NOTES

(i) In this report, “$” refers to US dollars.

(ii) The fiscal year (FY) in Pakistan starts on 1 July and ends on 30 June. “FY” before a calendar year denotes the year in which the fiscal year ends, e.g., FY2018 ends on 30 June 2018.

<table>
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<tr>
<th>Director General</th>
<th>Marvin Taylor-Dormond, Independent Evaluation Department (IED)</th>
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The guidelines formally adopted by the Independent Evaluation Department on avoiding conflict of interest in its independent evaluations were observed in the preparation of this report. To the knowledge of the management of the Independent Evaluation Department, there were no conflicts of interest of the persons preparing, reviewing, or approving this report.

In preparing any evaluation report, or by making any designation of or reference to a particular territory or geographic area in this document, the Independent Evaluation Department does not intend to make any judgment as to the legal or other status of any territory or area.
### Abbreviations

<table>
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<tr>
<th>Acronym</th>
<th>Full Form</th>
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<tbody>
<tr>
<td>ADB</td>
<td>Asian Development Bank</td>
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<tr>
<td>AEDB</td>
<td>Alternative Energy Development Board</td>
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<tr>
<td>AETP</td>
<td>Accelerating Economic Transformation Program</td>
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<tr>
<td>AFD</td>
<td>Agence Française de Développement</td>
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<tr>
<td>AMI</td>
<td>advanced metering infrastructure</td>
</tr>
<tr>
<td>BOD</td>
<td>Board of Directors</td>
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<tr>
<td>BTOR</td>
<td>back-to-office-report</td>
</tr>
<tr>
<td>CCGT</td>
<td>combined cycle gas turbines</td>
</tr>
<tr>
<td>CDTA</td>
<td>capacity development technical assistance</td>
</tr>
<tr>
<td>CFL</td>
<td>compact fluorescent lamps</td>
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<tr>
<td>CPEC</td>
<td>China-Pakistan Economic Corridor</td>
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<tr>
<td>CPPA-G</td>
<td>Central Power Purchasing Agency Guarantee Limited</td>
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<tr>
<td>CPS</td>
<td>country partnership strategy</td>
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<td>CSP</td>
<td>country strategy and program</td>
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<tr>
<td>DISCO</td>
<td>distribution company</td>
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<td>EFF</td>
<td>Extended Fund Facility</td>
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<tr>
<td>EIRR</td>
<td>economic internal rate of return</td>
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<tr>
<td>ESTF</td>
<td>Energy Sector Task Force</td>
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<tr>
<td>FAST</td>
<td>Faster Approach to Small Nonsovereign Transactions</td>
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<tr>
<td>FATA</td>
<td>Federally Administered Tribal Areas</td>
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<tr>
<td>FBR</td>
<td>Federal Bureau of Revenue</td>
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<tr>
<td>FESCO</td>
<td>Faisalabad Electric Supply Company</td>
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<tr>
<td>FIRR</td>
<td>financial internal rate of return</td>
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<tr>
<td>GENCO</td>
<td>generation company</td>
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<tr>
<td>GEPCO</td>
<td>Gujranwala Electric Power Company</td>
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<tr>
<td>GHG</td>
<td>greenhouse gas</td>
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<td>HFO</td>
<td>heavy fuel oil</td>
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<td>IED</td>
<td>Independent Evaluation Department</td>
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<tr>
<td>IESCO</td>
<td>Islamabad Electric Supply Company</td>
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<tr>
<td>IFC</td>
<td>International Finance Corporation</td>
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<td>IMF</td>
<td>International Monetary Fund</td>
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<td>INDC</td>
<td>Intended Nationally Determined Contributions</td>
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<tr>
<td>IPP</td>
<td>independent power producers</td>
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<td>IsDB</td>
<td>Islamic Development Bank</td>
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<td>JICA</td>
<td>Japan International Cooperation Agency</td>
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<td>KESC</td>
<td>Karachi Electricity Service Company</td>
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<td>KFW</td>
<td>German Development Bank</td>
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<tr>
<td>LED</td>
<td>light emitting diode</td>
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<td>LESCO</td>
<td>Lahore Electric Supply Company</td>
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<td>LNG</td>
<td>liquefied natural gas</td>
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<td>MFF</td>
<td>multitranche financing facility</td>
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<td>MOE</td>
<td>Ministry of Energy</td>
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<td>MTDF</td>
<td>Medium-Term Development Framework</td>
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<td>NEPRA</td>
<td>National Electric Power Regulatory Authority</td>
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<td>NGO</td>
<td>nongovernment agency</td>
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<td>NSO</td>
<td>nonsovereign operations</td>
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<tr>
<td>NTDC</td>
<td>National Transmission and Dispatch Company</td>
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<td>PBL</td>
<td>policy-based loan</td>
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PCR – project completion report
PEPCO – Pakistan Electric Power Company
PESCO – Peshawar Electric Supply Company
PFR – periodic financing requests
PHPL – Power Holding Private Limited
PPA – power purchase agreement
QESCO – Quetta Electric Supply Company
RFO – residual fuel oil
RRP – report and recommendation of the President
SCADA – supervisory control and data acquisition
SEPCO – Sukkur Electric Power Company
SESRP – Sustainable Energy Sector Reform Program
SOE – state-owned enterprise
TA – technical assistance
TCR – technical assistance completion report
TESCO – Tribal Areas Electric Supply company
USAID – United States Agency for International Development
WACC – weighted average cost of capital
WAPDA – Water and Power Development Authority
WB – World Bank
XARR – extended annual review report

Units and Measures

\( \text{CO}_2 \) – carbon dioxide
\( \text{GW} \) – gigawatt
\( \text{GWh} \) – gigawatt-hour
\( \text{kV} \) – kilovolt
\( \text{kW} \) – kilowatt
\( \text{kWh} \) – kilowatt-hour
\( \text{MVA} \) – megavolt ampere
\( \text{MW} \) – megawatt
\( \text{MWh} \) – megawatt-hour
\( \text{NO}_x \) – sulfur dioxide
\( \text{SO}_2 \) – nitrogen oxide
\( \text{tCO}_2 \) – ton of carbon dioxide
\( \text{TWh} \) – terawatt-hour
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Acknowledgments

This report has been prepared by Alfredo Baño Leal, guided by Kapil Thrukal, and supported by Olimpia Henriques da Silva, Nelson Guevara, Irene Garganta, and the consultants Chrisantha Ratnayake, Muzaffar Cheema, Munir Ahmad, Maria Lourdes Lopez, and David Corderi.

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The Independent Evaluation Department remains fully responsible for the contents of this report.
Foreword

Pakistan has endured a severe energy crisis over the past decade, with long blackouts and industries unable to operate at optimal levels because of the inadequate power supply. The share of oil-fired power plants in the energy mix for power generation in Pakistan contributes disproportionately to the high average cost of power supply, impacting on the welfare of the overall population, particularly the poor.

The Asian Development Bank (ADB) has been the leading development partner in Pakistan, supporting the energy sector with $7.8 billion approved and $6.2 billion committed from 2005 to 2017. ADB support across all energy subsectors has helped expand and strengthen the national power grid, build power plants, increase access to electricity, and initiate important sector reforms.

As a result of this support, the power system’s reliability and efficiency have increased over the years, but only limited progress has been made in addressing the underlying causes of circular debt (i.e., cash shortfalls across the power supply chain) and in strengthening the financial sustainability of the energy sector. Despite these limitations, the situation of the sector would have been even more precarious without ADB support.

Several challenges continue to threaten the Pakistan energy sector, particularly ballooning circular debt that is reaching unsustainable levels. Good governance, financial sustainability, and institutional efficiency are the cornerstones of an energy sector that is functioning well. A comprehensive multipronged approach is needed to help overcome Pakistan’s energy hurdles. This evaluation offers a set of strategic and operational recommendations to help ADB make a more meaningful contribution to the sector.

Independent Evaluation’s consultations with the government have validated the findings, issues, and recommendations offered by the report and key stakeholders have expressed their commitment to address the issues that affect the sustainability of the energy sector in Pakistan. Abundant opportunities exist for ADB and the government of Pakistan to work together constructively, in collaboration with other development partners, to develop a sustainable and efficient energy sector in Pakistan.

Marvin Taylor-Dormond
Director General
Independent Evaluation
ADB’s Support to Pakistan Energy Sector (2005–2017)

ADB has been the leading development partner in the Pakistan power sector, with Board approved financing of $7.76 billion from 2005 to 2017. ADB has employed an integrated approach that has included investments in power transmission and distribution, institutional and regulatory reforms, sovereign and nonsovereign financing for conventional and renewable energy generation, and technical assistance.

Working in a very challenging environment, ADB has successfully supported power transmission and conventional power generation, and to a lesser extent, power distribution. However, it has been less than successful in supporting renewable energy, energy efficiency, and sector and regulatory reform. In addition, the limited progress on reforms and the circular debt problem makes ADB’s support less likely sustainable.

In terms of results, ADB’s efforts to increase the power system’s reliability and efficiency have been limited. Efforts to address the underlying causes of circular debt (i.e., cash shortfalls across the power supply chain) and the financial sustainability of the power sector have not led to visible improvements on the ground to date. However, without ADB support, the situation of the power sector in Pakistan would likely be more precarious. Consultations with the government have confirmed the findings, issues and recommendations offered by the report and key stakeholders have expressed their commitment to address the issues that affect the sustainability of the energy sector in Pakistan.

RECOMMENDATIONS

In order to increase the effectiveness of the Asian Development Bank’s support to the power sector in Pakistan, this evaluation provides the following recommendations:

Strategic

1. Emphasize support to the improvement of governance in the power sector, strengthening the regulator so it has sufficient power and authority, promoting mechanisms in sector operations that remain in effect through political changes, and supporting interagency coordination.

2. Assist Pakistan in addressing the accumulation of circular debt by targeting its underlying causes, implementing the amended NEPRA Act, and establishing an effective system of cost-recovery tariffs.

3. Support long-term planning and management systems through technical assistance and continue providing infrastructure investments in transmission and distribution.

4. Strengthen support to clean energy and conservation through investments in renewable energy generation and energy efficiency, as well as review the Renewable Energy Policy and associated regulations, to increase the share of renewable energies in the mix, reduce cost of generation, and mitigate impact on climate change.

Operational

1. Continue supporting the government with advisory services towards developing a competitive electricity market and achieving financial sustainability of the power sector.

2. Promote sovereign investments for lowering the cost of base-load power generation, building on sound integrated energy planning to increase Pakistan’s energy security by reducing its dependency on imported fuels.

3. Support implementation of an action plan for DISCO commercialization, including efficient infrastructures, energy accounting through advanced metering, theft reduction through aerial bundled conductors (ABC), area planning and coordination, commercialization and privatization analysis and a potential pilot project to attract private investors.

4. Strengthen ADB’s internal monitoring and reporting system in order to consolidate all project-related information, to enable easy access and continuous ongoing management and reporting.
ADB ASSISTANCE

Pakistan has been one of ADB’s largest borrowers in the energy sector. From 2005 to 2017, Board approvals amounted to $7.76 billion, and financing commitments totaled $6.17 billion. During this period, there were 28 sovereign loan commitments totaling $5.43 billion, 12 nonsovereign operations totaling $725 million, and 10 technical assistance projects worth $8.3 million. ADB’s portfolio covered all energy subsectors: sector reforms (18%), generation from conventional sources (22%), transmission and distribution (46%), and renewable energy and energy efficiency (14%).

PERFORMANCE

Amid challenging working conditions, ADB has been successful in their support to power transmission and conventional generation, and to a lesser extent power distribution. It has been less than successful in supporting sector and regulatory reform, as well as renewable energy and energy efficiency, as many of the outputs and outcomes have not been achieved to date.

The overall performance of ADB is rated less than successful, while the limited progress on reforms and the circular debt problem makes ADB support less likely sustainable.

RESULTS

To date, the overall results with respect to addressing the causes of circular debt and increasing financial sustainability have been modest. ADB efforts have had a limited impact on reducing the circular debt flow, which has kept increasing rapidly, despite continuous attempts to reduce it.

Increasing institutional efficiency remains work in progress. Efforts to date have been much delayed and improvements have been limited, although it is too early to gauge the benefits from the amended National Electric Power Regulatory Authority (NEPRA) Act and the creation of the market operator. Commercialization of distribution companies (DISCOs) and generation companies remains high on the agenda of the government, but progress has recently stalled.

ADB efforts to support increased power supply reliability and efficiency have been satisfactory in transmission, and to a lesser extent in distribution. ADB contributed substantially to the improvement and expansion of the transmission and distribution network capacity, but DISCOs still have high losses and low performance levels.

ADB’s nonsovereign operations investments have supported increases in the share of renewable energy. However, limited progress has been achieved in significantly improving access to electricity or in improving energy efficiency. Safeguards results have been satisfactory in general and women have benefitted from the improved reliability of the electricity supply.

Without ADB’s assistance, the situation of the power sector in Pakistan would likely be more precarious.

ISSUES

Regarding external issues, upcoming power generation may overload the transmission and distribution systems (the weakest link of the power system) and may threaten the financial sustainability of the energy sector. Power sector state-owned companies do not have sufficient incentives to improve their financial and operating performance, while IPP operations have been adversely affected by delayed payments from the off-taker. Inter- and intra-agency coordination is poor, while political economy factors that support the status quo and resist reforms and transparency, have slowed down improvements in the power sector.

With respect to internal issues, ADB’s analytical and capacity building support to improve the performance of the power sector entities has not been sufficient, and policy-based load programs have failed to trigger substantial reforms to date to contain circular debt. Further, design flaws of MFF programs have reduced the effectiveness of the portfolio, and ADB internal reporting and availability of information on the Pakistan energy portfolio has not been adequate.
Executive Summary

Pakistan has been one of Asian Development Bank’s (ADB’s) largest borrowers in the energy sector in terms of Board approvals, with $7.76 billion approved in 2005–2017. ADB has been the leading development partner in the Pakistan energy sector since 2005, employing a multipronged approach, including sovereign loans, nonsovereign investments, and technical assistance across all subsectors.

The sustainable development of Pakistan’s power system requires the sector’s circular debt (i.e., cash shortfalls across the power supply chain) to be addressed. The sector needs to become more efficient and financially sustainable, while the power supply needs to be more reliable and accessible to more people, while increasing the share of renewable energies.

Working in a very challenging environment, ADB has successfully supported power transmission and conventional generation, and to a lesser extent power distribution, which has become the weakest link of the grid power supply network. Support for sector reform and clean energy fell short of achieving its intended outcomes. The overall performance of ADB’s assistance is less than successful. All subsectors are rated less likely sustainable in view of the circular debt situation and the high financial risks across all subsectors. Regarding results, the power system’s reliability and efficiency have increased, but only limited progress has been made in addressing the underlying causes of circular debt and in strengthening the financial sustainability of the power sector. However, without ADB support, the situation of the power sector in Pakistan would likely be more precarious.

The following recommendations are intended to improve ADB’s performance and its support to the power sector in Pakistan. Strategically, ADB should support: (i) improved governance in the power sector, through mechanisms that remain in effect through political changes; (ii) efforts in addressing the accumulation of circular debt by targeting its underlying causes; (iii) long-term planning and improved management systems in transmission and distribution; (iv) clean energy and conservation through investments and enhanced policies and regulations. Operationally, ADB should (i) provide advisory services towards developing a competitive electricity market; (ii) promote sovereign investments for lowering the cost of base-load power generation and integrated energy planning; (iii) support implementation of an action plan for DISCO commercialization, including efficient infrastructures, energy accounting through advanced metering, theft reduction through aerial bundled conductors (ABC), and commercialization analysis; and (iv) strengthen ADB’s internal monitoring and reporting system. A consultation mission in November 2018 with the government confirmed the findings, issues and recommendations offered by the report and key stakeholders have expressed their commitment to address the issues that affect the sustainability of the energy sector in Pakistan.

Introduction

Pakistan has been one of ADB’s largest borrowers in the energy sector in terms of Board approvals with $7.76 billion approved in 2005–2017. ADB supported the country’s energy sector through a multipronged approach, including investments in sovereign policy-based loans (PBLs) and technical assistance (TA) for sector institutional and regulatory reforms, conventional and renewable energy generation, and transmission and distribution. The total amount of ADB’s financing commitments was $6.17 billion: $5.43 billion of sovereign financing, $724 million of nonsovereign financing, and $8.3 million of TA activities. As of October 2017, $2.9 billion have been disbursed.

This evaluation assessed the performance of ADB support to Pakistan over the past decade, in order to gain insights and lessons learned from past investments and to guide ADB’s future involvement in Pakistan’s energy sector. IED carried out this sector assistance performance evaluation, at the request of the Board to assess ADB’s support to Pakistan’s power sector since 2005 and recommend how ADB can best continue supporting the sector. The relevant government authorities appreciated the high quality and good timing of the report and expressed their commitment to address the issues that affect the sustainability of the energy sector in Pakistan.

The sustainable development of Pakistan’s power system requires the issues underlying the circular debt to be addressed; the financial sustainability and institutional efficiency of the power sector strengthened; power supply reliability and access improved; and the share of renewable energy increased. To contribute to these outcomes, ADB
supported the Pakistan power sector at two core levels: (i) the institutional and regulatory level, by supporting sector reform and increased institutional efficiency; and (ii) the power infrastructures level, through investments in enhanced power facilities. As inputs, ADB used sector reform programs, technical assistance and infrastructure investments in four subsectors: generation from conventional sources, transmission, distribution, and renewable energy. ADB also provided nonsovereign financing for conventional and renewable energy generation.

**Evaluation Framework**

This evaluation aims at responding to the overarching question: To what extent has ADB contributed to (i) addressing the causes of circular debt and increasing the financial sustainability of the power sector, (ii) increasing the institutional efficiency of the sector, (iii) improving the reliability of the power supply, (iv) increasing access to electricity, and (v) increasing the share of clean energy? Three subsidiary questions were also asked. (i) What is the relevance and additivity of ADB support to Pakistan’s power sector? (ii) What has been ADB’s institutional efficiency in supporting the Pakistan power sector? (iii) How effective has ADB been in supporting the Pakistan power sector to achieve the intended results?

To complement the data from the limited project completion reports available, the evaluation carries out a real-time analysis of almost completed operations to inform the performance of ADB’s assistance. The evaluation gathered evidence through review of ADB’s project documents, portfolio analysis, project monitoring reports, government documents, and interviews with ADB staff and other key sector stakeholders.

**Pakistan Energy Sector Context**

Reform of the power sector started in 1992 with the unbundling of the Water and Power Development Authority (WAPDA), which is still in progress. With support from donor agencies, the power wing of WAPDA was separated into several state-owned enterprises for generation, transmission and distribution. In 1997 private independent power producers (IPPs) entered the sector, and the independent regulatory body, the National Electric Power Regulatory Authority (NEPRA), was established. Currently, Pakistan has 10 distribution companies (DISCOs), four generation companies (GENCOs), 36 private IPPs, three nuclear power plant companies, one hydropower company (WAPDA Power), a transmission and system operator (the National Transmission & Despatch Company [NTDC]), and an electricity market operator (the Central Power Purchase Agency [CPPA-G]). All DISCOs and GENCOs are still state-owned. K-Electric is the only private power utility to serve the Karachi metropolitan and surrounding areas; it is vertically integrated and operates generation, transmission and distribution facilities.

The sector is now administered by the Ministry of Energy, which was created in 2017, after a restructuring of the two leading ministries of water and power, and petroleum and natural resources. Regulation of the sector has been part of the mandate of the National Electric Power Regulatory Authority (NEPRA) since 1997. Other power-sector-related agencies are the Planning Commission, which carries out energy integrated planning, the Private Power and Infrastructure Board (PPIB), which leads the licensing of independent private producers (IPPs), and the National Energy Efficiency and Conservation Agency (NEECA), which leads energy efficiency initiatives and labelling.

**Circular debt is a symptom of several problems that underlie the Pakistan power sector.** The circular debt stock, including debt transferred to the state-owned company Power Holding Private Limited (PHPL), which is not recognized as circular debt by the government, is approximately 1 trillion Pakistan Rupees (PRs), approximately $10 billion. Circular debt is a shortfall at CPPA-G of cash inflows from DISCOs and outflows to power suppliers. It is a result of (i) inadequate tariff and subsidy systems, and (ii) technical and operational inefficiencies. In addition to high technical and commercial losses (including theft), and lower than targeted collections, various political factors affect the circular debt. The delay between the determination of the tariff by NEPRA and the notification of the tariff by the government has increased the gap between the cost of supply and the billed amounts to consumers, which the government identified as the main contributor for circular debt growth. The federal government continues to subsidize electricity sales to certain regions, collections are not recovered from federally administered tribal areas and tube-wells in Balochistan, and taxes are still raised on non-recovered amounts. The
government confirmed during the consultation mission that targeting theft has become a top priority and it has established task forces to reduce industrial commercial and high-end defaulters, in coordination with relevant federal and local authorities.

