delayed by over two years due to some reasons that could not be anticipated such as elections and landslides, but also due to reasons such as lack of responsive bids, delayed equipment supply, and supply of equipment not to specifications, etc., that could have been anticipated. The capacity of one of the two projects developed was also much lower than planned. A CAPE site visit to the ongoing Nurek 500 kV Switchyard Reconstruction Project indicated that the project has been delayed due to reasons that should have been anticipated including the inability to get large construction equipment to the project site, the narrowness of the site and approach road and delays in getting design drawings completed. The project timeline also appears to have been unrealistically set in the first place due perhaps to an inadequate feasibility report. The Regional Power Transmission Interconnection Project however was delivered on time and budget.

62. ADB’s processes have not always led to significant delay in project implementation. The first project for the energy sector—the Power Rehabilitation Project—suffered due to lack of Project Implementation Unit experience with ADB processes and guidelines. This has now been streamlined by a centralized Project Management Unit (PMU), which is managing all projects in coordination with Barki Tojik, which is the executing agency and beneficiary of the projects (Box 2).

63. Stakeholders were questioning of the efficiency of ADB process of managing large TA operations such with sector operational performance improvement component largely from Manila without significant on-the-ground staff to enable closer day-to-day interactions with the executing agency. It was generally expressed that more technical staff locally based would help achieve the desired outcomes of TA operations.

64. The government feels that the ADB process of designing projects, approving feasibility studies, obtaining approval, and tendering projects takes several years, which leads the government to approach bilateral government partners, such as the People’s Republic of China, whose EXIM bank can approve and implement projects much faster. The government however acknowledged the role of safeguards that ADB ensure in its project development process which can take time.
5. Sustainability

65. The sustainability of ADB’s support to the energy sector over the CAPE period is rated less likely. The financial internal rate of return (FIRR) of the Power Rehabilitation Project was revised downwards by the PCR from 7.7% to 3.2%, which could be less than the WACC (which was not estimated for this project). The RRP estimates for the Regional Power Transmission Interconnection Project were an FIRR of 20.8% with a WACC of 3.0%. A revised FIRR needs to be estimated based on the actual revenues from sales of energy to Afghanistan. The Nurek 500 kV Switchyard Reconstruction Project has not yet been implemented, but the RRP estimated the FIRR to be 9.3%, with a WACC of 2.54%, and the FIRR estimated in the RRP of the ongoing Regional Power Transmission Project was 6.24%, with a WACC of 3.54%.

66. A key measure of sustainability of projects is the ability of Barki Tojik, the executing agency and project beneficiary, to finance the recurrent costs and operation and maintenance costs of projects. Barki Tojik, however, is not financially solvent due to low customer tariffs (averaging $2.5/kWh) and poor revenue realization, which results in arrears of 6 months or more. Significant tariffs increases were approved in 2009 and 2010 and tariffs were further increased in 2012. This has improved the revenue base of Barki Tojik but costs have also been going up and Barki Tojik incurred operating losses in 2011 after registering a profit in 2010. Regardless, the tariffs in the country are not cost reflective and barely cover operation and maintenance costs. The tariffs do not reflect the LRAIC of supply based on the need to meet revenue requirements, service debt and finance necessary investments to meet future demand.
67. The receivables of Barki Tojik are also very high due to poor collections rate especially from other SOEs who cannot be disconnected for non-payment of bills. As of October 2012, Barki Tojik’s receivables were about $140 million. The collection rate even excluding TALCO, the biggest debtor, is only about 50% and the utility is unable to generate an aging report, which would indicate the likelihood of payments against arrears. Barki Tojik’s revenues are also subject to transfer to the state budget, which leaves little for budgeting recurrent costs and for major rehabilitation or repairs. Arrears forces the utility to rely on the government support, high interest working capital loans from Orienbank, grants and deferred loans from international finance institutions.

68. Despite the efforts of ADB TA operations and recent support from the World Bank, the financial management system at Barki Tojik is very weak and does not comply with IFRS. External auditors have been unable to given an opinion on the annual accounts of Barki Tojik.

69. The government has committed to reform the electricity sector and restructure Barki Tojik, further increase tariffs, and promote private sector participation in the electricity sector. The political will to make the planned changes is less certain. Capacity among electricity sector institutions is also weak and high turnover of trained staff remains a concern.