These political economy factors have led to revenue shortfalls which have made it difficult to reduce the technical inefficiencies that also contribute to the circular debt problem. Revenue levels that are below cost-recovery push power sector entities into short-term debt to service their working capital, reducing their capacity to invest in improved facilities. Dated infrastructures waste electricity, whose cost is never recovered. These factors require the government to subsidize the power sector entities, or to allow them to make large losses. As a result, the increased efficiency of power utilities, reform of tariff structures, and timely payment of arrears are critical if the downward spiral of circular debt is to be stopped. Recent reports show rapidly rising circular debt levels, although the government confirmed during the consultation mission the increased focus on rationalization of tariffs to address this issue.

Due to the circular debt problem and since investment in power systems has not kept pace with needs, a large demand–supply capacity gap of over 6 GW has emerged, leading to frequent load shedding. The upcoming 10 GW of power generation projects to be added by 2021 is expected to reduce and eventually eliminate power generation shortages, but in the absence of required sector reforms to address cost recovery these projects may worsen the financial sustainability of the sector. During the past decade, electricity consumers have experienced frequent load shedding of about 5 hours a day in urban areas and 10 hours a day in rural areas. As a result, electricity consumption per capita was stagnant during most of the evaluation period, with only a 6% increase from 2005 to 2016, whereas the ratio of industrial electricity consumption decreased resulting in industries turning to captive generation or closing business. This situation started changing in 2017 due to a change in policy that discontinued load shedding in high loss feeders.

One third of the population lacks access to grid electricity supply. Official government estimates indicate that about one third of the population is not connected to the grid power supply. However, because of the large number of illegal connections across Pakistan, it is difficult to estimate the actual number of households supplied from the grid.

The energy mix for power generation in Pakistan is dependent primarily on hydropower, oil-fired and gas-fired power plants, with each accounting for approximately 30%, whereas the costs are heavily skewed toward oil-fired power plants, which account for 46% of total costs, contributing significantly to the high average cost of supply. Pakistan’s high percentage of oil-fired generation is a result of neglected integrated energy planning, and of decisions that were based on short-term considerations, which is evident from the fact that installed hydropower capacity has increased by only 7% from 2005 to 2016, and only 12% out of a potential of 60 GW has been developed to date. This increase is equivalent to 15% of the 4,081 MW of thermal power generation added during the same period, which has enjoyed 56% growth. Further, almost all thermal plants in Pakistan have power purchase agreements (PPAs) with a take-or-pay clause that guarantees capacity payments, even if no electricity is generated. Also, increased oil prices and a weaker currency increase substantially the variable cost of thermal generation (cost of fuel), which has become higher than renewable energies. Investments in the power sector are not anchored on long-term plans for generation, transmission and distribution systems. With continued circular problems, investments in transmission and distribution systems have also tended to address bottlenecks rather than to optimize system expansion and strengthening over a longer time horizon. Consultations with the government in November 2018 confirmed the increased sense of urgency and priority to address the key issues affecting the sector, including institutional reforms, improved productivity and institutional efficiency, as well as emphasis on improved governance.

**ADB Assistance**

ADB has been the leading development partner in the energy sector in Pakistan during the evaluation period. The energy sector in Pakistan benefited from ADB support across all subsectors and from ADB’s support for essential sector reforms, in coordination with the other main
development partners. ADB’s energy policies during the evaluation period aimed at supporting energy security, facilitating a transition to a low-carbon economy, and supporting poverty reduction through increased access to affordable energy. The ADB Energy Policy (2009) specified the objective of helping developing member countries provide reliable, adequate, and affordable energy for inclusive growth in a socially, economically, and environmentally sustainable way. Implementation of the policy is guided by three pillars: (i) promoting energy efficiency and renewable energy, (ii) maximizing access to energy for all, and (iii) promoting energy sector reform, capacity building, and governance.

A total of four country strategies and various updates were in place during the evaluation period (2005–2017). Pakistan’s country strategy and program (CSP) 2002–2006 and its three updates focused on enhancement of transmission and distribution systems, as well as on supporting renewable energy generation. This was followed by the country partnership strategy (CPS), 2009–2013 which focused on energy sector reforms and expansion of the energy supply, including generation, transmission, and distribution, as well as energy efficiency activities. An interim CPS, 2014–2015 aimed at reducing distribution and transmission losses and reducing load shedding, and the current CPS 2015–2019 continues to support tariff reforms, loss reduction by DISCOs, energy efficiency and conservation, increased transparency and performance, and commercialization and privatization of DISCOs.

ADB’s portfolio from 2005 to 2017 supported all energy subsectors through a variety of financial instruments, including sovereign loans, nonsovereign operations, and technical assistance. During the evaluation period, ADB approved 28 sovereign loans with a net amount (after adjustments and cancellations) of $4.5 billion (86% of the total), 12 nonsovereign operations of $725 million (14%), and 10 TA projects of $8.3 million (0.1%). The actual amounts committed were significantly less than the amount approved by the Board, as some tranches of MFF programs were never initiated. This reduced the overall amount of MFF operations to $3.1 billion as of 2017. By subsector, the ADB portfolio supported sector reforms (18%), generation from conventional sources (22%), transmission and distribution (46%), and renewable energy and conservation (14%).

Performance and Results
Performance
This evaluation assessed ADB’s performance in five main areas: (i) sector reform and regulations, (ii) generation from conventional sources, (iii) transmission systems, (iv) distribution systems, and (v) renewable energy and energy efficiency. Most project loans have not been officially closed, but some are far enough in implementation to be objectively assessed. To date, only two completion reports of sovereign loans, four of NSO, and four of TA projects have been prepared, which have also been validated by IED. An additional set of operations has been assessed using monitoring documents provided by ADB project teams.

Sector Reform and Regulations
The Sustainable Energy Sector Reform Program (PB) and TA activities were designed to support sector and institutional reform. The PB built on the work of the previous Accelerating Economic Transformation Program PBL, 2008 that was discontinued in 2010 during implementation of the second subprogram, after the IMF’s Standby Arrangement was cancelled. ADB did not support power sector reforms again in Pakistan until 2014. The Sustainable Energy Sector Reform Program of 2014 supported the reform initiatives outlined in the National Power Policy, 2013, which aimed to build an affordable, reliable, sustainable, and secured energy sector, in coordination with Pakistan’s main development partners. It sought to contain the accumulation of circular debt by reducing transmission and distribution losses, improving tariff collection, and reducing the time for NEPRA’s tariff determination after DISCOs had submitted their petitions for tariff revisions. Key support for sector reform was provided through TA activities starting in 2005 and extended during most of the evaluation period; e.g., the Energy Sector Task Force (ESTF) and support to CPPA-G. Considering the wide reach of the Sustainable Energy Sector Reform Program’s interventions in several sectors, the coordinated effort with other development partners, combined with various TA activities that targeted important aspects of the sector, this evaluation rates ADB’s support for sector reform relevant.
While the Sustainable Energy Sector Reform Program contributed to various institutional and regulatory changes, it has not yet delivered most of the outputs or achieved the outcomes to date, although some changes have contributed to put the sector in the right direction. The program helped place the sector on the right track, with the amendment of the NEPRA Act, which avoids the time lag between tariff determination and notification, instituted a unified revenue-based tariff mechanism, as well as enables NEPRA to manage tariff appeals more efficiently. These changes are expected to have a significant future impact on addressing the circular debt problem. The program also supported the restructuring of government ministries related to the sector (including the creation of Ministry of Energy). However, the program has not yet delivered most of the outputs or achieved its outcomes as of June 2018, according to its design and monitoring framework, although several reforms were stalled during the 2018 election period. Moreover, the commercial viability of DISCOs has not improved, and the objective of privatizing DISCOs and GENCOS has been stalled. Although some TA projects were effective (e.g., those supporting ESTF and CPPA-G), considering that only two of the five PBL program’s outcomes have been achieved to date, the performance of ADB’s support for sector reforms is rated less than effective.

Advisory and capacity building TA activities were generally effective, but delivery of the Sustainable Energy Sector Reform Program outputs was delayed with only two outputs fully achieved, despite the fact that $2.4 billion have been disbursed. Only the outcome indicator for private sector participation (due CPEC-related private investments) and the ratio of subsidies per percentage of Gross Domestic Product have been achieved. The others have been achieved only partially or not at all. The large budget appears to have been used for achieving limited changes such as the NEPRA Act amendment. Hence, ADB support is rated less than efficient.

It is unclear if the policy actions that have been delivered to date will have long-lasting effects. The recent escalation of circular debt shows that the sector’s underlying problems (tariffs that do not recover costs and inefficiencies along the power supply chain) may jeopardize the sustainability of the sector in the foreseeable future. This reflects the fact that more than 8 GW of new IPP generation capacity (mostly under the CPEC initiative) will be coming onstream over the next few years, which will increase electricity off-take in the national grid as well as electricity sales to end-users, although tariff rates will not recover full costs. The evaluation rates ADB’s support for sector reform less likely sustainable.

Overall, ADB support for sector reform and regulations is rated less than successful.

**Generation from Conventional Sources**

ADB’s interventions addressed the power demand–supply gap by supporting base load generation, through sovereign and private sector investments in power generation. ADB support for conventional energy (gas-fired and hydropower) was aligned with the government’s strategy of encouraging private participation in the power sector. It was also consistent with government’s Energy Security Action Plan, which called for increasing reliance on indigenous resources for power generation. The TA for coal development in Thar and Badin, and the loan for a supercritical coal-fired power plant supported the sector needs and government plans to move toward indigenous resources. Overall, ADB interventions in the subsector of generation from conventional sources are rated relevant.

Six out of eight nonsovereign operations in conventional power generation have been completed to date. They were assessed to have achieved their intended outputs and outcomes of diversifying the primary energy mix for power generation away from oil, toward hydro and gas power. The New Bong Escape Hydropower Project was the first private hydropower project in Pakistan. ADB also supported the preparation of templates for concession and financing documentation in Pakistan, and provided legal, financial and documentary benchmarks to other private investors in hydropower. The remaining projects in the portfolio are currently being implemented, and it is too early to evaluate their effectiveness. Although five of the eight conventional energy projects were sensitive in terms of environmental safeguards (category A), none of the six completed projects reported any issue, and all have complied with national and ADB’s safeguard policies. Overall, ADB support for generation from conventional sources is rated effective.
The completed NSO projects were executed with delays and cost overruns due to floods, security issues or design changes and problems during construction, but these did not have a major impact on the project outputs and outcomes. The completed projects, as shown in their validation reports, produced high economic internal rates of return (EIRRs) from 10.6% (Daharki) to 17% (KESC post-privatization), and helped reduce power shortages and associated load shedding. On the other hand, implementation of the Jamshoro supercritical coal-fired power plant is still ongoing following a 3-year delay, although its contract value is lower than the estimated costs at appraisal. Overall, the generation from conventional sources projects are rated efficient.

While the financial internal rates of return (FIRR) of two out of three evaluated projects were higher than their cost of capital, the financial risks due to circular debt problems are a matter for concern. The FIRRs exceed the weighted average cost of capital (WACC) in two out of three projects, except for Daharki. However, the financial risks for all the projects are significant—due to the circular debt problem and the fact that CPPA-G does not carry out timely contractual payments—which result in cashflow problems for IPPs. Such risks affect the financial sustainability of the projects, raising the possibility of default in the near future. ADB support for generation from conventional sources subsector is rated less likely sustainable.

The overall ADB support to generation from conventional sources is rated successful.

Transmission Systems

Both MFF transmission programs addressed the capacity shortages of the transmission network during the evaluation period. The MFF instrument is considered appropriate for transmission system investments, as it has assured NTDC of continued financial support. The first MFF program aimed to reduce bottlenecks by adding transforming capacity at 500 kV and 220 kV, extending backbone transmission lines following NTDC’s development plan, and reducing high technical losses. The second MFF continued the work from the previous program in rehabilitating and expanding high voltage networks, as well as supporting the development of a supervisory control and data acquisition (SCADA) system for adequate network control operations. The evaluation rates ADB support for the transmission subsector relevant.

ADB support helped achieve the objectives of reducing transmission bottlenecks and technical losses, as well as improving the transmission network reliability, but without supporting long-term planning. Two completed tranches of the first MFF transmission programs contributed 42% to the overall increase in transforming capacity of NTDC substations at 220 kV and 500 kV during the evaluation period, as well increasing the transmission line length by 12% to allow off-take from new power plants, and to meet growing demand. The second MFF was approved in 2016 and few outputs have been delivered to date. Nonetheless, it is expected that the subprojects currently being implemented will also achieve the intended objectives. Subprojects of the MFF Transmission program were categorized B for environment and A for social safeguards, due to the potential impact on land acquisition and displacement of people along transmission lines’ right-of-way or area for new substations. Regarding gender, results have been positive due to improved power supply and increased access. Overall, ADB support for the transmission subsector is rated effective.

The subprojects of the first MFF were implemented as designed, although some tranches were delayed. There were significant cost savings due to lower costs of good, in the wake of the global financial crisis. This allowed additional subprojects to be carried out and increased the effectiveness of the program. However, after misprocurement was declared in some contracts of tranche 2 of the first MFF due to procedural issues (not fiduciary), ADB carried out a project procurement-related review in 2014. NTDC implemented the recommendations from ADB and improved its fiduciary processes for future projects. The economic impact of a more reliable transmission network, increased transmission capacity, and reduced technical losses is significant, as shown by the EIRRs of 14% and 18% in the two completed tranches. The high economic benefits for the economy of a reliable power network suggests that ADB support to transmission subsector is efficient.

The MFF programs supported increased transmission capacity and helped reduce losses that led to higher sales to distribution companies. Further, increased transmission capacity
connected new power generation capacity and helped reduce the demand–supply gap and load shedding. Also, the recent restructuring of NTDC and the creation of CPPA-G resulted in the responsibility of market operations and payment to power generators being handed over to CPPA-G. Hence, NTDC revenues now come from regulated wheeling charges, which support its financial sustainability, but only if NTDC is paid in full, which is unlikely if circular debt keeps escalating. Nonetheless, this evaluation rates ADB support to the transmission subsector likely sustainable.

The overall ADB support for the transmission subsector is rated successful.

**Distribution Systems**

ADB is the only development partner with significant presence in the distribution subsector, which has been neglected by most development agency programs. Both distribution MFFs were structured in line with the government’s Power Distribution Sector Road Map for 2008–2017, and targeted rehabilitation and expansion of distribution networks, and enhancing of system and commercial operations of the DISCOs. The first MFF supported infrastructure investment in rehabilitation and the expansion of 132kV subtransmission and 11 kV medium voltage networks, with the aim of removing bottlenecks, as well as supporting the restructuring and commercialization of DISCOs. The second MFF aimed at reducing commercial losses, as well as improving collection through an advanced metering infrastructure (AMI). The cost-benefit analysis done by the program’s feasibility study shows a financially viable program, although benefits from eliminating losses from theft may not be solved by AMI, as assumed by the feasibility study. Also, it was missing a comparison of investments in AMIs vs aerial bundled conductors (ABC), as a counterfactual. A coordinated approach of ABC and AMI would be more effective in addressing both commercial losses through appropriate metering system, and electricity theft through the use of ABC in low voltage networks. ADB support to reduced bottlenecks and overloaded substations and feeders, as well as an improved metering and energy accounting systems is rated relevant.

The first distribution MFF helped increase 31% of the total transformer capacity at 132kV and remove bottlenecks by upgrading and expanding networks in 8 DISCOs but did not help reduce technical and commercial losses significantly. As of mid-2018, the 4 tranches are almost completed, with a total of almost 800 subprojects implemented. The program contributed to rehabilitate the networks, increase voltage from 66 to 132 kV, as well as expand medium voltage distribution lines. It added a total capacity of 13,309 MVA at 132 kV (31% of total installed in the country), and 2,200 km of subtransmission lines (9% of the total). However, only one of the four program outcomes were achieved (i.e., additional 12 terawatt-hours distributed, but 3 years late), whereas reduction of outages and increase access to 90% of the population remain to happen. It is noted in the previous section of relevance that such indicators are not realistic, and the effectiveness of the program cannot be measured appropriately with such outcome targets. As the second MFF on advanced metering systems has not yet started, its effectiveness is not evaluated. Regarding safeguards, the MFF Distribution program was categorized as B for environment and B for social safeguards, and projects followed relevant ADB’s safeguards policies, and gender balance support have been positive due to improved power supply and increased access. Notwithstanding that DISCOs have not achieved financial autonomy and distribution losses have not been reduced significantly, ADB support has helped increase transformer capacity at the 132kV level. Hence, this evaluation rates ADB support to the distribution subsector effective.

The implementation of all four tranches of the first distribution MFF program is on track, with expected completion in 2018, although the implementation of the second MFF has yet to begin after almost 3 years. Tranche 1 of the first distribution MFF required a major change of scope to utilize surplus loan proceeds to finance additional equipment, due to significant lower contract values in the wake of the global financial crisis. Overall, the expected economic benefits of the program are large, as it supports reduced outages and increased sales. It is noted that the second MFF was approved in November 2015 and put on hold by the previous government until now that has been reactivated. The MFF distribution program was categorized as B for environment and B for social safeguards, and projects followed relevant ADB’s safeguard policies. Regarding gender, results have been
positive due to improved power supply and increased access. This evaluation rates ADB support for the distribution subsector efficient.

Whereas the MFF program’s FIRR might be relatively high, there are concerns about the financial sustainability of certain DISCOMs. Some of these companies have higher than average technical and commercial loss levels, lower revenues and/or lower collection rates. Unless there is strong budget and institutional support from the government to improve the infrastructures and operations of such DISCOMs to meet NEPRA’s tariff requirements, half of them will continue to run at a loss and will need to be supported with budgetary transfers from the government. Hence, ADB’s support to the distribution subsector is rated less likely sustainable.

ADB’s overall support to the distribution subsector is rated successful.

Renewable Energy and Energy Efficiency

NSO projects in wind and solar power were among the first renewable energy projects to achieve financial closure. The projects were aligned with the energy policy at the time, which stressed the need to encourage private sector participation in power generation. Zorlu Enerji wind power project was also the first project in the country registered to sell certified emission reductions in the United Nations Framework Convention on Climate Change (UNFCCC) carbon market.

The benefits of using the programmatic MFF approach for both renewable energy and energy efficiency subsectors, rather than stand-alone project loans, remains unclear. The MFF on renewable energy and the MFF on energy efficiency were designed to implement a wide range of projects with multiple implementing agencies, which made progress difficult and led to cancellations. The MFF on renewable energy was to implement mini-hydro projects with designated agencies in provincial governments and private wind power projects with guarantee support from the Alternative Energy Development Board (AEDB). This made progress difficult. Similarly, the MFF on energy efficiency aimed at implementing four different tranches in four very different subsectors across both demand and supply sides. Each tranche was to have different executing agencies, most with no experience of working with ADB at the time. The results-based loan (RBL) approved in November 2016 is to support two provincial governments in implementing their clean energy programs in their bid to achieve universal electricity access. This evaluation rates ADB support to renewable energy as less than relevant.

NSO projects were effectively implemented, although the MFF programs failed to deliver the expected outputs. The MFF on renewable energy could only implement tranche 1 as tranche 2 was cancelled after approval, but before disbursement. Tranche 1 delivered only 40 MW of mini-hydro power out of the 325 MW expected. The MFF on energy efficiency could implement only tranche 1. While it distributed all the compact fluorescent lamps (CFLs) that were intended, it is unclear whether it achieved the targets of saving electricity or reducing emissions, as studies suggest that the extended time of use of the lights would offset the savings. Implementation of the RBL has begun only recently, and its effectiveness is not yet clear. All projects and programs were categorized B for environment and B for social safeguards. ADB has flagged the MFF on energy efficiency with CFL distribution as a potential problem, due to the unavailability of waste management facilities for lamp disposal. Regarding gender, the only program of the portfolio concerning effective gender mainstreaming is the RBL on access to clean energy, as its second output targets increased opportunities for women and girls to obtain energy services and benefits. Overall, the evaluation rates ADB support to renewable energy less than effective.

The experience with the Zorlu Enerji wind power project indicates that NSO projects in wind power can be broadly considered economically efficient, while the two MFF programs on renewable energy and energy efficiency ran into long delays and cancellations. Tranche 1 of the renewable energy MFF was extended by 5 years and tranche 2 was cancelled after 3 years of the availability period. As a result, the renewable energy MFF closure date had to be extended beyond 10 years. The energy efficiency MFF has not yet been closed because of issues with lamp disposal (due to mercury content), although only one tranche was implemented in 8 years. The Zorlu Solar project has been stalled due to a policy change in January 2018 that halted development of all renewable energy projects under preparation. The overall
support for renewable energy and access is rated less than efficient.

**NSO wind projects are affected by circular debt issues, the operation and maintenance of mini-hydro projects is unclear in the long run, and CFLs are being substituted by light emitting diode (LED) lamps.** The wind power projects are expected to have higher FIRRs than their cost of capital, as showed by the Zorlu Enerji validation report, if CPPA-G pays according to power purchase agreements (PPAs). However, this has not been the case recently and there are concerns about the sustainability of such projects. Distribution of CFLs has finished after the project, as they are available in the market at competitive prices and are currently being replaced by more efficient LEDs. The sustainability of the mini-hydro projects financed by the renewable energy MFF is unclear and is subject to appropriate operation and maintenance systems being in place. The RBL on access to clean energy builds on government programs in Punjab and Khyber Pakhtunkhwa (KPK), although it is unclear what will happen once the RBL program is closed. Hence, the support to the subsector is rated less likely sustainable.

The overall support to renewable energies is rated less than successful.

**Overall Performance of ADB Assistance**

Whereas NSO operations and the first MFFs on transmission and distribution have been successful, the performance of the PBL and the two failed MFFs on EE and RE weighs down the overall performance. Also, almost all operations are considered less likely sustainable, due to the impact of circular debt on the financial sustainability of the power sector entities, both public and private. The overall performance is rated less than successful.

**Results**

The analysis of the results follows the overarching question: to what extent has ADB contributed to addressing the causes that underlie circular debt, increasing the financial sustainability and institutional efficiency of the power sector, improving power supply reliability, efficiency, and access; and increasing the share of clean energy.

**Addressing the Causes that Underlie Circular Debt and Increasing Financial Sustainability**

To date, the overall achievements of ADB’s efforts to address the causes that underlie circular debt are limited, with unclear impact on reducing the circular debt flow that keeps increasing rapidly.

Despite continuous attempts by ADB and other development partners to address circular debt, it has risen substantially since the government paid off most of the debt in 2013. ADB renewed its support for sector reform in 2014 after the full settlement of circular debt of PRs480 billion in 2013. The ADB PBL was fully coordinated with the IMF’s extended fund facility (EFF) and with the World Bank. While several policy actions were achieved, most outputs have not yet been fully delivered and most outcomes have not been achieved. It is too early to tell whether the policy actions achieved, such as the reduction and elimination of the delay between tariff determination and notification, will influence reductions on circular debt. Besides, the total circular debt has risen rapidly in FY2018, reaching previously new heights. Most DISCOs and GENCOs are running at a loss, and private IPPs are not being paid according to their contracts, which requires them to take out expensive short-term financing to keep operating.

**ADB has indirectly helped to reduce the rate of accumulation of circular debt by supporting generation projects that reduce the average cost of generation.** The ADB-supported IPP portfolio is focused on technologies that help diversify the energy mix away from expensive oil-fired generation. Although only 1,600 MW of gas-fired, 84 MW of hydropower, and 156 MW of wind capacity supported by ADB has come on stream to date, these new cleaner energy sources have helped reduce the overall cost of generation. Other ADB supported generation capacity being implemented (coal-fired power plants, run-of-river hydropower, wind, and solar photovoltaic (PV)) will further reduce the average generation cost.

**Increasing the Institutional Efficiency of the Power Sector**

Although some institutional changes have been implemented, the effort to date has been much delayed, remains a work in progress, and improvements have been limited. Key institutional reforms recommended 10 years ago were implemented only within the last year and moves to commercialize DISCOs have been stalled.
ADB led the Energy Sector Task Force (ESTF) which recommended many institutional reforms in 2010, some of which have been implemented recently. However, the sector reforms and restructuring that began in the 1990s remain to be completed. In line with the ESTF report recommendations, some restructuring has already occurred, such as the unified Ministry of Energy in October 2017 or the separation of CPPA-G from NTDC in 2015. However, the benefits from those institutional reforms in the form of better interagency coordination under the Ministry of Energy or improved wholesale market operations remain to be seen.

It is too early to gauge the benefits from the amended NEPRA Act and the creation of CPPA-G. Regarding the amended NEPRA Act, the extent to which the efficiency of tariff determination and notification will improve, how well the appellate tribunal will function, or whether NEPRA will be able to impose the requisite levels and types of surcharges is not clear. While CPPA-G absorbs payment-default risks and moves debt upstream to generators, it is unclear how long NTDC will be spared from sharing the burden of the circular debt, although CPPA-G has added transparency by eliminating discretionary payment decisions to generators and publishing such payments regularly. It is however unclear how the power market will evolve toward a competitive market given the ongoing long term PPAs.

While privatizing DISCOs and GENCOS remains high on the agenda of the government and ADB, progress has been slow and is currently stalled. The only privatized utility is K-Electric, an integrated utility which was privatized in 2005, and which is supported by ADB through infrastructure investments. ADB’s most recent attempt to support privatization of power sector entities has been through the Sustainable Energy Sector Reform Program, where ADB sought to implement market-oriented reform to improve sector performance and pave the way for privatization of some DISCOs. However, in 2017, the government suspended plans to privatize DISCOs and GENCOS through strategic sales or public offerings.

Efforts to improve transparency and accountability have delivered some preliminary results, but there is still limited information available. Currently CPPA-G, NEPRA, and DISCOs publish information on their respective websites, but the latest published figures are from June 2016, over 2 years ago. Reliable information on circular debt is difficult to find, particularly financial information related to PHPL, and how its debt is being financed. Finally, improved metering systems across the transmission and distribution networks that would help accurately measure energy flows have not been implemented.

Increasing Power Supply Reliability and Efficiency

Results of ADB’s efforts to increase power supply reliability and system efficiency have been satisfactory.

ADB’s contribution to adding new generation capacity has been satisfactory. During the 13-year evaluation period, ADB approved support for about 3,000 MW of generation capacity, of which 1,840 MW has been commissioned to date. This is about 21% of the total capacity additions during the evaluation period. However, since 2013, a total of 3,140 MW of power generation capacity has been already commissioned under the CPEC program, and other CPEC priority projects with a combined capacity of 8 GW are expected to come on stream by 2022.

ADB’s contribution to improving the performance of the transmission network has been satisfactory. About 42% of the overall NTDC’s increased transmission capacity during the evaluation period was financed by two tranches of the first ADB transmission program, which also contributed to loss reduction. However, the results of efforts to improve operational control and processes in the transmission system and grid operation remain to be seen, as some have only been recently implemented (e.g., CPPA-G as market operator) while others are still being implemented (e.g., the SCADA system at NTDC). Without ADB’s support, the country’s transmission network would be completely overloaded with constant forced outages and blackouts.

ADB has contributed to increase the transformer capacity of DISCOs, but their operational performance has not improved as expected. While 8 DISCOs have benefited from ADB support, which added 31% of its total transformer capacity at 132 kV, their technical and commercial losses have not decreased as expected, and all DISCOs but one breach NEPRA’s losses targets (IESCO).
Increasing Access to Electricity

ADB's contribution to increasing access to grid and off-grid electricity has been relatively modest to date. ADB's MFF distribution program supported mostly the expansion of subtransmission networks and substations at 132 kV but offered only limited support to medium voltage network expansion. Since 2013, domestic consumers have increased by 17.5%, although illegal connections are still widespread, which are effectively unaccounted for consumers with access to electricity. ADB is currently supporting off-grid electricity access through solar PV and micro-hydropower projects being developed by the provincial governments of Punjab and KPK, although significant increases in access have not yet occurred.

Increasing Share of Clean Energy

ADB aimed to mainstream clean energy technologies and its contribution to increasing the share of clean energy has been modest. ADB supported renewable energy development through a TA project to help formulate a renewable energy policy and support AEDB, which laid the groundwork for private developers in the clean energy field. ADB was the first development partner to support private renewable energy projects and has been successful with its NSO interventions, which have supported about 400 MW of wind and solar capacity during the evaluation period, although only 156 MW of wind power has been commissioned to date. However, under its sovereign operations, ADB could only deliver 40 MW of small hydropower projects in Punjab and KPK. Results from energy efficiency were very limited as well. Further, it is noted that ADB support for renewable energy capacity is less than one third of the 1,300 MW of renewable energy under the CPEC program priority projects (600MW already commissioned).

Overall results

ADB’s contribution has been limited in terms of addressing the circular debt problem, improving the financial sustainability of the power sector, as well as improving institutional efficiency. While some regulations have been recently passed and institutional changes have been implemented, the effort to improving financial sustainability and reducing circular debt remains a work-in-progress, as receivables and circular debt flows keep increasing rapidly.

ADB has made satisfactory contributions in increasing conventional and renewable energy generation capacity and improving the transmission network, which helps increase power supply reliability. However, ADB’s contribution to improving the performance of the distribution system and increasing consumer access has been modest. Finally, environmental and social safeguards have been satisfactory in general, with positive impact on gender balance, due to improved reliability of electricity supply. It is noted that without ADB’s assistance, the situation of the Pakistan power sector would likely be more precarious.

Lessons, Issues and Recommendations

Lessons

Incomplete policies and timid reforms do not fully address the underlying causes of circular debt. The government, assisted by development partners, has tried unsuccessfully to resolve the accumulation of circular debt. However, circular debt flows continue and are increasing. The financial situation of the sector and the country is jeopardized by circular debt problems, and these cannot be further ignored or delayed. Together with the debt parked at PHPL, the circular debt stock is reported to have reached PRs1 trillion in FY 2018, equivalent to 3% of GDP.

Continued and strong political support and guidance is essential to implement significant reforms. Sudden changes of direction negatively affect the progress of improvements and reforms. In the past various programs have been cancelled (e.g., the Accelerating Economic Transformation Program, along with IMF’s standby arrangement). As a result, a comprehensive circular debt resolution program was abandoned. Considering the internal resistance to change within the power sector, significant reforms will never happen unless key decision makers in federal and provincial governments support such changes. Strong political support is needed to stop circular debt flows and ensure the sustainability of the power sector.

Neglecting integrated energy sector planning contributes to inefficient sector development. Solutions undertaken were suboptimal, which
pushed the sector into short-term solutions for structural problems. Integrated energy planning across all subsectors and long-term planning for generation, transmission and distribution is essential for the efficient development of the power sector. However, pressed to reduce load shedding, the government turned to the private sector, as a short-term solution, to build power generation plants without appropriate planning.

Incomplete restructuring and unbundling of the vertically-integrated power utility WAPDA prolongs the reliance on government subsidization and bailouts to the power sector. The incomplete unbundling of the power sector has allowed for corporatized SOEs (which are independent only in theory) to delay efficiency improvements by benefiting from government bail-out and subsidies. Some regulatory and institutional changes have happened, but the results on the ground are not yet apparent, particularly when circular debt keeps increasing rapidly; e.g., the NEPRA Act was amended 10 years after it was initially addressed under the Accelerating Economic Transformation Program, and DISCOs continue being operated in a coordinated manner through the Pakistan Electric Power Company (PEPCO).

**Issues**

**External**

Upcoming power generation capacity may overload the transmission and distribution networks, unless these systems are expanded, and may threaten the financial sustainability of the sector. Overcoming transmission and distribution capacity constraints gains a sense of urgency as several transmission substations and medium voltage feeders are already overloaded, while the distribution system has become the bottleneck and weakest link of the power network, and the chances of forced outages and system failures in the power networks will increase. Further, such new generation will increase energy sales volumes substantially, which will increase the flow of circular debt, exacerbating losses and the unpaid debt travelling upstream from DISCOs to power generation companies and fuel suppliers. Unless the contributing factors to circular debt are eliminated or substantially reduced, this circular debt accumulation will increase significantly as electricity sales rise.

Power sector SOEs do not have sufficient incentives to improve their financial and operating performance, whereas IPP operations have been adversely affected by delayed payments from CPPA-G. The circular debt cash shortfall starts at DISCOs that do not receive enough revenues to cover their operating and capital costs. However, DISCOs are not independent corporations but SOEs that are regularly bailed out by the government, through substantial subsidies and by paying-off receivables, Hence, the incentives for DISCOs to be financially sustainable are absent, since it is expected that the government will eventually pay off the debt. At the same time, delayed payments result in more borrowings to meet working capital requirements, which increases operating costs. Although IPPs have government guarantees for payments, many IPPs have resorted to arbitration or litigation as liquidated damages have not been satisfied in capacity payments when plant availability is forcibly reduced because enough fuel cannot be procured owing to delayed payments by CPPA-G. Renewable energy IPPs have also suffered delayed payments, although their operating costs are much lower. Private developers may lose confidence in investing in power generation if the situation deteriorates further.

Inter- and intra-agency coordination is poor, which hinders a coordinated approach to problem solving. There is limited communication between the Planning Commission, which prepares the integrated energy planning; PPIB, which provides licenses to prospective IPPs; and NTDC, which designs the power sector development plan. Hence, the integrated energy planning is not followed, PPIB provides licenses to unsolicited project offers, and NTDC focuses on bottlenecks rather than on long-term planning. Further, departments within the same agency or even the same company do not cooperate efficiently. For instance, departments of subtransmission at 132 kV at DISCOs have limited communications with departments handling medium and low voltage networks. This approach makes it impossible to put in place an adequate integrated development of the sector, leading to inefficiencies.

Reliance on imported fuel leads to excessive cost of generation, which calls for increased use of domestic energy sources, as well as increased share of renewable energies to meet the targets.
for GHG emission reduction. Power generation using domestic resources would contribute to supply base-load generation capacity, increase energy security, and improve the balance of payments and foreign reserves, due to avoided oil imports, as well as reduce the average cost of generation and increase energy security. Suitable hydropower project sites for development (with manageable environmental and social impacts) and expansion of domestic gas fields need to be investigated. Also, there is a need to step up support for expanding renewable energy investments and for energy conservation to help achieve the government’s commitment to reduce GHG emissions by 20% by 2030. Renewable energies, due to their declining and competitive generation costs, will help reduce the average cost of supply, as well as improve energy security.

Political economy factors that support the status quo and resist reforms and transparency, have slowed down improvements to the power sector, as can be seen by the unchecked circular debt problem. Some political economy factors are a result of the incomplete unbundling of WAPDA that created independent power sector companies only on paper. DISCOs, GENCOs and other sector SOEs are still directed by the Ministry of Energy (formerly the Ministry of Water and Power), are regularly financially rescued by the government, and have directors that are political appointments. Further, such companies are staffed by public servants with little or no incentive to improve operations, since their compensation is not related to the sustainability of their respective company. Experience at K-Electric showed great resistance to reforms by public service staff and labor unions.

Internal

ADB has provided insufficient analytical and capacity building support to improve power sector performance in a sustainable way. While ADB provided financial support to all segments of the power sector (policy, regulatory, generation, transmission, distribution, efficiency) through a combination of sovereign and nonsovereign modalities, the required analytical back-up has been inadequate. More comprehensive analysis should be done on such topics as (i) developing the intended wholesale market by CPPA-G, (ii) developing integrated energy planning and long-term planning for generation, transmission and distribution that would lead infrastructure investments, (iii) commercialization of public sector entities to increase efficiency, and (iv) defining effective policies and masterplans in order to reach financial sustainability.

Design flaws of MFF programs have reduced effectiveness of the portfolio, as only two of the four MFFs approved before 2010 will be completed in full. While the MFF modality helps establish a longer-term partnership with the borrower and the executing agency (e.g., the transmission MFF with NTDC), it may not be the most appropriate modality in all circumstances. MFFs are better suited to financing existing long-term plans by one executing agency, rather than to working with various executing agencies at the same time or designing new tranches during implementation. Further, implementation risks need to be carefully assessed during appraisal to avoid cancellations or excessive delays.

ADB policy-based loan programs have failed to trigger substantial reforms and contain the accumulation of circular debt. Under the Sustainable Energy Sector Reform Program PBL, the $2.4 billion provided to the government (including co-financing from WB, JICA and AFD), achieved only a few visible changes with limited results to date. Previous PBLs did not result on significant improvements on the ground and have effectively become budget support operations, rather than targeted reform operations, with no monitoring of use of funds. The issues underlying the accumulation of circular debt have not been addressed sufficiently well to date.

ADB’s internal reporting and availability of information on the Pakistan energy portfolio has not been adequate. As most projects did not have a project completion report available (only 2 out of 28 sovereign loans), it was required to access back-to-office-reports and Aide Memoires. However, when requested, only a few were available. Due to the lack of updated project information readily available during the preparation of this evaluation, there was a need for several specific requests to project officers in order to obtain updated information, which made the process inefficient and time consuming to all parties involved.

Recommendations

In order to increase the effectiveness of ADB support to the power sector in Pakistan, this
evaluation provides the following four strategic and four operational recommendations.

**Strategic recommendations**

1. **Emphasize support to the improvement of governance in the power sector, strengthening the regulator so it has sufficient power and authority, promoting mechanisms in sector operations that remain in effect through political changes, and supporting interagency coordination.** The unbundling of WAPDA and corporatization of the various power companies was intended to improve their operational and financial performance. However, the power companies continue to be heavily influenced by political economy factors, and it has hindered institutional reforms and performance improvements of these companies. ADB should support strengthening governance through institutional changes and frameworks that allow the sector’s corporatized entities to make independent investment and operational decisions through mechanisms that continue to be effective during political changes. Also, ADB should foster an interagency coordinated approach to address the key problems that hinder sector development.

2. **Assist Pakistan in addressing the accumulation of circular debt by targeting its underlying causes, implementing the amended NEPRA Act, and establishing an effective system of cost-recovery tariffs.** ADB should provide analysis to address tariff and subsidy issues, through effective implementation of the amended NEPRA Act; and support the increase of technical and operational efficiency of the DISCOs. ADB should (i) support the government, NEPRA and DISCOs to design and implement a verifiable mechanism incorporating agreed performance parameters that would help promote efficiency and rationalize subsidies, while supporting lower income households; (ii) support implementation of new provisions of the amended NEPRA Act; (iii) support DISCOs to reduce theft through adequate infrastructure investment, such as aerial bundled conductors; (iv) carry out independent audits of power generation assets to ascertain capacity factors and efficiencies, particularly of old generation plants; and (v) support the design and implementation of a competitive tariff system for prospective power generation projects and workable market rules, as well as the separation of technical and retail responsibilities at DISCOs, as outlined in the amendment to the NEPRA Act and the forthcoming energy policy.

3. **Support long-term planning and management systems through technical assistance and continue providing infrastructure investments in transmission and especially distribution, for being the weakest link of the power system.** ADB should continue providing support to NTDC and DISCOs to enhance power infrastructures, as well as improving management systems and system operations, to avoid increased outages and load shedding. For that, ADB should support capacity building to relevant agencies and utilities, to help them build an integrated energy sector plan and a long-term integrated system plan that would lead the development of infrastructures.

4. **Strengthen support to clean energy and conservation through investments in renewable energy generation and energy efficiency, as well as review the renewable energy policy and associated regulations to increase the share of renewable energies, reduce generation costs and mitigate impact on climate change.** The Pakistan’s Intended Nationally Determined Contribution (INDCs), submitted to the 2015 Paris Agreement, aims to reduce up to 20% of its 2030 projected greenhouse gas (GHG) emissions. However, given the increased subcritical coal and gas-fired capacity under construction and the increased demand from air conditioning and cooling systems, such targets will be unachievable without strong support to increase both supply-side and demand-side energy efficiency. Investments in low GHG emission technologies and energy efficient infrastructures, including off-grid technologies, would help tackle climate change and increase environmental sustainability, in alignment with the second and third priorities of ADB’s Strategy 2030.

**Operational recommendations**

1. **Continue supporting the government with advisory services towards developing a competitive electricity market and achieving financial sustainability of the power sector.** Due to the urgent need of large investments in generation, transmission, distribution, renewable energies and energy efficiency, the country’s financial sustainability depends on selecting adequate projects and negotiating appropriate
financing conditions of such projects. Through a comprehensive and coordinated approach with other key partners, ADB should provide advisory services to (i) help develop a transparent regulatory environment and a competitive market to attract private sector investors, (ii) build capacity in managing competitive tenders for generation projects; and (iii) support technical and financial due diligence, and negotiation of unsolicited projects.

2. Promote sovereign investments for lowering the cost of base-load power generation, building on sound integrated energy planning to increase Pakistan’s energy security by reducing its dependency on imported fuels. Nationwide integrated energy planning should lead the investments, and not let the investor community define which and where power plants and transmission lines are built. In addition to NSO, sovereign investments should support base-load power plants using domestic resources to reduce dependency on imported fuels, increase energy security and improve the country’s balance of payments and foreign reserves.