70. The additional revenues from the export of power can significantly improve the financial condition of Barki Tojik, provided excess revenues of Barki Tojik are not appropriated in to the State budget.\(^{19}\) If the government commitments are honored, and Barki Tojik introduces IAS and IFRS and improves its collection rate, the risks to the sustainability of projects will be substantially mitigated.

6. Development Impacts

71. Overall, the development impact of ADB’s support is rated less than satisfactory. Although, ADB interventions have supported the rehabilitation of substations and transmission lines, which has strengthened the electricity infrastructure in the country, ADB did not or will not likely achieve several key objectives.

72. Cross-sectoral impacts and inclusive growth. The sector strategies in the 1998 ERIOS and 2004 and 2010 CSP were principally to assist in the reform of the energy sector, rehabilitation of the infrastructure, improving efficiency and sustainability, increasing power exports, reducing the winter power deficit and increasing private sector participation. The 2012 country operational business plan (COBP) additionally targeted improving energy security and increasing energy access in rural areas. The 2010–2014 CPS and the latest COBP introduced ambitious targets as indicators, many of which have not been achieved.

73. Overall, ADB interventions have increased the country’s ability to export surplus power during summer months and helped to reduce the winter deficit by increasing power availability through rehabilitated systems that have also reduced losses. While the export of surplus power is monitored and its benefits can be measured, the impact of projects specifically on reducing the winter deficit is difficult to quantify. The infrastructure rehabilitation projects have also clearly reduced system losses thereby increasing power availability throughout the year. However, it is safe to say that specific indicators such as “Reduction in winter deficit from 3 TWhs to 1 TWhs by 2013” has not been achieved since the winter deficit is still very significant.\(^{20}\) It is also not evident if some of the projects which emphasized support for increased export of power were required or were a priority given that Tajikistan is no longer a part of CAPS and exports to Afghanistan are limited by that country’s ability to absorb imports and pay for power purchases.

\(^{19}\) This is based on discussions with stakeholders during CAPE mission interviews.

74. The financial performance of the utility has marginally improved due to project covenants that required the government to undertake actions to reform the sector, increase tariffs and improve collections from SOEs. The TA operations have been less effective in achieving outcomes despite their persistent attempt to improve Barki Tojik’s financial performance. Given the worsening financial condition of Barki Tojik, as attested by the ADB assessment, the impacts of ADB interventions on the financial performance of Barki Tojik could not be observed. Certainly, specific 2012 COBP indicators such as tariffs increased to cover costs by 2014—were too ambitious in the first place.

75. ADB support for the restructuring of Barki Tojik is a major ongoing initiative supported by sector operational performance improvement consultants. This supports the government’s objective of reforming the electricity sector to make it more efficient and promote private sector participation and investment. ADB projects were implemented with the support of private sector contractors but there was no private equity contributions made in the projects, although, public private partnership is a stated objective in the 2010 CPS and 2012 COBP. In addition, support for broad-based reform of the electricity sector is an important ADB initiative, but ADB has not directly supported private initiatives such as the World Bank Group’s support for Pamir Energy.

76. Other indicators envisioned in the CPS such as improved energy efficiency and development of thermal power plants have not been a focus of ADB interventions, though the 2010 CPS has specific indicators related to these interventions.

77. The projects and TA operations supported by ADB over the evaluation period would have led to cross-sectoral impacts such as increased national income and growth rate since the electricity infrastructure improvements have definitely reduced system losses and made more electricity available which has a direct impact on economic activity. The impacts cannot easily be attributed to ADB’s interventions alone since they cannot easily be isolated from improvements made by non-ADB supported projects and numerous other parameters that impact economic activity. While the direct impacts of ADB interventions in the energy sector on inclusive growth and reducing the incidence of poverty in the country is not easily discerned or measured, the cumulative impacts of interventions that rehabilitated and improved electricity infrastructure in the country would be positive.

78. ADB’s support for the development of micro-hydropower plants through grant for Community Based Rural Power Supply Project and through technical assistance for Development of Community-Based Micro-hydropower Supply in Remote Rural Areas specifically supported the installation of micro-hydropower plants in rural areas and increased power availability in winter months. Despite some drawbacks, these projects installed micro-hydropower plants, which have clearly had a direct impact on the lives of rural populations and economies and resulted in positive sector outcomes. The projects also spurred significant interest and activity leading to the increased development of micro-hydropower plants across the country. Over 40 MHPPs have been apparently developed with donor and local funding and 14 more projects are under development. Overall, it is estimated that there are over 300 such plants in the country, which has increased electricity access to rural areas and led to positive sector impacts. Such sector impacts have led to inclusive growth with direct economic impacts on the social lives and incomes of poor rural communities in the country.