3. Support implementation of an action plan for DISCO commercialization, including efficient infrastructures, theft reduction through ABC, improved energy accounting through AMI, area planning and coordination, commercialization and privatization analysis and a potential pilot project to attract private investors. As shown by previous reform programs, it is not enough to put DISCOs on sale. Building on the One ADB approach, various departments should support the following actions to support commercialization and privatization of DISCOs: (i) investments in power infrastructures to reduce technical losses and improved energy accounting through sovereign operations; (ii) enhanced area-wise planning and coordination between 132 kV and medium voltage expansion plans for DISCOs, as well as analysis of options and market assessment for potential privatization through sovereign TA; (iii) address electricity theft and wire-tapping by extending the use of aerial bundled conductors (ABC) in high loss areas; (iv) advisory services on commercialization options and privatization processes through the Office of Public and Private Partnerships; (v) design and implementation of a pilot showcase privatization project to raise interest among private investors, through NSO instruments.

4. Strengthen ADB’s internal monitoring and reporting system in order to consolidate all project-related information, to enable easy access and continuous ongoing management and reporting. In order to ensure availability of all relevant information, as well as save time for the various teams involved along the project cycle of ADB operations, it is essential to optimize the access to ADB’s central document repository, as well as ensure an adequate maintenance of project documentation. Therefore, following confidentiality and privacy policies, ADB officials with adequate clearances can access any document relevant to implementation, monitoring and evaluation of ADB’s operations.
INTRODUCTION
CHAPTER 1

Introduction

1. Pakistan has been ADB’s second largest borrower in the energy sector, after India, in terms of Board approvals with $7.76 billion approved from 2005 to 2017. The total committed amount was reduced to $6.2 billion due to unprocessed tranches of multitranche financing facilities (MFFs), loan cancellations, and budget adjustments. ADB supported the country’s energy sector through a multisectoral approach, including investments in transmission and distribution infrastructure, sector institutional and regulatory reforms, sovereign and nonsovereign financing in conventional and renewable energy generation, and technical assistance (TA).

2. In June 2017, ADB’s Board of Directors (BOD) requested IED to evaluate the performance of ADB’s support to the Pakistan energy sector over the previous decade, given the large size of the portfolio. The objective was to gain insights and lessons learned from past investments and guide ADB’s future involvement in Pakistan’s energy sector. In response, IED carried out this sector assistance performance evaluation to assess ADB’s support for Pakistan’s power sector since 2005 and to recommend how ADB can best continue supporting the sector. During the evaluation period (2005–2017), ADB’s Board of Directors approved 28 sovereign loans, 12 nonsovereign operations, and 10 TA projects.

3. Consultations with the government by the end of 2018 have confirmed the findings, issues and recommendations offered by the report and key stakeholders expressed their commitment to address the bottlenecks holding back the sustainable development of the energy sector. The relevant government authorities appreciated the high quality and good timing of the report and concurred with its findings, issues and recommendations.

A. Evaluation Scope

1. Conceptual Framework

4. Pakistan’s power system sustainability requires to address circular debt underlying causes, and the challenges of increasing financial sustainability and institutional efficiency of the power sector, as well as increasing power supply reliability, efficiency, access and share of clean energy. To achieve these outcomes as reflected in the theory of change developed by IED (Figure 1 below), ADB should support the Pakistan power sector at two core levels: (i) institutional and regulatory level, and (ii) investment in power sector infrastructure. ADB support used reform programs, TA and infrastructure investments in key subsectors towards reduction and elimination of circular debt, financial sustainability of the power sector, efficient institutions, reliable and efficient power supply, universal access to electricity, and energy efficiency and conservation.

5. This evaluation is designed to inform ADB’s Board of Directors and Management of ADB’s experience in supporting Pakistan’s power sector during the evaluation period and to provide guidance on further engagement in the future. The evaluation provides an independent assessment of ADB’s

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1 For the purposes of this evaluation, conventional power generation refers to power generation projects using large hydropower (>10 MW), coal-fired and gas-fired power plants.
operations in support of Pakistan’s power sector reforms and infrastructure development and draws lessons that may be used to address financial sustainability and the other challenges that the sector faces.

6. **This evaluation responds to the following overarching question:** to what extent has ADB contributed to (i) addressing the causes of circular debt and increasing the financial sustainability of the power sector, (ii) increasing the institutional efficiency of the sector, (iii) improving the reliability and efficiency of the power supply, (iv) increasing access to electricity, and (v) increasing the share of clean energy? Three subsidiary questions helped answer the overarching question.²

   (i) **What is the relevance and additionality of ADB support for Pakistan's power sector?** The evaluation examined three aspects. First, what is the strategic positioning of ADB’s engagement in Pakistan’s power sector, and to what extent are ADB’s interventions aligned with the evolving power sector situation? Second, what strategies and policies guide ADB’s engagement with Pakistan’s power sector? Third, what has been ADB’s operational approach (in terms of the forms of its support, project designs, and coordination with other development partners)?

   (ii) **What has been ADB’s institutional efficiency in supporting the Pakistan power sector?** The evaluation examined three aspects. First, it looked at resource allocation across various modalities, e.g., multitranche financing facilities (MFFs), which have an impact upon resource allocations for further support, and policy-based lending (PBL), which provides incentives for sector reforms and political expediency in exchange for budget support. Second, it examined the time efficiency of the design, alterations, and implementation of public and private sector operations. Third, it considered ADB’s internal coordination among various departments and offices at headquarters and between headquarters and the Pakistan resident mission.

   (iii) **How effective has ADB been in supporting the Pakistan power sector to achieve the intended results?** The evaluation examined ADB’s effectiveness and contribution to sector sustainability in five interlinked dimensions: (i) improving financial sustainability and managing circular debt; (ii) improving sector governance, institutional effectiveness, and capacity; (iii) increasing sector operational efficiency and supply reliability, through enhanced grid stability, reduced losses, and increased generation capacity and availability; (iv) improving environmental sustainability through reduced greenhouse gas emissions (GHGs), greater renewable energy generation, and appropriate management of the adverse environmental implications of conventional hydropower and fossil fuel-fired power generation; and (v) providing socioeconomic sustainability, through reduced load shedding, and greater affordable access to electricity.

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Figure 1: Theory of Change

EE = energy efficiency, MFF = multitranche financing facility, NSO = nonsovereign operations, PBL = policy-based loan, RBL = results-based lending, RE = renewable energy, T&D = transmission and distribution.

Source: Independent Evaluation Department.

2. Evaluation Methodology

7. The evaluation gathered evidence through a desk review of ADB’s directional and project documents, portfolio analysis, and interviews with ADB staff and other key sector stakeholders during the evaluation mission.

(i) **Portfolio analysis.** Two types of analysis were used: (i) a descriptive analysis of all sovereign loan and grant projects, TA projects, and nonsovereign operations (NSO) approved during the evaluation period; and (ii) an evaluative analysis of completed, self-evaluated and independently validated operations. The descriptive analysis illustrated the type and evolution of ADB support during the evaluation period and delineated the reasons for changes in the portfolio mix. Key aspects of the portfolio included time trends and the composition of financing instruments. The evaluative analysis assessed the relevance, effectiveness, efficiency, and sustainability of completed operations.

(ii) **ADB document reviews.** ADB’s corporate policies, strategies, operational plans and other directional documents were reviewed, along with relevant country partnership strategies (CPSs) spanning the evaluation period (2005–2017) and project documents for all the interventions covered in the portfolio analysis. In addition to documents seeking Board approval and documents prepared at completion, the following were also examined: knowledge products, back-to-office reports, documents unique to multi-tranche financing facilities, and documents prepared for processing and monitoring the progress...
of nonsovereign operations. Information from ADB’s project performance database was accessed and analyzed for the studied portfolio, including reports and recommendations of the President (RRPs), periodic financing requests (PFRs) for MFF tranches, and other relevant documents.

(iii) **Sector information.** As the information available from ADB operations documents was limited, the evaluation used information from publicly available sources, mostly government agencies and academia. These showed how the sector has evolved over time, and helped the evaluation identify cause and effect links between ADB’s operations and improvements in the sector. These sources threw light on the macro-economic, institutional environment, and cultural context in which the Pakistan power sector functions and provided perspectives on governance-related issues and the role of private stakeholders in the power sector.

(iv) **Interviews with key stakeholders.** ADB staff at headquarters and the Pakistan resident mission were interviewed to obtain strategic and operational perspectives on ADB’s interventions in the Pakistan power sector. During the independent evaluation mission in March 2018 to Islamabad, Lahore and Karachi, interviews were conducted with key stakeholders in government, client public sector entities, the private sector, and other development partners for their perspectives on the power sector’s numerous challenges, ADB strategies and interventions, and ADB’s efficiency and institutional matters.

3. **Evaluated Portfolio**

8. **For the projects approved since 2005, few self-evaluations, or independent validations or evaluations were available at the time of this evaluation.** For sovereign operations, two PCRs for the MFF Power Transmission Enhancement Investment Program tranches 1 and 2 were finalized in September 2017. Both rated the program successful, and they were independently validated with the same rating in 2018. For NSO, four XARRs were available, of which two rated the projects highly successful and two successful. IED validated the four XARRs agreeing with the ratings of three and rating the fourth successful (downgraded from highly successful). Three of the four TCRs were rated successful, and one partly successful. Most of the operations approved in the past 12 years had not closed by the time of the evaluation, and others that had been closed for more than one year had pending completion reports.

<table>
<thead>
<tr>
<th>Ref no.</th>
<th>Operation</th>
<th>Self-Evaluation</th>
<th>Independent Validation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2289</td>
<td>MFF Transmission Tranche 1</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>2396</td>
<td>MFF Transmission Tranche 2</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>7222</td>
<td>New Bong Escape Hydropower</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>7254</td>
<td>K-Electric Post-privatization</td>
<td>HS</td>
<td>HS</td>
</tr>
<tr>
<td>7319</td>
<td>Zorlu Enerji Wind Power</td>
<td>HS</td>
<td>S</td>
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<tr>
<td>7265</td>
<td>Daharki Gas-fired Combined Cycle</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>4982</td>
<td>Integrated Energy Model</td>
<td>S</td>
<td>-</td>
</tr>
<tr>
<td>7467</td>
<td>Pakistan Energy Sector Task Force</td>
<td>S</td>
<td>-</td>
</tr>
<tr>
<td>4870</td>
<td>Establishment of CPPA</td>
<td>PS</td>
<td>-</td>
</tr>
<tr>
<td>4881</td>
<td>RE Policy and Capacity Building for AEDB</td>
<td>S</td>
<td>-</td>
</tr>
</tbody>
</table>

**Table 1: Ratings from Available Self-Evaluations and Independent Validations**


Source: ADB’s Independent Evaluation Department.
9. Table 2 shows that the first (and only) tranche of the renewable energy MFF has been implemented for over 10 years but has not yet closed. However, the investment component of the first tranche of the MFF on distribution has been closed for 4.7 years, and no PCR has been prepared because the support loan to the program is still active. The first subprogram of the PBL Sustainable Energy Sector Reform has been closed for 3 years, but no PCR is yet available. PCRs of closed loans or subprograms may not be available because the associated operations or programs have not closed for more than 2 years. Nevertheless, it would have been desirable that more information on development results of these projects was available, given the number of years since closure of the loans.

<table>
<thead>
<tr>
<th>Program</th>
<th>Tranche</th>
<th>Loan No.</th>
<th>Loan Effectiveness</th>
<th>Loan Closure</th>
<th>Implementation Period (years)</th>
<th>Since Closure (years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MFF Renewable Energy</td>
<td>1</td>
<td>2286</td>
<td>Nov-07</td>
<td>Jun-18</td>
<td>10.5</td>
<td>0.2</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2287</td>
<td>Nov-07</td>
<td>Jun-18</td>
<td>10.5</td>
<td>0.2</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>2726</td>
<td>Dec-10</td>
<td>Dec-13</td>
<td>3.0</td>
<td>4.8</td>
</tr>
<tr>
<td>MFF Transmission</td>
<td>1</td>
<td>2289</td>
<td>May-07</td>
<td>Jun-12</td>
<td>5.1</td>
<td>6.2</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2290</td>
<td>May-07</td>
<td>Jun-17</td>
<td>10.1</td>
<td>1.2</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>2396</td>
<td>Apr-09</td>
<td>Feb-16</td>
<td>6.9</td>
<td>2.5</td>
</tr>
<tr>
<td>MFF Distribution</td>
<td>1</td>
<td>2438</td>
<td>Jan-09</td>
<td>Jan-14</td>
<td>5.0</td>
<td>4.7</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2439</td>
<td>Jan-09</td>
<td>-</td>
<td>9.7</td>
<td>-</td>
</tr>
<tr>
<td>MFF Energy Efficiency</td>
<td>1</td>
<td>2552</td>
<td>Aug-10</td>
<td>May-15</td>
<td>4.7</td>
<td>3.3</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2553</td>
<td>Aug-10</td>
<td>-</td>
<td>8.0</td>
<td>-</td>
</tr>
<tr>
<td>PBL Sustainable Energy Sector Reform</td>
<td>2</td>
<td>3126</td>
<td>Apr-14</td>
<td>Jun-15</td>
<td>1.1</td>
<td>3.2</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>3321</td>
<td>Nov-15</td>
<td>Jun-16</td>
<td>0.6</td>
<td>2.2</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>3322</td>
<td>Nov-15</td>
<td>Jun-16</td>
<td>0.6</td>
<td>2.2</td>
</tr>
</tbody>
</table>

MFF = multitranche financing facility, PBL = policy-based loan.
Notes: The only 2 PCRs available are for the first 2 tranches of the first MFF Transmission program. Tranche 2 of MFF Renewable Energy was not implemented. Tranche 1 of MFF Energy Efficiency has been extended until 16 September 2019.
Source: Independent Evaluation Department based on ADB Loan information database.

10. As it is noted in the next section of limitations, in order to overcome the limited availability of completed project evaluations, IED complemented such data base with real-time assessments, where active projects were evaluated based on their implementation progress and results to date.

4. Limitations and Exclusions

11. Few operations have been completed to date and few completion reports were available, although several programs are almost completed. Hence, this evaluation complemented such data base with real-time assessments, where active projects were evaluated based on their implementation progress and results (both actual and realistically expected). In the case of projects still under implementation, IED uses monitoring reports (i.e., BTORs, Aide Memoires, consultants and government reports, etc.) to inform the evaluation. Only two project completion reports (PCRs) were available out of the 19 sovereign operations; four extended annual review reports (XARRs) were available out of the 12 approved NSO, and four TA completion reports (TCRs) were available out of the 10 approved TA projects. The two PCRs were validated by IED in 2018, and the four XARRs were validated in 2014, 2015, and 2018 (two reports). As a result, the evaluation also had to rely on secondary data obtained outside ADB from government agencies, the private sector, and other development partners.

<table>
<thead>
<tr>
<th>Table 3: Availability of Internal Evaluations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approved</td>
</tr>
<tr>
<td>Sovereign Operations</td>
</tr>
<tr>
<td>Nonsovereign Operations</td>
</tr>
<tr>
<td>Technical Assistance</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

Note: Details and ratings of the internal evaluations are provided in Table 1.
Source: Independent Evaluation Department.
12. Access to reliable data was an issue during preparation of the evaluation, as data sourced from various official reports from donors and government agencies did not always reconcile. Hence, this evaluation had to triangulate and use best judgment to use certain figures and values in the analysis. For example, the electrification rate in Pakistan is unclear. The figures published by the Ministry of Planning, Development & Reform in its 2014 document *Pakistan Vision 2025: One Nation – One Vision* showed electrification rates of 67% in urban areas and 57% in rural areas; a World Bank field survey in 2016 showed rates of 81% to 86% (this included off-grid electricity and solar home systems), and the World Bank databank for the same year (2016) reported 98.8% in rural areas and 99.64% in urban areas. Similarly, annual electricity sales reported by the National Electric Power Regulatory Authority (NEPRA) and the National Transmission and Dispatch Company (NTDC) for a particular fiscal year are slightly different; e.g., for FY2017, NTDC reported 94,602 GWh whereas NEPRA reported 94,358 GWh.

13. In terms of exclusions, the evaluation did not investigate ADB engagements that had only an indirect impact on the performance of the power sector. Examples of such interventions include measures to improve governance in public sector entities in general, to create a fair environment for the private sector, and to facilitate ownership change (i.e., the privatization of state-owned enterprises).

5. Organization of this Report

14. The report has four chapters. Chapter 1 describes the evaluation scope and context of the energy sector. Chapter 2 presents ADB’s strategies, policies and operations, and describes the portfolio. Chapter 3 outlines the evaluation of ADB’s interventions in terms of their relevance, effectiveness, efficiency, sustainability, and results, linked to the contribution made by ADB’s interventions. Chapter 4 provides issues, conclusions, and recommendations for the future involvement of ADB in Pakistan energy sector.

B. Energy Sector Context

1. Institutional Structure and Policies

15. Reform of the power sector started in the 1992 with the unbundling of the Water and Power Development Authority (WAPDA), the vertically-integrated power utility of Pakistan. However, WAPDA’s Strategic Plan for the Privatization of the Pakistan Power Sector is still in progress. With support from development agencies, the power wing of WAPDA was separated into state-owned generation, transmission and distribution companies. However, as public investments in power generation were not enough to support the growth in electricity demand, the government allowed private investors to participate through the Power Policy in 1994, which targeted the addition of 13 GW of power capacity by independent power producers (IPPs). In 1997, the first private power plant was commissioned. The government announced upfront tariffs and allowed interested private parties to select sites, technologies and fuel types, without following any government generation or transmission development plans.

16. In 1997, NEPRA was established and the Pakistan Electric Power Company (PEPCO) was created 1 year later. NEPRA was created by the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997 to introduce transparent economic regulation to the power sector with the aim of ensuring the provision of reliable, efficient and affordable power supply to consumers, and of facilitating the transition from a protected monopoly (e.g., WAPDA) to a competitive electricity market. Among its

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responsibilities, NEPRA was to: (i) issue licenses for generation, transmission and distribution of electric power; (ii) establish and enforce standards to ensure safe and high-quality supply of electricity to consumers; (iii) approve the investment and power acquisition programs of the utility companies; and (iv) determine tariffs for generation, transmission and distribution of electricity.7 PEPCO was created as the coordinating agency for all corporatized entities (i.e., DISCOs, GENCOs, and the NTDC) although it was officially dissolved in 2012. However, PEPCO is still the implementing agency of the MFF Distribution program and still influences the operations of DISCOs.

17. In 2002, a new Power Policy was approved, introducing international competitive bidding for all gas, oil and dual-fuel projects; and all other prospective projects (including hydropower and coal-fired projects) for which feasibility studies had been conducted. In 2005, the government launched the Medium-Term Development Framework, 2005-2010, which included an Energy Security Action Plan to meet the strategic objectives of securing a reliable energy supply through an optimal energy mix and reducing dependency on imported oil. The action plan included ambitious objectives for increasing the generation capacity. The same year, 2005, the government issued the National Energy Conservation Policy to address growing load shedding, as well as the Gas Allocation and Management Policy prioritizing (i) first-end users, (ii) fertilizer and industrial sectors, and (iii) power plants.

18. In 2006, prompted by continued tightening of international oil markets, the government produced its first renewable energy policy, covering only small hydropower, wind and solar technologies through private sector investments. A National Energy Policy was approved in 2010, focusing on energy conservation, rehabilitation of GENCO power plants and short-term plans for increased power generation. This was followed by the medium-term Alternative and Renewable Energy Policy in 2011. In 2013, a new government issued the National Power Policy and articulated a set of measures with the ambitious objectives of increasing power generation, reducing transmission losses, improving financial performance, and decreasing the overall cost of power generation. In 2015, the new Power Generation Policy was approved, replacing the 2002 policy, and becoming the main policy for thermal and large hydropower development (>50 MW), mainly for private sector and public–private partnership projects. Currently, the government is drafting a national electricity plan and new energy policy, with support from ADB, which will lay down the framework for the future development of the sector.

19. The current power sector includes generation, transmission and distribution utilities, a private integrated power utility for Karachi, and a few off-grid supply facilities in remote areas. The institutions consist of 10 distribution companies (DISCOs), four public generation companies (GENCOs), 36 private IPPs (mostly thermal power plants), three nuclear power plant companies, one hydropower company (WAPDA Power), a transmission and system operator, the National Transmission and Despatch Company (NTDC), a transmission market operator, the Central Power Purchasing Agency Guarantee Limited (CPPA-G), and one private power supply company (K-Electric) for the metropolitan area of Karachi (with integrated generation, transmission and distribution facilities). In addition, there are a few power supply companies outside the national grid providing off-grid supply to remote locations.

20. Since 2015, when CPPA-G became a separate entity from NTDC, the power market in Pakistan has operated according to a single-buyer model. CPPA-G buys power from all generation companies on behalf of all DISCOs, based on long-term power purchase agreements (PPAs). This arrangement is considered temporary, and the government’s objective is to transition towards a competitive market, where the price of electricity is based not on PPAs but on daily demand–supply balances.

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7 NEPRA website https://www.nepra.org.pk
Figure 2: Power Sector Structure

DISCOs = distribution companies, Distr = distribution, Gen = generation, GENCOs = generation companies, IPP = Independent power producer, NTDC = National Transmission and Dispatch Company, Trans = transmission, WAPDA = Water and Power Development Authority

Source: Independent Evaluation Department.

21. The sector is overseen and administered by the Ministry of Energy, which was created in 2017 through the restructuring of the two leading ministries of water and power, and petroleum and natural resources. Other agencies related to the power sector include the Planning Commission, which carries out energy integrated planning; the Private Power and Infrastructure Board (PPIB), which functions as a “one-window” office for private developers in power generation, which has absorbed the Alternative Energy Development Board (AEDB), previously responsible for licensing renewable energy projects, and the national Energy Efficiency and Conservation Agency (NEECA), which leads energy efficiency and conservation activities through development plans and policies, labelling, information outreach, and training.

2. Circular Debt and Governance

22. Circular debt, the chronic shortfall between cash inflows and outflows for power sector participants, is a symptom of several problems that underlie the Pakistan power sector. Circular debt is defined as the cash shortfall within the market operator (CPPA-G), which means it does not make payments to power supply companies (including IPPs, GENCOs and NTDC). Such payment defaults result from the shortfall between cash inflows and outflows at CPPA-G. Shortages of inflows are the result of three main factors: (i) regulated tariffs are not enough to recover the costs incurred by DISCOs, with

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losses and non-collections higher than those allowed by NEPRA; (ii) the government fails or delays payment of tariff differential subsidies to DISCOs, which in turn do not pay to CPPA-G; and (iii) tariff determination and/or notification is delayed, so DISCOs are caught between the actual costs for a period, the determined tariff for another, and the notified tariff for yet another one. As DISCOs do not have enough cash to cover their own costs and margins, CPPA-G cannot in turn pay to NTDC the wheeling charges, and the cost of supply (energy and capacity installed as per PPAs) to the power generation companies. Thus, GENCOs and IPPs are not fully paid and are unable to meet their payment obligations in a timely manner. IPP generation capacity is underutilized, and GENCOs and DISCOs cannot maintain their facilities adequately. This cash flow deficiency flows through the entire energy supply chain, and as a result fuel suppliers and refineries are not fully paid.

23. **Circular debt began with an increase in power generation costs that was not transferred to end consumers.** Tariffs had remained unchanged from November 2003 to February 2007, when NEPRA allowed a tariff increase, as power generation costs increased due to rising fuel prices and the depreciation of the Pakistan rupee. However, government-notified tariffs did not increase accordingly, remaining below the determined tariffs, and the tariff differential subsidy was not being paid in a timely manner. In 2008 and 2009, oil prices ballooned during the global financial crisis and circular debt flows and stock increased further. In response to the IMF’s lending requirements in 2013 under its Extended Financing Framework, 2013-2016, the government cleared part of the debt by injecting $3.8 billion as DISCOs’ equity, substantially reducing the arrears. The objective was to (i) reduce electricity generation costs by prioritizing efficient plants and (ii) increase collections by establishing recovery targets for DISCOs.

24. **In 2015, the government launched a circular debt management plan, supported by ADB’s Sustainable Energy Sector Reform Program.** The plan was designed to: (i) privatize DISCOs, with the hope of increasing their efficiency; and (ii) resolve subsidy and tariff issues and discrepancies. However, DISCOs’ receivables have kept increasing since then and reached Prs730 billion as of June 2017 (about $7 billion), as privatization was delayed (it is currently stalled), and subsidy and tariff issues were not addressed; e.g., the low-tariff arrangements in certain regions, unpaid arrears of government electricity bills, recovery issues in Balochistan and the Federally Administered Tribal Areas (FATA), and inadequate taxation structures by the Federal Bureau of Revenue (FBR). The main factors are:

(i) All DISCOs apart from the Islamabad Electric Supply Company (IESCO) report technical and commercial losses that exceed NEPRA’s targets. The DISCOs can be divided into (i) those with losses 6%-10% over the targets, and (ii) those with reported losses within 2% of NEPRA’s allowed values for losses included in the determined tariff.

(ii) Some DISCOs have difficulties collecting payments from electricity bills invoiced to private consumers. Such shortfalls can represent up to 45% of the bills, as in Sukkur Electric Power Company (SEPCO), which essentially means that billed consumers pay only about half of what they are invoiced. Non-collected dues from private consumers (excluding those in Balochistan and FATA) were about Prs50 billion in FY2017.

(iii) The government of an autonomous region, does not accept NEPRA-determined tariffs and allows a tariff of only Prs2.59 per kWh. The difference adds to the suppliers’ receivables—

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9 The difference between the regulated tariff and the actual costs reported results from technical and commercial losses, higher than those allowed by NEPRA. Further, DISCOs are not able to collect the full amount billed to consumers, so that shortfall adds to the difference, as NEPRA does not allow non-collection of electricity bills.

10 ADB. 2014. Report and Recommendation of the President to the Board of Directors: Proposed Programmatic Approach and Policy-Based Loan for Subprogram 1 for the Islamic Republic of Pakistan: Sustainable Energy Sector Reform Program. Manila. See also footnotes 58 and 59.

11 NEPRA’s determined tariff is higher than the cost-recovery level, because costs reported by DISCOs are not trusted by NEPRA, and to incentivize DISCOs to reduce losses and increase efficiency.
IESCO, Gujranwala Electric Power Company (GESCO) and Peshawar Electric Supply Company (PESCO) —and contributes to circular debt.

(iv) In Balochistan, pumping of groundwater for irrigation is done by electric tube wells, whose owners are charged a flat rate of PRs6,000 per month (the rest of the costs being subsidized by the federal government). However, few farmers pay the bills, and although over 30,000 legal and illegal electric tube wells consume most of the energy supplied by the Quetta Electric Supply Company (QESCO), only a small amount is recovered by the utility (the recovery rate was 43.6% in FY2017). The government has plans to solarize tube wells and offset the cost of solar photovoltaic (PV) panels with avoided subsidization of electricity bills.

(v) Delays in tariff notifications from the government create a mismatch regarding what DISCOs can invoice and what they are supposed to invoice as per NEPRA’s determined tariff for the year. The effective tariff in FY2015 was determined in June 2015. The tariff determined for FY2016 was determined in April 2016, but due to litigation it was revised in September 2017. However, the new tariff was only notified by mid-2018. Hence, DISCOs have been invoicing a tariff determined for FY2015, but for costs incurred in FY2016, FY2017 and FY2018, which are essentially different.

(vi) There are also issues related to fiscal requirements by the FBR. There have been disputes between DISCOs and the FBR as to whether the sales tax should be charged on invoiced or collected amounts. The difference arises from technical and commercial losses over NEPRA’s targets, bills to the government of some regions that do not pay their bills in full), and arrears on the tariff differential subsidy paid by the government. Further, FBR delays the refund of the withheld sales tax, increasing the receivables at DISCOs.

(vii) Issues at FATA prompted the federal government to split the Tribal Areas Electric Supply Company (TESCO) from the PESCO and to subsidize the consumption of domestic consumers. Such consumption needs to be paid as subsidy, but part of it is left as arrears.

(viii) Tariff differential subsidies are a result of subsidizing the difference between the best and the worst performing DISCOs. Such subsidies are not paid on time or in full (as budgeted amounts are sometimes below actual requirements) or are unpaid due to court rulings. The differences contribute to DISCOs’ receivables and the associated circular debt flow. Consultation with the government in November 2018 confirmed the increased focus on tariff rationalization to avoid these issues.

(ix) As circular debt is directly proportional to the amount of sales, the more expensive the cost of supply, the higher the invoices, and higher the difference between collections and billed amounts. Since 30% of generation is based on the oil-fired power plants, increases in global oil prices or the devaluation of the Pakistan rupee exacerbate the circular debt problem, as costs increase faster than revenues.

<table>
<thead>
<tr>
<th>Category</th>
<th>Receivables FY2016-17</th>
<th>Receivables By June 2017</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>By June 2016</td>
<td>Billed</td>
</tr>
<tr>
<td>Federal Government</td>
<td>4.0</td>
<td>41.1</td>
</tr>
<tr>
<td>Provincial Governments</td>
<td>165.1</td>
<td>64.8</td>
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<tr>
<td>FATA (domestic consumers)</td>
<td>20.6</td>
<td>11.6</td>
</tr>
<tr>
<td>Balochistan (agricultural tube-wells)</td>
<td>152.7</td>
<td>47.9</td>
</tr>
<tr>
<td>Other private consumers</td>
<td>295.4</td>
<td>846.2</td>
</tr>
<tr>
<td>K-Electric</td>
<td>46.2</td>
<td>44.8</td>
</tr>
<tr>
<td>Total</td>
<td>684.0</td>
<td>1,056.4</td>
</tr>
</tbody>
</table>

DISCO = distribution company, FATA = Federally Administered Tribal Areas, FY = fiscal year.
Note: Receivables are accounted based on arrears and non-collection of payments as per invoiced bills. However, such invoices are based on the notified tariff from FY2015, which does not reflect the costs incurred by DISCOs during FY2017.
25. **An important factor is the widespread electricity theft, through wire-tapping (so-called ‘kunda’) and meter by-passing, across the country.** Electricity theft is not part of the Table 4 above since the electricity consumed is not measured at the meter level and billed to the consumer, although it is roughly estimated out of technical losses calculated based on reading differences at the substation level and the consumer level. In the absence of accurate metering and energy accounting, such estimations of power theft are not reliable. Nevertheless, considering the widespread extension of the wire-tapping practice, the government has initiated in October 2018 the Chief Minister’s Task Force on Electricity Theft in cooperation with provincial government authorities, distribution companies, and law enforcement agencies at provincial and district levels. Such task effort aims at surveying, investigating, reporting and enforcing the Electricity Law, specifically regarding electricity theft. The first phase will target industrial, commercial and high-end domestic consumers, whereas the second phase will target agricultural and domestic consumers.\(^\text{12}\)

26. **Since 2013, the circular debt flow has kept increasing and it escalated further in 2018 with an increase in global oil prices.** From 2014, lower crude oil prices have decreased the average cost of supply, which seems to have contained the flows of circular debt. However, with the oil price increase in 2018, recent reports have estimated the circular debt stock, including debt transferred to the state-owned company Power Holding Private Limited (PHPL), which is not recognized as circular debt by the government, at approximately PRs1 trillion (about $10 billion),\(^\text{13}\) which will cause macroeconomic instability in the near future unless it is resolved.

27. **Most importantly, there are no updated reports from the federal government regarding circular debt flow and stock.** The government has provided neither current balances nor the cost of servicing the debt parked at the PHPL. The only available information is reported from media outlets in Pakistan, based on interviews with key government officials. It is discouraging that the government does not publish the financial statements of a state-owned enterprise (SOE) created to finance the circular debt that was transferred from the receivable accounts of power sector participants to PHPL. In fact, PHPL does not even appear in a publication from the Ministry of Finance,\(^\text{14}\) which reports on almost all SOEs in the country. This lack of reliable information on circular debt raises issues of transparency, governance, and accountability.

28. **Governance and transparency issues have affected the sector in the past.** Efforts to inform all sector participants and the public have produced some intermediate results, although further progress is required. CPPA-G publishes the contractual values of sales to DISCOs and purchases from generators, albeit only until the end of FY2016 and FY2017. The most recent data are over 1 year old.\(^\text{15}\) No information is publicly available on PHPL, where about PRs500 billion of circular debt is parked. Appointing members of board of directors of DISCOs, GENCOs, and other public entities is carried out by the federal government and the Council of Common Interests (CCI), and political considerations guide such nominations, reducing the independence of directors, and limiting the transparency and public outreach following such nominations. However, there have been some moves to increase the independence of management and directors, with the introduction of staff performance indicators and discontinuing the seniority lists at PEPCO and the Ministry of Energy.\(^\text{16}\)

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\(^{12}\) Source: Meeting with the Secretary of the Power Division, Ministry of Energy. November 2018.

\(^{13}\) Media reports. https://www.thenews.com.pk/print/340341-power-sector-circular-debt-soars-to-rs1-032b


\(^{15}\) CPPA-G website.

\(^{16}\) As explained during for a meeting with representatives of the Power Division of the Ministry of Energy in November 2018.
3. Evolution and Status of the Power Sector

29. The extensive demand-supply capacity gap of over 6 GW\textsuperscript{17} (about 25% of total capacity) in recent years has led to frequent load shedding. Until early 2018, electricity consumers experienced frequent load shedding on a daily basis: about 5 hours a day in urban areas and 10 hours a day in rural areas. This situation started changing in 2017, in the context of newly added generation capacity and the pre-election period, due to a change in policy that discontinued load shedding in high loss feeders. This decision has not been reversed and currently load shedding is not being applied systematically.\textsuperscript{18}

![Figure 3: Available Generation Capacity and Demand Deficit, FY2013–FY2017 (in GW)](image)

FY = fiscal year, GW = gigawatt.
Note: Available capacity is lower than installed capacity due to inefficient thermal plants and low water flows of hydropower plants.

30. Power shortages affect the whole country, but particularly those economic sectors that are heavily dependent on power. Some industrial and commercial facilities, mostly in urban areas, have had to invest in back-up generators and battery-invertor systems to keep functioning during load shedding periods. In the past 5 years, overall electricity sales grew by 5.2% per year. However, sales to industry grew only by 1.7% compounded annually, and the ratio of grid electricity consumption of the industrial sector as compared to the overall consumption actually decreased from 30% to 26% from 2013 to 2017.\textsuperscript{19} Although some industrial facilities have invested in their own power generation systems, many smaller companies have been badly affected by load-shedding and had to close business. The most affected are energy-intensive manufacturers of metal products, which suffer a loss of productivity of 50% for every 10% increase in power shortages (elasticity of 0.2).\textsuperscript{20}

\textsuperscript{17} As of 30\textsuperscript{th} of June 2017, NEPRA reported that demand-supply deficits for NTDC system was 6,097 MW and for K-Electric’s system was 231 MW, totaling 6,328 MW of deficit, equivalent to 22% of the total available capacity of 25,117 MW.
\textsuperscript{18} As reported by the Secretary of the Power Division, Ministry of Energy, during the consultation mission in November 2018.
Due to the supply shortages, the average electricity consumption per capita in Pakistan has stagnated from mid-2000s onwards, with no significant increase since 2005. From 2005 to 2017, the average electricity consumption has been relatively constant between 460 and 500 kWh per capita. Most other developing countries in the region did increase continuously the electricity consumption per capita. Further, during the study period the average consumption per consumer has been completely stagnant, and slightly decreasing in recent years. This situation started changing by the end of 2017 in the context of new generation capacity available and upcoming national elections, due to a change in policy that discontinued load shedding in high-loss feeders (i.e., with losses over 80% of the load).

32. **A sizable part of the population lacks access to electricity supply, and the government's official figures estimate that one third of the people live without grid power supply.** Given the large number of illegal connections across Pakistan, it is difficult to estimate the actual number of households with grid electricity supply. A World Bank survey reports electrification rates of 86% in urban areas and 81% in rural areas, but this includes off-grid supply and solar home systems. Nonetheless, grid-connected consumers still endure several hours a day of brownouts, reducing the potential benefits of electricity supply. Limited access to reliable electricity supply increases hardships, particularly of the poorer and more disadvantaged in rural areas and hampers economic development and productivity.

33. **The energy mix for power generation in Pakistan is mainly dependent on hydropower, oil-fired and gas-fired power plants with approximately 30% each, whereas the costs are substantially skewed towards oil-fired with 46% of the total cost in FY2017.** Albeit the large hydropower potential estimated at 60 GW, mainly in the northern provinces of the country, only 12% has been developed to date, and the hydropower contribution to the mix has decreased in recent years due to the installation of oil-fired power plants. The high cost of oil-fired power plants account for 46% of the total, which contributes to a high average cost of supply. If global oil prices were to escalate again (after the last 3 years of depressed prices) the cost portion of oil-fired generation would increase over 50% of the total and could jeopardize the financial sustainability of the sector.

**Figure 6: Energy Generated, and Cost Invoiced by Generators in FY2017, Per Source (%)**

![Energy Generated and Cost Invoiced](image)


34. **Since the government opened the power generation sector to private developers in 1997, a significant number of IPPs have invested in power generation plants (mostly oil-fired).** However, no efforts were made to develop public sector generation projects. This resulted in a poor fuel mix and the high usage of residual fuel oil, which pushed up the cost of electricity. The contribution of private power increased gradually since the early thermal IPPs in 1997 and now accounts for approximately half of the total generation. As of 2018, 12,428 MW of thermal IPPs, 213 MW of hydropower IPPs and 1,463 MW of renewable energy IPPs generate 45% of the total. Further, almost all thermal plants in Pakistan have

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power purchase agreements (PPAs) with a take-or-pay clause that guarantees capacity payments, even if no electricity is generated. Also, increased oil prices and a weaker currency increase substantially the cost of variable thermal generation, which has become higher than renewable energies. IPPs have maintained a better availability rate and fewer downtimes and have performed more efficiently than the GENCOs, as the plants are newer. However, IPPs operate under difficult financial conditions in view of the delayed payments associated with circular debt. Such delays affect their output, as often they have to delay payment to fuel suppliers, who then withhold the fuel supply required for daily operations. As a result, some IPP plants are no longer available.

35. Pakistan’s Intended Nationally Determined Contribution (INDCs), submitted to the 2015 Paris Agreement, aimed to reduce Pakistan’s 2030 projected GHG emissions by up to 20%. The current scenario anticipates that emissions for the energy sector in 2015 will grow by 4.83 times by 2030, from 186 MtCO₂eq to 898 MtCO₂eq (or approximately 56% of total emissions). Economic analyses indicate that a reduction of up to 20% in the projected emission figures for 2030 would require an investment of approximately $40 billion, calculated at current prices.24 However, with the increased subcritical coal and gas-fired capacity under construction and the greater demands for air conditioning and cooling systems, such targets will be unachievable without strong support for an increase in both supply-side and demand-side energy efficiency, as well as a strong renewable energy development program and appropriate policies and tariff structures.

36. Nonetheless, the energy mix is expected to change rapidly in the foreseeable future due to the upcoming 10 GW of power generation projects, financed by the China–Pakistan Economic Corridor (CPEC) initiative, which are expected to be commissioned by 2021. The CPEC program has attracted $33 billion in investment through 2022, primarily for electricity generation and transmission (with 80% of private investments). The initiative aims to promote bilateral and regional construction, investments and trade between People’s Republic of China (PRC) and Pakistan. Currently, there are various coal-fired, hydropower, solar and wind power projects under construction, and approximately 10 GW of generation capacity is expected to be commissioned by 2021,25 contributing to a power supply surplus in the short term. However, the associated investments in manufacturing industries will also increase the load rapidly, reducing the generation surplus. Further, it is not clear whether the current power network would be able to manage the increased load capacity effectively, given the limited capacity of substations and transmission lines, a supervisory control and data acquisition (SCADA) system26 that is not yet complete, and archaic operational procedures.

37. The transmission and distribution systems are heavily loaded at critical elements and investments are needed to prevent supply bottlenecks. Investments in the power sector are not anchored on long-term plans for generation, transmission and distribution systems. With continued circular debt problems, investments in transmission and distribution systems have also tended to address bottlenecks rather than to optimize system expansion and strengthening over a longer time horizon. The transmission system has developed serious problems over time, mainly due to lack of investment. Network bottlenecks, with many sections substantially loaded above their stipulated ratings, and low voltage capacity have prevented the addition of new loads. Distribution systems have become the bottleneck and weakest link of the power network, and face overloading and voltage drops related to increased load demand. In FY2017, it was reported that 29% of 11 kV feeders and 37% of distribution transformers were overloaded by over 80%.27

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24 UNFCCC. 2015. Pakistan’s Intended Nationally Determined Contribution. [online] Available at http://www4.unfccc.int/ndcregistry/PublishedDocuments/Pakistan%20First/Pak-INDC.pdf.
26 The current supervisory control and data acquisition (SCADA) system only covers about 10% of the power network, and an upgrade is essential to manage efficiently the new generation capacity.
38. K-Electric is the only privately-owned power distribution company in Pakistan (with a 22% government shareholding) but its performance is no better than a number of publicly owned DISCOs. The electricity distribution network in Karachi has been established and managed separately from the rest of the country’s network by the Karachi Electricity Service Company (KESC), currently called K-Electric. In 2005, due to the company’s bad performance and inefficiencies, the government decided to privatize KESC, although power supply conditions did not improve as expected. In 2009, Abraaj Capital, a leading private equity firm based in Dubai, purchased the stock from the previous Saudi conglomerate and started the company’s turnaround, albeit at a slow pace. System losses have decreased from a maximum of 35.4% in 2007 to 22.2% in 2017, still about three times higher than what could be expected from a well-run power distribution company supplying a metropolitan area with a high load density. Nonetheless, K-Electric has been able to improve existing power plants and introduce more efficient gas-fired combined cycle power plants, as well making a considerable improvement to the transmission and distribution facilities, with support from ADB and other donors. In October 2016, Shanghai Electric placed an offer to purchase K-Electric, and the deal is still pending, awaiting the determination and notification of the multiyear tariff for K-Electric, which will be used for the company’s valuation. In June 2018, Abraaj Capital ran into financial difficulties and filed for provisional liquidation in July, which may affect the sale of K-Electric to Shanghai Electric.