79. Regional cooperation. Regional cooperation is one of key objectives in the 2004 CSP and updates, and 2010 CPS, through ADB support to the energy sector. Both strategies aimed to increase energy exports and set ambitious indicators such as “export 5000 GWh of electricity to neighboring countries by 2010” as in the 2004 CSP, and “annual summer electricity exports reach 2.5TWh by 2012 and annual winter electricity imports reach 2TWh by 2012” in the 2010 CPS. These targets have not been achieved. Incidentally, the 2012 COBP without explanation lowered the power export target to “annual summer exports reach 0.6 TWh by 2014 from 0.09 TWh in 2010,” a target which has already been achieved in 2012 through power exports to Afghanistan supported by the new transmission line constructed under the Regional Power Transmission Interconnection Project.
80. Three out of six approved energy projects during the evaluation period which account for about 65% of ADB's financial support to the energy sector were designed to strengthen regional energy transmission. The Regional Power Transmission Modernization Project with Uzbekistan was canceled, but the Regional Power Transmission Interconnection Project was successfully completed. The third project, Regional Power Transmission Project was approved in 2010 and is ongoing.

81. The investment needs of the energy sector in Tajikistan are huge given that much of the infrastructure was built during the Soviet era and, moreover, a significant stock of equipment is past its design life. The lack of funds for rehabilitation and maintenance has led to a situation where much of the infrastructure needs to be replaced or rehabilitated. The government has sought the support of developmental partners to fund the rehabilitation projects. Given the dire economic condition in the country, development partners have been providing the country with grants and very concessional financing for the energy sector. The approach to investments has however been ad hoc given that the country is not working off a master plan for investments in generation, transmission and distribution facilities. This lack of a prioritized investment plan could lead to suboptimal decisions driven more by the interests of the government or the donor agency or IFI. As noted above, three major ADB projects have targeted rehabilitation of infrastructure to support increased regional trade in energy (the projects also improve reliability of supply within Tajikistan). While this clearly is to the benefit of Tajikistan and to the countries in the region, the risks to regional trade do not appear to have been adequately identified or addressed.

82. A principal risk for increased regional cooperation in energy is the political differences between the countries due to their past history exacerbated by technical issues related to water sharing rights between upstream and downstream countries. An ADB project planned in 2002, Regional Power Transmission Modernization Project whose objective was to enhance energy trade between Tajikistan and Uzbekistan had to be cancelled since the two countries could not reach contractual agreements. A more recent project, Regional Power Transmission Project, includes a component to strengthen transmission and substations infrastructure to enable greater energy trade with Uzbekistan—this after the failure of the earlier project and after Tajikistan was left out of the CAPS. The RRP for this project was prepared in July 2010, which was after Tajikistan was left out of CAPS beginning 2010, but made no reference to this major risk or proposed mitigation actions. The project component however will also improve reliability of the power system within Tajikistan.

83. Despite the many constraints, electricity exports and imports have been taking place and the country imported about 114 GWh from the Kyrgyz Republic and exported about 775 GWh to Afghanistan, the Kyrgyz Republic, and Kazakhstan in 2012, of which 630 GWh was exported to Afghanistan. ADB support contributed to increased energy supply in Afghanistan from 4 to 24 hours per day, which led to significant economic and social benefits. The disconnection of Tajikistan from CAPS in early 2010 has however been a major constraint to the export of surplus power in the summer and imports during winter deficit months. Overall, ADB's development impact was rated borderline less than satisfactory because (i) energy exports in 2012 was far less than the envisaged target and (ii) significant actions to decrease winter energy shortage were not taken.