Box 1: Privatization of K-Electric

Since its foundation, K-Electric (formerly KESC) has operated as an integrated power utility independent of the rest of the country’s network run by WAPDA. KESC was incorporated as a private limited company in 1913 and subsequently listed on the Karachi Stock Exchange. In 1952, the government of Pakistan nationalized KESC by acquiring a majority shareholding. Over several decades, KESC has faced many operational and financial challenges primarily due to inefficient public-sector management and lack of investment.

In 2003, the government began the privatization of KESC through a competitive bidding process, supported by ADB through the Energy Sector Restructuring Program. The privatization process was successfully concluded in December 2005 when the government transferred 73% of KESC’s shares to a consortium of investors led by KES Power Limited (KES Power), 60% owned by Al-Jomaih Holding, a Saudi industrial group, and 40% by National Industries Holding, a subsidiary of one of the largest Kuwaiti industrial and financial conglomerates.\(^2\)

However, the expected company turnaround did not happen.

Following the departure of the KESC management in 2008, existing shareholders approached the Dubai-based Abraaj Group to invest and take management control of KESC. In May 2008, Abraaj Capital agreed to invest $361 million for a 50% stake in KES Power, the holding company that owned 71.5% of KESC, with the aim of implementing a turnaround and growth plan. Existing shareholders retained equity in the business, with Abraaj assuming full management control. It has added 1,057 MW of generation capacity, enhanced transmission and distribution networks, and made improvements to customer service. After 3 years of management restructuring, KESC posted a profit for the first time in 17 years for FY2012.

In October 2016, Abraaj entered into an agreement to divest its 66.4% shareholding in K-Electric to the Shanghai Electric Power Company Limited, at a price that was to be a function of the regulated multi-year tariff to be determined by NEPRA and notified by the government. In March 2018, the Cabinet Committee on Privatisation (CCOP) approved the granting of a National Security Certificate to KES Power Limited for the sale of all of its 66.4% shareholding in K-Electric. However, as there has been no agreement regarding the tariff to date, the sale to Shanghai Electric has not been completed. Four months later, in July 2018, Abraaj filed for provisional liquidation.


4. Support from Development Partners

39. Of the development agencies active in Pakistan, ADB led the development of the energy sector during the evaluation period, both through the amount of its financing and its technical coordination with the government. ADB has been the co-chair of Pakistan’s Energy Sector Task Force (ESTF), providing technical support to the government and coordinating the efforts of other development partners. With more than $7 billion of total approved lending, ADB has been the major source of finance for the sector, surpassing the World Bank’s lending of $4.9 billion in the same period. More generally, the International Monetary Fund (IMF) has provided budget support to the country with a total of $17.9 billion of lending, part of which was related to the energy sector. Several other multilateral and bilateral development partners have stepped in to help the government address Pakistan’s power sector challenges. These have been the Agence Française de Développement (AFD), Islamic Development Bank (IsDB), German Development Bank (KfW), Japanese International Cooperation Agency (JICA), and the United States Agency for International Development (USAID).

40. The World Bank ramped up its financial support to the energy sector in the evaluation period. World Bank support was mainly for large hydropower generation, sector reform, and transmission and distribution projects. The World Bank started direct lending to the power sector in Pakistan after a long hiatus from 1995 to 2008. Total public sector approved funding during the 2008–2017 period amounted to $4.9 billion. Approximately half of total financing was channeled to large hydropower generation, representing an expected increase of 3,870 MW in capacity. The most relevant investments were in two hydropower projects: Tarbela IV extension and its additional financing, and Dasu Hydropower, which was financed through a combination of an investment loan and a guarantee. Two additional projects were financed to build capacity in water resources management, with an important focus on hydropower management in 2008 and 2015. In the upstream power sector, a $200 million natural gas efficiency project was financed in 2012. To accompany increases in generation capacity, electricity transmission and to a lesser extent distribution projects were financed in 2008, 2015 and 2017. The total amount allocated was $1.2 billion (24% of the total). Finally, two energy policy sector reform loans were financed in 2014 and 2015 for a total amount of $ 1.1 billion, in parallel to ADB’s Sustainable Energy Sector Reform. Most projects were developed in close coordination with ADB programs.

41. The International Finance Corporation (IFC) contributed to the development of private sector power generation projects, including gas-fired, hydropower, waste-to-energy, wind and solar. Support for the sector started in 2007, with IFC’s investment in the Karachi Electric utility company after its privatization, in parallel with ADB’s KESC post-privatization project. Since then, IFC’s combined investments have focused on independent power providers (IPPs) which contributed approximately

34 In several projects, technical feasibility studies funded by ADB were used in the design of WB projects.
35 IFC Website: https://disclosures.ifc.org/#/projectDetail/ESRS/25396
36 These have been: Engro Energy, KOEK, Metro Wind, Gulpur Hydro, Karot Hydro, Gul Ahmed, Tenaga Generasi, and Jhimpir wind power project. IFC also co-financed with ADB the following: Laraib Energy, Uch-II, Star Hydropower, Zorlu Enerji wind, and Zorlu Solar.
2,015\textsuperscript{37} MW by 2017. The distribution of increased capacity was 1,051 MW from hydropower, 438 MW from wind, 100 MW from solar, 404 MW from combined cycle gas turbines and 22 MW from biowaste.

42. The Islamic Development Bank and bilateral donors have provided smaller amounts of financial support for gas, hydropower, and renewable energy generation, as well as for transmission and distribution projects, many in collaboration with ADB. The IsDB committed funds for Patrind hydro, Uch-II gas combined cycle, Trinconboston Wind project and Jamshoro power plants with a total assistance of $450 million.\textsuperscript{38} AFD has supported hydropower\textsuperscript{39} and wind energy projects, and co-financed three operations with ADB, including sector reform, transmission and energy efficiency programs.\textsuperscript{40} JICA has mainly financed projects on electricity transmission and distribution.\textsuperscript{41} KfW financed two hydropower projects\textsuperscript{42} and an electric power transmission and distribution project.\textsuperscript{43} Finally, USAID provided support for projects related to generation, transmission and distribution, as well for capacity building and TA.\textsuperscript{44}

\textsuperscript{37} This amount excludes additional generation capacity under KESC post-privatization financial support.
\textsuperscript{38} Estimated from the amounts committed at appraisal. Actual figures not yet available as projects are still being implemented.
\textsuperscript{39} Mainly, the rehabilitation of the Warsak, Dargai and Chitral hydroelectric power stations and the construction of the Jaggran-II and Harpo hydroelectric power stations. Also, private sector financing of $20 million for a wind energy project of 50 MW.
\textsuperscript{40} It contributed $100 million to ADB’s Sustainable Energy Sector Reform Program, subprogram 3 in 2017, $82.5 million to the MFF Power Transmission Enhancement Investment Program, tranche 4 in 2013, $25 million to the MFF Energy Efficiency Investment Program, tranche 1.
\textsuperscript{41} Total investments were approximately $423 million.
\textsuperscript{42} It contributed $40 million for the rehabilitation of Warsak and $20 million to the construction of Harpo.
\textsuperscript{43} It contributed $60 million for the construction of the Ghakkar substation in 2010.
\textsuperscript{44} Further information can be found in https://www.usaid.gov/pakistan/energy.
ADB ASSISTANCE
CHAPTER 2

ADB Assistance

43. This chapter includes an overview of relevant ADB policies and strategies, as well as the portfolio of sovereign, nonsovereign and TA operations.

A. ADB Policies and Strategies

44. The energy sector has been traditionally at the heart of ADB’s development strategies. ADB’s Long-Term Strategic Framework, 2001–2015 prioritized electrification and renewable energy investments in rural areas. Energy priorities were founded on country strategies and programs. Under this framework, ADB focused on energy and the environment to achieve solutions to climate change challenges, resulting in a cross-sector strategic emphasis on environmental sustainability. ADB’s Strategy 2020 (for the period 2008–2020) identified infrastructure, including energy, as one of the five core areas for ADB investments. Strategy 2020 stipulated that, for the purpose of meeting growing energy demands in a sustainable manner, ADB would support the expansion of energy supply and promote energy efficiency through supply-side and demand-side measures. More recently, Strategy 2030 focused on the use of energy sector investments as part of ADB’s second and third operational priorities. The second priority was “accelerating progress in gender equality” by reducing the time poverty of women through investments in rural electrification, clean cookstoves and biogas. The third was “tackling climate change, building climate change and disaster resilience, and enhancing environmental sustainability” by prioritizing investments and shifting country plans to support low greenhouse gas emissions, in line with countries’ nationally determined contributions under the Paris agreement, and by promoting less water-intensive energy (e.g., solar and wind) and fostering energy-efficient water supply.

45. ADB’s energy policies during the evaluation period aimed at supporting energy security, facilitating a transition to a low-carbon economy, and supporting poverty reduction. The Energy Policy, 1995 and its revision in 2000 guided ADB’s support until 2009, when an updated Energy Policy was approved. This had the objective of helping developing member countries provide reliable, adequate, and affordable energy for inclusive growth in a socially, economically, and environmentally sustainable way. The implementation of the policy was guided by three pillars: (i) promoting energy efficiency and renewable energy; (ii) maximizing access to energy for all; and (iii) promoting energy sector reform, capacity building, and governance. It was envisaged that the Energy Policy would align ADB’s energy operations with its overall strategy (Strategy 2020) by emphasizing energy security, facilitating a transition to a low-carbon economy, supporting universal access to energy, and achieving ADB’s vision of a region free of poverty.

46. **At the country level, four country strategies and various updates were issued for Pakistan during the evaluation period (2005–2017).** Pakistan’s country strategy and program (CSP), 2002–2006 had three updates (CSPUs) which covered the period up to 2008: 2004–2006, 2005–2006, and 2006–2008. This was followed by the country partnership strategy (CPS), 2009–2013; an Interim CPS, 2014–2015; and the current CPS, 2015–2019. The strategies’ focus on the energy sector is discussed below.

47. **CSP, 2004–2006 and updates.** The energy sector was allocated 25% of the original CSP budget and 9% more in the updates. Planned assistance included an industrial efficiency and environment improvement project, a renewable energy project, and a standby project on power transmission and trade enhancement. This period included $50 million for the Cleaner Fuel Project in 2004, $200 million for the Renewable Energy Development project in 2005, and $150 million for Power Transmission and Distribution Enhancement project in 2006.

48. **CPS, 2009–2013.** This strategy focused on energy sector reforms and expansion of the energy supply, including generation, transmission, distribution, system enhancement, and energy efficiency to promote inclusive and environmentally sustainable growth. ADB’s positioning of its energy sector strategy was aligned with the government’s priorities, which included energy security and sector reforms. During the period, ADB supported sector reforms and made significant investments in generation, transmission, distribution, and energy efficiency. The energy portfolio amounted to $1,690.2 million or 39% of total approvals of the envisaged envelope. Based on the CPS, while sector reforms are crucial and must continue in order for the full benefits of infrastructure investments to be realized, particularly in terms of their sustainability, ADB should target critical reforms where there is visible government commitment, and should adopt a sector-specific medium-term approach, as also indicated by ADB’s country assistance program evaluation (CAPE) in 2013.

49. **Interim CPS, 2014-2015.** This document supplemented the country operations business plan (COBP) and was intended to extend the validity of the CPS, 2009–2013 until the endorsement of the CPS, 2015–2019. During the interim CPS period, it was envisaged that ADB assistance would continue to focus on six sectors, including energy. Based on the country operations business plan (COBP), 2015–2017, ADB support for the energy sector would amount to $1.1 billion or 34% of the total envelope. It would focus on reducing distribution and transmission losses from 23% (2013) to 16% (2018), and load shedding from 5,000 MW (2013) to 0 (2018).

50. **CPS, 2015-2019.** The current CPS, 2015-2019 is in line with the government’s priorities as reflected in its “four Es” agenda: economy, energy, education, and elimination of extremism. For energy, the CPS recognized the need to relieve some of the main constraints on inclusive growth such as energy shortages. It was envisaged that ADB support would continue to support: (i) tariff reforms in order to create a self-sustaining regime and to target subsidies at low-income consumers; (ii) loss reduction and larger tariff collections by electricity distribution companies; (iii) stronger demand-side efficiency and energy conservation measures; (iv) instituting performance-based contracts and increasing public access to information on generation, consumption, tariffs, and subsidies through web-based disclosure; and (v) commercializing and privatizing electricity distribution companies. The reforms would be supplemented by investments to rehabilitate transmission and distribution systems, and to increase the supply of renewable energy. In addition, it was anticipated that synergies would be developed between ADB’s nonsovereign and sovereign operations and that they would complement each other through a focus on energy security and selective investments to increase the supply of electricity based on domestic sources (hydropower, gas, wind, and solar). Total resources allocated for the energy sector were estimated at $2.0 billion for 2015–2019, 40% of the total 2015–2019 resource envelope.

B. **ADB Portfolio**

51. **ADB was the leading development partner in the energy sector in Pakistan during the evaluation period.** The energy sector in Pakistan benefited from ADB support across all subsectors and ADB
supported essential sector reforms. Through sovereign loans, nonsovereign instruments, and TA, as well as by leading the coordination of all development agencies in Pakistan, ADB has provided extensive support for energy sector development, with a view to meeting electricity demand and securing financial sustainability. However, further efforts are necessary to achieve such objectives.

52. **Pakistan was the second largest ADB borrower in the energy sector during the evaluation period.** Of the $28.4 billion sovereign loans and grants in the whole ADB energy sector portfolio during the evaluation period, $7.76 billion was approved for Pakistan, making it the second largest recipient of funds in the energy sector during 2005–2017, after India.

53. **The ADB portfolio from 2005 to 2017 supported all energy subsectors through a variety of financial instruments, including sovereign loans, NSO, and TA.** During the evaluation period, ADB approved 28 sovereign loans amounting to commitments of $5.4 billion (88.2% of the total), 12 NSO of $725 million (11.7%), and 10 TA projects of $8.3 million (0.1%).

**Table 5: ADB Energy Portfolio for Pakistan During the Evaluation Period, as of 2017 ($ million)**

<table>
<thead>
<tr>
<th>ADB Portfolio</th>
<th>Number</th>
<th>Commitments</th>
<th>Actual Loans</th>
<th>Disbursed Loans</th>
<th>Disbursed Portion</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Sovereign Loans</strong></td>
<td>28</td>
<td>5,433.4</td>
<td>4,634.9</td>
<td>2,324.7</td>
<td>42.8%</td>
</tr>
<tr>
<td>MFF Renewable Energy</td>
<td>3</td>
<td>315.0</td>
<td>122.1</td>
<td>109.0</td>
<td>34.6%</td>
</tr>
<tr>
<td>MFF Transmission</td>
<td>5</td>
<td>947.2</td>
<td>506.5</td>
<td>506.5</td>
<td>53.5%</td>
</tr>
<tr>
<td>MFF Energy Efficiency</td>
<td>2</td>
<td>60.0</td>
<td>45.2</td>
<td>27.8</td>
<td>46.4%</td>
</tr>
<tr>
<td>MFF Second Transmission</td>
<td>3</td>
<td>385.0</td>
<td>385.2</td>
<td>0.1</td>
<td>0.0%</td>
</tr>
<tr>
<td>MFF Distribution</td>
<td>5</td>
<td>906.2</td>
<td>765.3</td>
<td>564.1</td>
<td>62.3%</td>
</tr>
<tr>
<td>MFF Second Distribution</td>
<td>2</td>
<td>495.0</td>
<td>495.0</td>
<td>0.1</td>
<td>0.0%</td>
</tr>
<tr>
<td>PBL Sustainable Energy Sector Reform</td>
<td>4</td>
<td>1,100.0</td>
<td>1,093.1</td>
<td>1,093.1</td>
<td>99.4%</td>
</tr>
<tr>
<td>Project Loan Jamshoro Coal Power</td>
<td>3</td>
<td>900.0</td>
<td>897.4</td>
<td>10.9</td>
<td>1.2%</td>
</tr>
<tr>
<td>RBL Access to Clean Energy</td>
<td>1</td>
<td>325.0</td>
<td>325.0</td>
<td>13.1</td>
<td>4.0%</td>
</tr>
<tr>
<td><strong>Nonsovereign Operations</strong></td>
<td>12</td>
<td>724.5</td>
<td>724.5</td>
<td>594.6</td>
<td>82.1%</td>
</tr>
<tr>
<td>Technical Assistance</td>
<td>10</td>
<td>8.3</td>
<td>8.3</td>
<td>4.4</td>
<td>54.2%</td>
</tr>
<tr>
<td><strong>Total Portfolio</strong></td>
<td>50</td>
<td>6,165.9</td>
<td>5,367.7</td>
<td>2,923.7</td>
<td>47.4%</td>
</tr>
</tbody>
</table>

*Source: Independent Evaluation Department calculations based on ADB loan information system.*

1. **Sovereign Loans**

54. **Although ADB’s Board of Directors approved about $7 billion of sovereign operations, the actual commitments were significantly less than the Board approvals.** Some tranches of multitranche financing facility (MFF) programs were never initiated while others were cancelled or had their budgets adjusted during implementation, reducing the actual loans to $5.4 billion (77% of the total approved) as of 2017.\(^{50}\)

55. **The majority of ADB’s sovereign loan interventions supported Pakistan’s electricity transmission and distribution (whereas most NSO supported power generation).** ADB’s support for transmission and distribution amounted to about $2.8 billion or 46% of the total portfolio. This was followed in terms of volume by conventional power generation and large hydropower projects ($1.4 billion, 22%), energy sector development and institutional reform ($1.1 billion, 18%), and renewable energy, energy efficiency, and access ($0.9 billion, 14%).

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\(^{50}\) Two MFFs are under early implementation and more funding may be committed in the upcoming years.
Figure 7: ADB Sovereign Loans, Nonsovereign Operations and Technical Assistance for Pakistan Energy Sector (Net Amount)\(^a\) by Subsector, 2005–2017

\(\text{\^{\tiny a}}\) Net amount refers to loan values after budget adjustments and cancellations. Source: IED calculations based on ADB loan information system.

56. Since 2006, ADB has approved a total of six multitranche financing facilities (MFFs) amounting to $4.7 billion for the Pakistan energy sector. Of these, two were for enhancement of the transmission subsector, two were for enhancement of the distribution subsector, one was for energy efficiency, and one was for renewable energy. Under these six facilities, a total of 20 loan tranches amounting to $3.1 billion have been approved thus far.\(^{51}\) A list of MFFs and their tranches is in Appendix 1.

57. The total amount of MFF sovereign loans provided ($3.1 billion) differs substantially from the overall MFF amount approved by the Board ($4.7 billion). The MFF modality enables ADB to provide assistance programmatically by aligning the provision of financing with project readiness and the long-term needs of a client. However, in certain cases, such as the MFFs for renewable energy development and for energy efficiency in Pakistan, programmatic approaches did not achieve the expected results and only one tranche under each MFF was implemented. Figure 8 shows Board approvals, net loans after adjustments and cancellations, contract awards, and disbursements as of 2017.

\(^{51}\) $2.2 billion in terms of net loan amount but $3 billion in terms of total original amount approved.
Figure 8: Multitranche Financing Facilities in the Pakistan Energy Sector, as of October 2017 ($ million)

EE = energy efficiency, MFF = multitranche financing facility, RE = renewable energy.
Notes: Actual loans are calculated as the net amount of the tranches approved, minus tranche cancellations and budget adjustments. Disbursed amounts are calculated as of October 2017.
Source: Independent Evaluation Department calculations based on ADB loan information system and project database.