84. The potential benefits of regional power trade appears to have shifted the focus in favor of such projects instead perhaps focusing on meeting the winter deficit in the country which has a very significant impact on the GDP of the country and is a hardship on its population. This is not to say that regional power trade projects should not be promoted, but that there should be a clear understanding of the risks of such projects benefiting the country in the near to medium term. Thus while the projects remain strategically relevant for multiple reasons, the investment may be suboptimal and at the cost of projects that focus on more immediate issues relating to reducing losses, increasing energy efficiency, and meeting the winter deficit.
85. **Transformation to market economy.** Supporting the transition of the state dominated energy sector to a market economy based model has been the goal of all ADB sector strategies for the country. The 1998 ERIOS espoused a strategy to foster privatization and commercialization, and the 2004 and 2010 CPS both sought to increased private sector participation and support reform of the main state owned electric utility, Barki Tojik. The 2010 CPS and the 2012 COBP also sought to promote PPP for development of power infrastructure. No targets were however set and none have been achieved. ADB has not supported private sector equity participation in the power sector (unlike the World Bank Group, which supported Pamir Energy). ADB projects have supported reform of Barki Tojik, and associated TA operations such as Improving Barki Tojik’s Billing and Collection System and two subsequent TA operations have supported installation of a pilot computerized billing system and putting in place IAS and IFRS based accounting systems at the utility. But these TA operations have not achieved their objectives and the current sector operational performance improvement program supported by ADB and another World Bank project continue to support projects to strengthen the accounting and billings and collections systems at the utility. Another TA, Strengthening Corporate Management of Barki Tojik, was initially designed to establish procedures to improve the overall managerial capability and technical and financial efficiency of Barki Tojik by providing institutional and corporate governance support through the development of a management contract, but the objectives were changed midway to prepare an updated plan to restructure Barki Tojik. The ongoing sector operational performance improvement component is the largest assistance designed to support the restructuring of Barki Tojik.

6. **Overall Assessment**

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E. **Conclusion: Key Findings, Lessons and Suggestions**

1. **Key Findings**

86. The electricity sector in Tajikistan is in a state of disrepair and there is an urgent need to rehabilitate or replace critical infrastructure in the electricity sector. ADB has been a lead development partner in the energy sector and has funded critical rehabilitation projects. Tajikistan is today able to meet the electricity needs of its consumers in summer and export surplus power, but it faces significant deficits in winter when river flows are low. This electricity deficit is estimated to cost the economy about 3% of the GDP and causes hardship to the ordinary populace, which depends on electricity for heating in harsh winters.

87. It does not appear that there is a master plan, which prioritizes investment projects in generation, transmission and distribution facilities to meet the short, medium and long-term electricity needs of the country under different strategic approaches. While all rehabilitation of the electricity infrastructure in Tajikistan is a necessity given its state of disrepair, the lack of a robustly developed

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21 Russia, the People's Republic of China, and Iran are also major investors in the energy sector, but their support is not coordinated through the Development Coordination Council, and the Government of Tajikistan engages in direct bilateral discussions with these countries to seek support for the power sector.
master plan could lead to suboptimal decisions and investments in non-priority projects, driven by the interests of government and its development partners.

88. The institutional structure for the electricity sector has multiple government stakeholders in-charge of sector operations but key decision making rests at the highest level of government and line agencies principally only have operational control. Barki Tojik, the vertically integrated state-owned utility has technical skills but the high attrition rate has left it with weak planning and management skills. The utility is also financially not solvent given its high losses, low tariffs, high receivables, and inability to generate or raise financing for capital expenditures.

89. Regional trade in electricity holds great promise and indeed many Central Asian countries were unified through the CAPS before regional differences led to Tajikistan’s separation from the system. But there are new prospects for Tajikistan to export surplus power in summer and import power in the winter. ADB and other development partners are very supportive of regional electricity trade since this is the most optimal long-term investment solution to the region’s energy woes.

90. There is little private sector participation in the electricity sector though the government and the development partners all express its importance. The RAO Unified Energy System of Russia is the largest private participant with its 75% stake in Sangtuda 1. At the other end of the spectrum is Pamir Energy, which is an affiliate of Aga Khan Foundation for Economic Development, and has a concession to supply power to the GBAO region in the east of the country which is not connected to the national electric grid. Equity investment by the private sector will be a challenge in Tajikistan given the perceived and real political risks, the weak financial position of the single buyer of electricity, Barki Tojik, the physical and financial risks in supplying power to countries in the region, and the inability of the country to provide sovereign guarantees against payment risks.

91. It is against this backdrop that the CAPE was undertaken to evaluate ADB support the energy sector over the past 15 years. The overall assessment of ADB support is satisfactory. But there are many lessons learned that need to be absorbed and reflected in future support for the sector to ensure that ADB support is relevant, efficient, effective and sustainable in addition to other benefits. Some of the principal lessons and suggestions are summarized below.