58. **ADB’s investment support for electricity transmission infrastructure was through two MFFs: the Power Transmission Enhancement Investment Program** $52$ and the Second Power Transmission Enhancement Investment Program. $53$ It was envisaged that the first power transmission program, approved in 2006, would improve power transmission infrastructure through rehabilitation, augmentation and expansion of the primary (220 kV and 500 kV) transmission network, relieve the power system from transmission bottlenecks, and support the commercialization of the NTDC. The MFF was expected to be completed in 31 December 2016 but the MFF availability period was extended by 3 years to enable NTDC to use cofinancing from the Agence Française de Développement (AFD) to complete the project under tranche 4. As a result, the MFF’s target outcome was considered to have been achieved, allowing ADB to administer financing under the MFF for an extended period with funds from AFD. Ten years after the approval of the first transmission MFF, a second power transmission program was approved in 2016. This was intended to further rehabilitate, augment, and expand the high-voltage transmission network by 2026 (through the addition of at least 1,000 km of new transmission lines and at least 2,500 MW of new substation capacity, extension and improvements to transformers and the application of the SCADA system to the entire transmission system) and to strengthen the operations and management of the NTDC and Central Power Purchasing Agency (Guarantee) Limited (CPPA-G). The fourth and final tranche is expected to be completed by December 2025 but only two tranches, have been approved so far.

59. **ADB’s investment support for electricity distribution infrastructure was through two MFF programs.** The Power Distribution Enhancement Investment Program $54$ and the Second Power

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$54$ ADB. 2008. Report and Recommendation of the President to the Board of Directors: Proposed Multitranche Financing Facility to the Islamic Republic of Pakistan for the Power Distribution Enhancement Investment Program. Manila. The fourth tranche of the program is classified under conventional energy but this evaluation considered the tranche under electricity transmission and distribution.
Distribution Enhancement Investment Program. The first power distribution program was approved in 2008. It was envisaged it would (i) improve the power distribution infrastructure through rehabilitation, augmentation, and expansion of the secondary (132 kV and 66 kV) transmission network and relieve the power system from distribution bottlenecks and constraints; and (ii) assist in commercializing the operations of the distribution companies. The program was to be implemented in four tranches and it was estimated it would be completed by 30 June 2018. The second distribution program was approved in 2015, 7 years after the approval of the first program. It aims to improve the financial viability of Pakistan’s power distribution sector by introducing advanced metering infrastructure (AMI) to power distribution companies all over Pakistan. In particular, the program will (i) reduce power distribution losses, and improve revenue collection through, among others, updating the operations manual (to strengthen theft detection) and improving monitoring and inspection procedures; (ii) reduce power outages by enhancing load control and load management; (iii) provide automated power consumption data; (iv) modernize the electricity metering and billing system through the implementation of the meter data management system and the installation of smart meters and communication equipment, and (v) improve customer services through a new billing system and customer information system. The program was designed to be implemented in four tranches and completed by 2024. To date, only one tranche has been approved, but the government has withheld its implementation.

Almost 30% ($1.3 billion) of the sovereign loan portfolio supported energy generation. Most of the support went to conventional energy generation with the approval of the $900 million Jamshoro power generation project in 2013. The project comprised three loans for $840 million, $30 million, and $30 million. It was envisaged the project would increase the generation capacity of the Jamshoro thermal power station in Sindh province through the installation of a 600-MW (net) supercritical coal-fired unit, and promote a lower-cost energy mix, diversifying generation away from expensive heavy fuel oil to less expensive coal. The project was to be implemented over 9 years from 2014 to 2023 and is currently being implemented. In addition, renewable energy and mini-hydropower projects accounted for $447 million (10% of the portfolio): the Renewable Energy Development Sector Investment Program and the RBL for the Access to Clean Energy Investment Program.

ADB approved the Sustainable Energy Sector Reform Program for an amount of $1.1 billion in 2014. This was ADB’s second program loan in the sector, 14 years after it supported energy sector reforms during the energy crisis in 2000. The design contemplated five subprograms to be implemented annually over a period of 5 years from 2014. However, the design was eventually trimmed down to three subprograms following a request by the ADB Board for ADB to carry out a sector evaluation before considering further policy-based lending support to the energy sector. The current evaluation is the response to that request. The first subprogram loan for $400 million was approved in 2014. The second was approved in 2015 in two loans totaling $400 million while the third for $300 million was approved in 2017. The program was intended to help the government with short-term stabilization measures and

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57 80/20 blend of imported sub-bituminous coal and domestic lignite when available.
58 The second tranche of the Renewable Energy Development Sector Investment Program was originally approved for $200 million in 2010 but prior to loan signing, the 3-year availability period of the Guarantee Facility lapsed on 14 December 2013, hence the loan was cancelled.
60 ADB. 2014. Report and Recommendation of the President to the Board of Directors: Proposed Programmatic Approach and Policy-Based Loan for Subprogram 1 for the Islamic Republic of Pakistan: Sustainable Energy Sector Reform Program. Manila.
to start the long-term restructuring to create a sustainable power sector through: (i) management of tariffs and subsidies, (ii) improvement to sector performance and market access for private sector participation and (iii) achievement of accountability and transparency in the power sector.

62. **In 2008, ADB approved the Accelerating Economic Transformation Program (AETP) cluster program loan.** The program was intended to support the government to implement policies targeted at economic diversification and structural transformation, including reducing energy subsidies. The program was delivered in two subprograms approved in 2008 and 2009, but later cancelled. The program does not form part of the portfolio being assessed under this evaluation but the related reforms to the energy sector are referred to in the performance and results section and in Box 2.

**Box 2: ADB’s Accelerating Economic Transformation Program**

Accelerating Economic Transformation Program (AETP) was envisaged as a four-subprogram policy-based loan to address the fiscal implications of the food and energy crisis in 2008 and 2009, in coordination with the IMF Standby Agreement, 2008–2010. Among other measures, it was designed to focus on reducing costly and inefficient subsidies in the energy and agriculture sectors. The first subprogram was approved in 2008, to be financed by two loans of $300 million and $200 million. For the power sector, subprogram 1 was intended to initiate work on determining the extent of circular debt, ensuring up-to-date and timely payments of the tariff differential subsidies to DISCOs, and allocating sufficient resources for energy subsidies in the budget to meet the forecast needs over FY2009. In addition, the program targeted obtaining parliamentary approval for reducing electricity subsidies for all consumers through (i) elimination of generalized sales tax subsidies for all domestic consumers, (ii) introduction of automatic monthly fuel price adjustments through a surcharge, and (iii) introduction of an additional surcharge to be levied on all consumers to reduce the gap between determined and notified tariffs. These targets were also part of the Sustainable Energy Sector Reform Program, but they have not yet been achieved.

Subprogram 2 was approved in 2009, to be financed by two loans for $350 million and $150 million, but it was discontinued in 2010 after the IMF's Standby Agreement went off-track. This subprogram set out to initiate power sector debt resolution through the implementation of a “circular debt resolution plan” designed to (i) resolve the circular debt problem, (ii) support improved corporate governance, and (iii) reduce technical and commercial losses, which have caused the chronic shortfall in Pakistan’s power supply. The key components of the plan focused on: (i) timely notification of the cost recovery tariff, (ii) sector debt resolution, and (iii) improved technical and financial performance of state-owned power sector companies. The objectives of the plan have not been achieved to date.

The reforms that were targeted by the AETP in 2008 are still pending. The program achieved only the creation of Power Holding Private Limited, which helped the government park some of the circular debt in the company’s balance sheet. Other reforms, such as the amendment of the NEPRA Act happened only 10 years later, while other proposed reforms were never pursued.


63. **The ADB portfolio includes the first and only energy RBL program in Pakistan.** Approved in 2016 for $325 million, it was envisaged that the Access to Clean Energy Investment Program would increase access to sustainable and more reliable electricity services for vulnerable communities in the Khyber Pakhtunkhwa (KPK) and Punjab. The RBL model was used for the project as it depended for its success on nongovernment organizations (NGOs), who were to be responsible for community mobilization and

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sustainability; approval for subsequent projects would depend on the results achieved. The program is intended to be implemented over a period of 5 years from 2016 to 2021.

2. Nonsovereign Operations

ADB’s NSO support to Pakistan’s energy sector totaled $724.5 million for the period 2005–2017. This consisted of 12 NSO, of which $611 million (84%) was financed from ADB’s ordinary capital resources, $110.6 million (15%) was guarantees, and $2.8 million (1%) was equity. In terms of coverage, ADB’s NSO in the Pakistan energy sector were almost equally divided among four subsectors: large hydropower, renewable energy, conventional generation, and transmission and distribution. Overall, generation (hydropower, renewable and conventional energy) made up about 79% of the total approved NSO and supported the government’s energy sector reforms, which had targeted fuel mix diversification. Electricity transmission and distribution accounted for the remaining 21%. Most of ADB’s nonsovereign investments were considered to be groundbreaking.

ADB’s support for private hydropower generation included the first private hydropower project in Pakistan: the 84 MW New Bong Escape project ($37 million) approved in 2005. ADB’s groundbreaking transactions supported the government’s attempts to attract other private capital into the energy sector, not only in hydropower but also in other energy sources. In 2011, ADB also financed the 147 MW Patrind hydropower project ($97 million) and in 2015, ADB approved financing for the 102 MW Gulpur hydropower project ($65 million).

For renewable energy generation, ADB approved three wind power projects (including one of the first private wind power projects developed in Pakistan) and one solar photovoltaic (PV) project. The three wind power projects included the $36.8 million investment loan for the 56 MW Zorlu Enerji Power Project in 2010 and the $66.6 million guarantee for the combined 100 MW Foundation Wind Energy I and II in 2011. In 2016, ADB approved a $75 million investment loan for its third private sector wind power project in Pakistan, the 150 MW Triconboston Wind Power project. Once commissioned, the project will be Pakistan’s largest wind farm to date. ADB also approved a $20 million investment loan for the Zorlu Solar Energy project in 2017. The 100 MW project was approved under ADB’s Faster Approach to Small Nonsovereign Transactions (FAST) framework and is ADB’s first private solar power project in Pakistan.

ADB NSO also supported generation from conventional sources, including gas-fired combined cycles plants and the first regasification plant in Pakistan. These operations included the 171-MW combined cycle low-British thermal unit (BTU) gas-fired power plant in Daharki, Sindh province. ADB provided the guarantee and equity for the project. The second project involved a

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$30 million investment loan for the Engro fast-tracked liquefied natural gas regasification project. This was the first liquefied natural gas (LNG) regasification facility and associated gas infrastructure in Pakistan, making use of regasified LNG. Finally, ADB provided a $100 million investment loan to the 404-MW Uch II Power Project. This investment involves the design, engineering, construction, and operation of a 404 MW gross combined cycle gas-fired power plant, near Dera Murad Jamali, Nasirabad District, Balochistan Province. The total amount invested by ADB for the three projects amounted to $176.5 million.

68. ADB NSO supported the rehabilitation and upgrade of generation, transmission and distribution facilities of K-Electric. This accounted for the remaining 21% of the Pakistan NSO energy portfolio during the period. In collaboration with the International Financing Corporation (IFC), the $150 million KESC Postprivatization Rehabilitation, Upgrade, and Expansion project of 2007 was intended to finance the turnaround of KESC by increasing its generation capacity and availability, improving the reliability of the transmission and distribution network (increasing reliability, decreasing transmission losses, and eliminating unscheduled outages), and upgrading commercial system operations. In February 2015, K-Electric carried out full repayment of the loan. At loan signing, an option to convert up to $25 million debt to equity at a predetermined price was agreed upon. In December 2012, ADB fully exercised this option at a strike price of PRs3.50 per share and acquired a 2.53% stake in K-Electric. In Aug 2014, the President approved the equity divestment, and ADB subsequently drip-fed the shares into the Pakistan Stock Exchange during 2015 and 2016 at an average price of PRs7.95 per share net of brokerage and remittance fees. The divestment was completed in July 2016 and ADB realized net gains of $28.4 million, generating an internal rate of return in US dollars of 24.7%.

3. Technical Assistance

69. In addition to sovereign loans and NSO, ADB also provided TA to the Pakistan energy sector amounting to $8.3 million. TA support for Pakistan’s energy sector consisted of a mix of policy and advisory technical assistance (PATA) and capacity development technical assistance (CDTA). A total of seven PATA projects amounting to $5.1 million were approved during the period, including a TA project for Pakistan’s Integrated Energy Model, TA for the Establishment and Commencement of Operations for the Central Power Purchasing Agency, TA for the Renewable Energy Policy Formulation and Capacity Building of the Alternative Energy Development Board, and the TA Update on Energy Sector Plan. There were also three CDTA projects approved amounting to $3.3 million: Determining the Potential for

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78 Such prepayment of $63.8 million was financed by a bridge loan, refinanced through issuance of domestic Susuk bonds.
80 Includes advisory and operational technical assistance.
Carbon Capture and Storage,\textsuperscript{85} Strengthening the Central Power Purchasing Agency,\textsuperscript{86} and Access to Clean Energy Investment Program.\textsuperscript{87}

70. \textbf{Aside from PATA and CDTA, there were also eight project preparatory technical assistance (PPTA) projects amounting to $10 million approved during the period.} Seven of the eight have led to subsequent financing and approval of the envisaged loans. The other is still underway. PPTA projects that are linked to loans are evaluated as part of the project completion report for the loan-financed project and are not evaluated separately.

71. \textbf{More than half of the approved TA projects supported Pakistan’s energy sector development and institutional reform.} These five TA projects amounted to $4.8 million (58\% of the total approved TA amount. Two TA projects amounting to $1.8 million (22\%) supported energy efficiency and conservation, including the TA Determining the Potential for Carbon Capture and Storage.\textsuperscript{88} The remaining $1.7 million supported energy generation (conventional and renewable energy generation).

\textsuperscript{85} ADB. 2017. \textit{Technical Assistance to the Islamic Republic of Pakistan for Determining the Potential for Carbon Capture and Storage}. Manila.

\textsuperscript{86} ADB. 2014. \textit{Technical Assistance to the Islamic Republic of Pakistan for Strengthening the Central Power Purchasing Agency}. Manila.


\textsuperscript{88} Footnote 82.
This chapter includes an overview of ADB’s performance in supporting Pakistan’s power sector, as well as results on-the-ground.

A. Performance

This evaluation examines ADB’s performance in five core areas, aided by the theory of change: (i) sector reform and regulations, (ii) generation from conventional sources, (iii) transmission systems, (iv) distribution systems, and (v) renewable energy generation and energy efficiency. Most project loans have not been officially closed, although implementation has progressed far enough for it to be objectively assessed. To date, only two completion reports for sovereign loans, four for NSO, and four for TA projects have been prepared. The completion reports for the sovereign loans and NSO have been validated by IED.

1. Sector Reform and Regulations
   a. Relevance

The Sustainable Energy Sector Reform PBL and TA initiatives supported sector and institutional reform that aimed to create a more reliable, sustainable, and secure energy sector that would promote economic growth. ADB did not renew its support for power sector reforms in Pakistan until 2014 with the Sustainable Energy Sector Reform PBL, which supported the reform initiatives outlined in the National Power Policy, 2013 which aimed to build an affordable, reliable, sustainable, and secured energy sector. The PBL program was designed and implemented in coordination with the International Monetary Fund (IMF) Extended Fund Facility (EFF), 2013-2016 program and the World Bank’s Power Sector Reform Development Policy Credits, as well as other donors, such as the Japan International Cooperation Agency (JICA) and the Agence Française de Développement (AFD). The Sustainable Energy Sector Reform Program built on the work of ADB’s AETP PBL, which had been discontinued in 2010 during implementation of the second subprogram after the IMF’s Standby Agreement was cancelled. Some of the reforms that have been recently achieved were proposed 10 years ago in the AETP.

The Sustainable Energy Sector Reform policy actions were not stringent enough to achieve the intended results. In order to achieve the first output of reducing tariff approval and implementation times, the policy actions required: approved tariff and subsidy guidelines for subprogram 1, submitted by NEPRA for three DISCOs for subprogram 3. However, although NEPRA did determine the multiyear tariffs for FESCO, IESCO, and LESCO in 2018, the three DISCOs rejected the decision and the government has not notified those tariffs, which essentially left the problem unresolved. In fact, DISCOs have been billing the determined tariff for FY2015 during the past 3 years, as updated tariffs were never notified. When looking at the key contributing factors to circular debt, and specifically those related to tariffs, the evaluation considers that the policy actions could have been better targeted. Other policy actions, such as those related to reducing losses and improving collections, did not deliver the intended outputs; e.g., the policy actions for subprogram 1, instructions from the ministry to certain DISCOs to outsource the
collection of high loss feeders to private companies, revenue protection programs, and adjustment of receivables from federal and provincial governments and, for subprogram 3, implementation of collection outsourcing for five DISCOs did not achieve the output indicator of improved collection rate of DISCOs of 94% of total billing by 2017. In fact, collections have not increased significantly since 2014, with all DISCOs having recovery ratios of about 90%.\footnote{The weighted average of the recovery ratio for all DISCOs (excluding for TESCO) was 92.9% for FY2017 as reported by NEPRA. However, this value includes a large arrear adjustment from the Government of Sindh to SEPCO. If recovery values for SEPCO are assumed to be similar to those of the previous fiscal year, the weighted average for all DISCOs’ recoveries would be 90.3% (similar to FY2015).}

76. **Support for sector reform was also provided through TA activities that started in 2005, with the TA to support the Office of the Energy Advisor at the beginning of the evaluation period.**\footnote{ADB. 2005. *Technical Assistance to the Islamic Republic of Pakistan for Operational Support to the Office of the Energy Advisor.* Manila.} Important donor coordination work led to the establishment of the ESTF, supported by another ADB TA project,\footnote{ADB. 2009. *Technical Assistance to the Islamic Republic of Pakistan for Pakistan Energy Sector Task Force.* Manila.} as well as the technical groundwork for the establishment and operation of CPPA-G, through two TA projects: Commencement of Operations for the Central Power Purchasing Agency and Strengthening the Central Power Purchasing Agency.\footnote{Footnotes 77 and 81.}

77. **Both the Sustainable Energy Sector Reform Program PBL and the TA projects targeted reforms, policies and regulations.** However, the policy actions should have been designed to address core issues and support actual changes. Nevertheless, the Sustainable Energy Sector Reform Program ranged across several sector issues, supported by a coordinated effort with ADB’s main development partners, together with various TA activities that targeted important aspects of the sector, this evaluation considers ADB’s support for sector reform relevant.

b. **Effectiveness**

78. **While the Sustainable Energy Sector Reform Program contributed to various institutional and regulatory changes, delivery of the program outputs and outcomes was incomplete.** Arguably the most important regulatory change was the approval in 2018 of the amendment to the NEPRA Act (initially proposed under subprogram 2 of the AETP in 2009), which provided the tools to the government to eliminate the time lag between tariff determination and notification, instituted an unified revenue-based tariff mechanism,\footnote{As reported by the Joint Secretary for Power Policy and Finance of the Power Division, Ministry of Energy in November 2018.} and allowed NEPRA to manage tariff appeals more efficiently than the current judiciary system, which has no expertise in this area. Other changes, such as the restructuring of government ministries related to the sector (with the creation of the Ministry of Energy), the separation of CPPA-G from NTDC, and the establishment of its role as an independent body, and the integration of the AEDB and PPIB under the same corporate structure, may improve processes and reduce institutional inefficiencies and delays. However, to date, these changes have not helped the output and outcome targets of the program to be achieved. As of June 2018, only two out of five outcome indicators had been fully achieved.\footnote{Outcome indicator b) private investment as a share of total investments in the power subsector increased to 23% by June 2018, has been achieved as a result of CPEC-related private investments in power generation. However, the indicator was intended to measure the progress in privatizing DISCOs and GENCOs, which has been tried without success, and ultimately abandoned. Outcome indicator e) power sector subsidy reduced to 0.3%-0.4% of GDP by 2016 from 1.8% in 2013, has been achieved. However, it is noted that subsidy budget for FY2019 has increased 30%, which may bring up the subsidy/GDP ratio over the 0.4% target again. Considering the substantial increase of the oil price this year, it is expected the subsidy requirements to grow as well faster than GDP.}

79. **Similarly, while some of the program outputs and associated policy actions were directed at reducing the circular debt flow, the volume of debt flow has kept increasing and has reached unprecedented levels.** Policy actions to reduce the accumulation of circular debt have included a circular
debt management plan adopted by the government, the amendment to the NEPRA Act (which allowed tariff surcharges), the increased transparency of money flows to and from the market operator, reduced tariff differential subsidies, and reduced overdue payables to generators. However, these have not been effective, and the accumulated debt has now even exceeded the business-as-usual scenario levels in the circular debt management plan.95

80. **Advisory and capacity building TA activities were generally effective** in helping the government to develop a comprehensive development plan for the power sector, establish and strengthen the market operator CPPA, and establish AEDB, as well as to support the draft and preparation of the renewable energy policy and the integrated energy model. However, it is important to note that: (i) the TA support was designed as a one-time effort, with no phased support or any other attempt to extend the assistance over a longer time period (except for the follow up TA to support the CPPA-G) and did not recognize the risk of losing trained personnel, which led to the abandonment of integrated energy planning at the Planning Commission; (ii) the design of the TA on the Integrated Energy Model did not incorporate the assessment and formulation of market guidelines for the operations of a central power trading system in the consultant’s terms of reference at the outset, and required significant changes later; (iii) the capacity building support for NEPRA, although it was useful, needs to be scaled up with further support to enhance its technical capabilities;96 and (iv) capacity development TA support to AEDB and provincial agencies responsible for renewable energy development fell short of requirements, as is evident from the fact that an insufficient skills base led to a situation where costs for small hydropower plants were estimated on the basis of unit costs for large hydropower plants, which resulted in substantial cost overruns and cancellation of one small hydropower plant.