2. Lessons

92. There are important lessons to be learned from the relevance, efficiency, effectiveness, sustainability and other criteria for evaluating the success of ADB interventions in the energy sector in Tajikistan. The above evaluation discusses many of these issues. Some of the important lessons learned are summarized below (not in order of priority):

93. The investment decision should be based on a robust plan for the short, medium and long-term development of the electricity sector and not be based on an ad hoc approach influenced by the interests of stakeholders. Investments should help reduce the electricity deficit in winter and not focus only on the potential for export of surplus power, at least in the near to medium term. Investments in loss reduction, energy efficiency and district heating have not been a focus of ADB interventions and should be considered as a strategy to efficiently meet the country’s electricity demand. Investments in distribution projects can bring greater benefits to customers at lower cost, though such projects entail higher transactions costs, more monitoring and have lower visibility.

94. The cumulative actions of ADB interventions have made small but important inroads towards transformation of the sector to market based principles and operations. Sector reform is however a long process that should focus on small but important steps towards efficient utility operations, with greater autonomy, accountability, and ownership. It will take real political will to achieve the desired transformation and reform of the electricity sector. ADB should engage the government at the highest
levels especially to address issues related to sector reform and sustainability of projects. This should include clear understanding on making Barki Tojik operations financially sustainable.

(i) Consider support to central Asian countries contingent to achieving agreements on regional energy trade.

(ii) ADB should consider supporting rural energy projects with greater private sector participation and investment to address the needs of rural poor and achieve inclusive growth.

(iii) Capacity building efforts should focus on building the long-term capacity of institutions and not focus on training of personnel alone. Building the capacity of institutions requires implementing a planned framework that addresses important structural issues for making changes that cannot be addressed in the absence of supportive policies. The sustainability of implementing capacity building is critical to achieving long-term objectives.

3. Suggestions

95. Suggestions for ADB to consider as it continues to engage with the government and undertake interventions in the energy sector follow from the evaluation of ADB’s energy sector portfolio and from the lessons learned discussed in this report. Some key suggestions for ADB’s consideration are summarized in Table 3, again not in order of importance.

Table 3: Suggestions

<table>
<thead>
<tr>
<th>Suggested Programs for ADB Support</th>
<th>Objectives of Program</th>
</tr>
</thead>
<tbody>
<tr>
<td>Support development of a Master Plan for the electricity sector that considers all strategic options to optimally meet energy demand</td>
<td>Prepare a master plan for generation, transmission and distribution expansion in the short, medium and long-term under different strategies and scenarios for development of the sector (energy security, winter deficit, export focused, etc.). The least cost option analysis should include consideration of a wide range of options to meet demand under different strategies. Develop a list of prioritized investment projects to meet defined objectives in the short, medium and long-term. The option analysis should include the impacts and benefits of district heating programs, energy efficiency, DSM, loss reduction and distribution improvement programs and innovative metering projects to optimally meet demand at least cost and reduce losses. Identify and analyze alternative options to meet energy needs for cooking and heating (low electricity prices send the wrong price signals and distort the market in favor of electricity use to meet thermal demand). Identify policy and structural changes required to implement the investment plan, and develop appropriate and measurable metrics for performance to be achieved in a realistic and reasonable timeframe given the context of the country.</td>
</tr>
<tr>
<td>Ring fence Barki Tojik revenues to make the utility financially sustainable</td>
<td>Work with Government of Tajikistan to ring-fence Barki Tojik revenues and help improve the sustainability of projects. Ensure that revenues from power exports and excess cash flows from improved operations are retained by Barki Tojik.</td>
</tr>
<tr>
<td>Support rural energy projects</td>
<td>Support the development of rural energy projects to meet the needs of rural power especially in winter. Promote the participation and investment of private sector to develop small-scale projects (the Pamir Energy project supported by the World Bank is an example of a successful project implemented and managed by the private sector). Support the development of appropriate business models to address issues related to risk mitigation, return on investments, etc. Support the development of subsidy policies and social safety nets to promote inclusive growth.</td>
</tr>
<tr>
<td>Suggested Programs for ADB Support</td>
<td>Objectives of Program</td>
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<tr>
<td>Promote regional cooperation in energy</td>
<td>ADB has been committed to CAREC and has actively supported power system improvements to enable greater trade in electricity between countries of the region. Support high-level government dialog on energy trade to break the political stalemate with clear and firm timelines that are designed to show quick progress on incremental steps. Stop support when timelines are not met. Make sector support contingent on achieving progress on regional trade issues. Support discussions on resource sharing agreements and power trade agreements that allay concerns of all parties and support preparation of legal documents.</td>
</tr>
</tbody>
</table>

ADB = Asian Development Bank, CAREC = Central Asia Regional Economic Cooperation.  
Source: Independent Evaluation Department.