81. **Overall, the Sustainable Energy Sector Reform Program has not yet delivered most of its outputs or achieved its outcomes, although several reforms were stalled during the 2018 election period.** It is unclear whether its policy actions address the key underlying problems of the sector. Circular debt keeps increasing at alarming rates, jeopardizing the sustainability of the whole sector, and the reforms designed to corporatize state-owned power sector entities have still not been carried out, given the political influence that exists in the governance of public sector entities. As the 2018 elections stalled decisions related to sector reforms and improvements, including tax regulations, incentivizing renewable energy, and cost recovery, several policy actions might have been delayed and not yet contributed to the delivery of outputs or achievement of outcomes.97 ADB support for sector reforms is considered less than effective.

c. **Efficiency**

82. **Delivery of the Sustainable Energy Sector Reform Program outputs has been delayed, with only two outcomes achieved.** Results on the ground have been disappointing, considering the size of the reform program ($2.4 billion, with ADB providing $1.1 billion and the World Bank, JICA and AFD also participating). The fact that such a large amount has achieved only limited changes raises concerns. Besides, some policy actions do not require substantial funding but just the right push from the government and legislators (e.g., the amendment to the NEPRA Act and revised cost-recovery tariff structures). Output delivery has been delayed, as most output indicator targets had not been reached one year after subprogram 3 was closed. Hence, ADB’s support for sector reform is rated less than efficient.

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95 The business-as-usual scenario estimated a projected accumulation of circular debt of PRs413 billion by June 2018, whereas the actual figure was PRs499 billion (20% higher), as reported by media based on declarations from key government officials.
96 NEPRA acknowledges the need for additional advisory support to enhance its technical capabilities through, for instance: (i) improved commercial and technical understanding of renewable, large hydropower, and thermal power generation options; and (ii) better know-how on tariff computation methodologies followed by regulators in other countries.
97 In June 2018, CWEU reported that one out of five outcome indicators had been achieved. Only one output indicator had been fully achieved, six partially achieved, four unachieved, and two were not applicable.
d. Sustainability

Although policy actions have been delivered to support the sustainability of the energy sector, it is unclear whether they will have long-lasting effects, considering the high political risk accompanying commercialization of the sector, as well as high levels of circular debt. While some results have been achieved, such as the amendment to the NEPRA Act, the restructuring of leading ministries (the creation of the Ministry of Energy), the separation of the market and system operator (CPPA-G), and the integration of AEDB into PPIB, the long-term effects of such changes are unclear. Requirements for subsidies have exceeded the agreed limits set by the program (due to increased electricity generation and delays on tariff notification), and the government keeps delaying the payment of subsidies, which is inflating arrears and circular debt flows. The recent escalation of circular debt shows that its underlying problems may jeopardize the sustainability of the whole sector. Moreover, once new IPP generation capacity comes on stream, increasing electricity sales, the circular debt will expand even more quickly.

The evaluation is unclear whether support from the Sustainable Energy Sector Reform Program has promoted the needed structural reforms. The huge level of circular debt, despite repeated efforts to reduce it, is a major concern. Previous experience from the AETP PBL shows that, although the elimination of electricity tariff subsidies was targeted by 2010, such reforms never happened; instead, subsidization increased until 2014 due to high oil prices, which increased generation costs which could not be transferred to customers. The Sustainable Energy Sector Reform Program did target subsidy reduction by supporting the introduction of fuel surcharges, although this were challenged in court. The improvement from 2015 onwards, where the tariff differential subsidy was about 1 PRs/kWh, is a result of a sustained increase in consumer tariffs and to lower global oil prices. The question is whether the oil price increase in 2018 will mean that subsidies or consumer tariffs will increase accordingly. The budget for FY2019 increased the estimated subsidies for the power sector by 30%, so subsidies are moving in the opposite direction to that intended by the reforms. For reforms to be sustainable, they must be structural and target core underlying causes of inefficiencies and instability. This evaluation considers the support to sector reform less likely sustainable.

Overall, the support to sector reform and regulations is considered less than successful, as actual improvements on the ground remain to be seen.

2. Generation from Conventional Sources

a. Relevance

ADB’s interventions addressed the power demand–supply gap by supporting base load generation using indigenous resources, through sovereign and private sector investments in power generation. ADB’s investments addressed the power supply shortage and supported lower cost generation, through hydropower plants, gas-fired combined cycles, a regasification of liquefied natural gas (LNG) plant, and a supercritical coal-fired power plant, which would supply base load generation at a lower cost. These power plants will help reduce average electricity costs and subsidy requirements, since the fuel they use is cheaper than furnace or diesel oil. ADB support for conventional energy generation was aligned with the government’s strategy of encouraging private participation in the power sector and was consistent with the government’s Medium-Term Development Framework, 2005–2010 and its Energy Security Action Plan, which identified low-cost energy generation through indigenous resources. The TA on coal development in Thar and Badin supported the sector needs and government plans of moving toward coal-fired generation using domestic resources. Overall, ADB interventions in the subsector of conventional power generation are rated relevant.

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b. Effectiveness

87. Six out of eight NSO projects in conventional power generation have been completed to date, three of which were independently evaluated, achieving the intended outputs and outcomes of diversification of the primary energy mix for power generation, away from oil, and the promotion of private sector investments in hydropower and gas power. The remaining projects of the portfolio—Jamshoro supercritical coal power, and Gulpur hydropower project—are currently under implementation, and their effectiveness cannot be evaluated as of now. Nevertheless, once the projects are completed, the new upcoming generation capacity using hydro, gas, and coal resources would support lower cost generation, and diversification of the energy mix.

88. In November 2005, ADB approved the New Bong Escape hydropower project, which was the first hydropower IPP to be commissioned in Pakistan. The project also supported the preparation of templates for concession agreements and financing documentation in Pakistan, and provided legal, financial and documentary benchmarks to other private investors in hydropower projects in the country.

89. Although five of the eight conventional power generation projects were sensitive in terms of environmental safeguards (category A), none of the six completed projects have reported any issue, and all have complied with national and ADB’s safeguards policies. Five projects had a category A for environmental safeguards (Jamshoro coal power, Uch-II gas, Patrind and Gulpur hydro projects, and Engro LNG regasification) due to the potential environmental impacts of project’s construction and operation, including impacts on critical habitats, water resources and emissions to air. However, none have reported any safeguards problem, and all have followed environmental management plans with mitigation monitoring measures, in accordance with national and ADB’s safeguards policies. All projects have complied with the government and ADB’s stringent safeguards policies, which helped reduce the environmental impact of projects during construction (e.g., soil erosion, water pollution, air pollution, noise pollution, safety hazards and public health concerns), as well as during operation (e.g., water flow variations and hydrological factors for hydropower plants, solid waste disposal and wastewater management). Conventional power generation projects have contributed to lower CO₂, SO₂ and NOₓ emissions, as compared with existing heavy fuel oil and diesel-based generation, while hydropower and renewable energy projects have further improved the carbon footprint of the energy mix. Only two projects—Gulpur and Patrind hydropower projects—were categorized A for social safeguards, due to their impact on crops and the displacement of four households by the Gulpur project and 39 by the Patrind project. Each project prepared a land acquisition and resettlement plan to ensure that the livelihoods of affected households were improved and that mechanisms were in place for prompt replacement and payment for all affected assets. There were no indigenous peoples impacted by any of the projects.
Box 3: Jamshoro Coal Power Plant – Environmental Safeguards Considerations

Jamshoro supercritical coal-fired power plant is the only coal-fired power plant financed by ADB. The main reason for the project was the net positive environmental impact of the plant on the environment, specifically its impact on climate change, due to reduced emissions of carbon and sulfur dioxides (CO₂ and SO₂), and nitrogen oxides (NOₓ) as compared with oil-fired generation.

The project was categorized A for environmental safeguards by ADB. The rationale for the project was its positive impact on the environment, as it would be installed in a brownfield site within the facilities of an older thermal power plant and would replace heavy fuel oil units which have higher sulfur emissions of power generated per kWh. The existing units at Jamshoro using heavy fuel oil emit 930 tCO₂/GWh while the new supercritical units would emit 750 tCO₂/GWh (19% less).

In order to reduce acid rain and air pollution, the project will install a wet scrubber with limestone flue gas desulfurization, which will remove at least 95% of SO₂ from exhaust flue gases, an efficient electrostatic precipitator to remove over 99.9% of fine particles (PM2.5) from the exhaust gases, and a low NOₓ burner combined with a catalytic reduction process to reduce NOₓ emissions even more. The project will also finance flue gas desulfurization for existing oil-fired units at Jamshoro plant to reduce SO₂ emissions in order to meet environmental standards.

Following ADB’s Safeguard Policy Statement (2009) and national environmental standards, the project will apply site remediation measures to address existing contamination issues, such as oil-contaminated soil, waste metals, and asbestos disposal. Mitigation measures supported under the project include (i) effluent water management, (ii) construction of a hazardous waste storage facility, (iii) development of a landfill site for colony waste, (iv) rehabilitation of evaporation ponds, (v) emissions control measures to address excessive SO₂ emissions, and (vi) ash disposal and traffic management.

The project design has budgeted $169 million (11% of total estimated cost) for environment and emission control.

\* Atmospheric particulate matter (PM) with a diameter below 2.5 micrometers.


90. **The KESC post-privatization project was categorized B for environmental and C for involuntary resettlement safeguards but had some issues on staff retrenchment.** Potential impacts on the environment, such as air emissions, thermal discharge, wastewater effluent discharge, noise and solid waste disposal were appropriately managed during construction and operation. As confirmed by the validated project completion report, all tested parameters comply with Pakistan’s national environmental quality standards and IFC and ADB environmental policies.\(^9\) Regarding social safeguards, the project has positive impacts through job opportunities to the local community and social programs, in collaboration with local nongovernmental organizations. The main issue was related to staff retrenchment as part of the turnaround plan. KESC consulted with labor unions on the planned labor restructuring, rationale, and compensation package to be offered. Despite strong resistance by labor unions, which filed lawsuits and organized violent protests, KESC successfully launched a voluntary separation scheme for its 4,300 noncore employees in late 2010 and followed up with new terms in July 2011 to allow more employees participate in the scheme. Of the retrenched workers, 50% accepted the package, while the other 50% filed cases in court. The company is still waiting for the final decision from the Sindh court on the cases filed by labor unions. KESC’s retrenchment plan and the voluntary separation scheme is considered by ADB to be in line with best practices.\(^1\)

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\(^9\) IFC safeguards policies were triggered as the project was cofinanced by IFC.

91. Overall, the conventional power generation projects that have been completed are considered effective.

c. Efficiency

92. The completed projects were executed with delays and cost overruns due to floods (Uch-II), security issues in project areas (Daharki), and design changes and issues during construction (New Bong Escape), but without major impacts on the projects’ outputs and outcomes. ADB was able to lend to the IPPs at competitive interest rates through the Private Sector Operations Department, with no loan repayment defaults experienced. The validation reports of the completed projects showed they produced high economic internal rates of return (EIRR) and helped reduce power shortages and associated load shedding. The EIRRs were New Bong Escape hydropower (16.9%), post-privatization of K-Electric (17%), and Daharki gas power plant (10.6%); all were well over the 9% hurdle rate for economic viability. The projects helped reduce the average cost of supply, as the average energy and capacity cost per kWh of hydroelectric IPPs in FY2017 was PRs8.35 per kWh while the cost of supply of the gas-fired IPPs was PRs8.31 per kWh; both technologies were one third cheaper than the average cost of oil-fired generation of PRs12.2 per kWh.

93. The sovereign project loan for the Jamshoro supercritical coal-fired power plant is still ongoing with the contractual arrangements with the contractors finally signed after 3.5 years. These delays will lower its efficiency rating as the project was originally planned to be commissioned by February 2018; the current expected commissioning date is the end of 2021. However, the contract value is lower than the estimated costs at appraisal. Overall, the conventional power generation subsector is considered efficient.

d. Sustainability

94. The projects contributed to the sustainability of the sector as they helped reduce the average cost of power generation in Pakistan, diversifying its energy mix away from oil, and helping to reduce the flow of circular debt. Also, the increased generation helped reduce the demand–supply gap and associated load shedding in some areas, supporting economic development and growth. Rehabilitation and expansion of gas generation at K-Electric and the installation of a regasification plant for LNG also supported lower cost power generation using gas combined cycles. In two out of the three NSO projects evaluated, the financial internal rate of return (FIRR) was higher than the weighted average cost of capital (WACC): New Bong Escape, where the FIRR of 15.3% was higher than the WACC of 9.9%. For the post-privatization of K-Electric, its return on invested capital of 8.9% was higher than the WACC of 7.7%. However, the FIRR of 5.4% for Daharki gas-fired power plant was lower than the WACC of 6.1%, due to implementation delays, increases in project costs, and NEPRA’s decision to disallow the recovery of about $30 million of project capital costs.

95. Nonetheless, the financial risk for the NSO projects is considered to have been high due to the circular debt problem and the fact that CPPA-G does not make timely contractual payments, which generates cash flow issues for the IPPs. This problem affects all projects financed by ADB, but particularly Uch-II and Daharki as their operating costs include the supply cost of natural gas. Payment delays from CPPA-G to both plants increase their trade receivables and reduce their operating cashflows and working capital. Many IPPs that need to purchase fuel have resorted to delaying payments to fuel suppliers as well. Many IPPs have resorted to arbitration or litigation (Box 4). As a result, overall ADB support for power generation from conventional sources is considered less likely sustainable.

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102 For example, the receivables of the Hub Power Company Limited (HUBCO) from CPPA-G at the end of FY2017 were Rs 66.5 billion or 90% of its total receivables (overdue, but not impaired). HUBCO’s payables to the fuel supplier at the end of FY2017 were Rs 63.5 billion or 95% of its total payables. Source: The Hub Power Company Limited, 2017. Celebrating Twenty Years of Brilliance: Annual Report 2017, Karachi, Pakistan.
Box 4: Circular Debt and IPPs: Recovery of Liquidated Damages

A number of IPPs have filed petitions at the Supreme Court of Pakistan to protect themselves against a reduction in capacity payment charges when their plant availability falls owing to the non-availability of fuel. The argument was simple: liquidated damages on capacity charges should not be imposed if plant availability falls because of the non-availability of fuel, because this is itself a consequence of delayed payments from CPPA-G which causes the IPPs to accumulate receivables. In February 2013, the Supreme Court passed an interim order stating that capacity payments to IPPs should not be reduced for these reasons.

In June 2013, IPPs agreed with the government that, on settlement of all overdue amounts, IPPs would withdraw the case and pursue expert adjudication and arbitration in accordance with the PPA.\(^a\) The expert’s decision was received in 2016. It was generally in favor of IPPs.

However, due to the government’s unwillingness to implement the expert’s decision, the IPPs began arbitration proceedings in the London Court of International Arbitration. As of June 2017, the arbitration proceedings were in progress; no further updates are available.

If the matter is decided in favor of IPPs, CPPA-G will need to refund the liquidated damages that have been charged. For Hub Power Company Limited,\(^b\) this would be more than PRs950 million.

\(^a\) The expert’s decision is non-binding on both the IPPs and the single-buyer (CPPA-G) and any party may decide to pursue arbitration pursuant to the PPA.

\(^b\) The Hub Power Company Limited runs residual fuel oil-fired IPPs and has a controlling interest in Laraib Energy Limited (an ADB client which owns and operates the 84 MW hydropower plant near New Bong Escape).


96. Overall, ADB support for power generation from conventional sources is considered successful.

3. Transmission Systems

a. Relevance

97. Both transmission MFF programs were aligned with the government’s and ADB’s strategies and addressed the essential needs of the transmission network during the evaluation period. The first MFF program aimed to reduce bottlenecks by adding transforming capacity at 500 kV and 220 kV,\(^{103}\) extending backbone transmission lines following NTDC’s development plan, and reducing high technical losses. The second continued the work in rehabilitating and expanding high voltage networks, as well as supporting the development of a SCADA system, essential for adequate network control operations.

98. The MFF instrument is considered to have been appropriate, since it assured NTDC of continued financial support to develop the utility’s transmission expansion plan over the long term. It provided flexibility that allowed future subprojects to be added according to implementation progress, NTDC’s development plans, and the specific needs of the power network. As the project was aligned with the country and sector strategies, and the program design and financing modality supported essential infrastructure for the power network, this evaluation considers ADB support to the transmission subsector relevant.

b. Effectiveness

99. ADB support helped to reduce transmission bottlenecks and technical losses and to improve the transmission network reliability, but it did not support long-term planning. The first transmission MFF program (tranches 1 and 2) contributed 42% of the overall increase of transforming capacity of NTDC substations at 220kV and 500kV during the evaluation period, and was responsible for almost 12% of the increase in the transmission line length to accommodate the discharge from new power plants and meet growing demand. Once the first MFF transmission program is completed in 2019, it will have added

\(^{103}\) For simplicity, this report refers to transformers from 500 kV to 220 kV as 500kV transformers, and 220-132kV as 220 kV transformers.
over 5,800 MVA at 500kV and almost 11,000 MVA at 220kV of transforming capacity, equivalent to one third of the total NTDC substation capacity at high voltage, and 10% of total transmission lines in the country. The second MFF is still being implemented and few outputs have been delivered to date. Nonetheless, it is expected that the subprojects currently under implementation will also achieve their intended objectives.

Table 6: Outputs Delivered by the Power Transmission Enhancement Investment Program

<table>
<thead>
<tr>
<th></th>
<th>Transmission Lines (km)</th>
<th>Substation Capacity (MVA)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>500 kV</td>
<td>220 kV</td>
</tr>
<tr>
<td>NTDC additions 2005–2017</td>
<td>783</td>
<td>3,070</td>
</tr>
<tr>
<td>MFF Transmission (as of 2017)</td>
<td>21</td>
<td>458</td>
</tr>
<tr>
<td>% of Additions 2005–2017</td>
<td>2.7%</td>
<td>14.9%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Transmission Lines (km)</th>
<th>Substation Capacity (MVA)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>500 kV</td>
<td>220 kV</td>
</tr>
<tr>
<td>NTDC total network (as of 2017)</td>
<td>5,127</td>
<td>10,063</td>
</tr>
<tr>
<td>MFF Transmission (est. 2019)</td>
<td>621</td>
<td>768</td>
</tr>
<tr>
<td>% of Installed as of 2017</td>
<td>12.1%</td>
<td>7.6%</td>
</tr>
</tbody>
</table>

Km = kilometer, kw = kilowatt, MVA = mega volt amp, MFF = multitranche financing facility, NTDC = National Transmission & Dispatch Company.

Note: Current delivered outputs as of 2017 refer to tranches 1 and 2. Estimated outputs by 2019 refer to the completion of the four tranches of the first MFF program.


100. **Subprojects of the transmission MFF program were categorized B for environment and A for social safeguards, because of the potential impact of the land acquisition and displacement of people along transmission lines’ right-of-way and in areas for new substations.** Three subprojects of tranche 1 resulted in compensation being paid to 1,610 affected persons, mainly for the loss of crops and trees during construction. No resettlement of affected people was required, and no houses or other structures were affected. Tranche 2 subprojects affected a total of 2,938 people, mainly through the location of transmission towers on private land and the loss of crops and trees along transmission line routes. All affected people have been fully compensated in accordance with ADB’s social protection policies and there are no outstanding issues. No reported environmental issues were reported, and there were no indigenous peoples in the project areas. ADB provided appropriate support to NTDC through training activities and constant monitoring. Resettlement management plans followed ADB’s Policy on Involuntary Resettlement (1995).

101. **Regarding gender, results have been positive due to improvements to the power supply and increased access to electricity.** According to ADB’s guidelines for gender mainstreaming, there were no gender elements to the programs, as infrastructure programs in transmission do not specify the gender of beneficiaries. However, such projects have contributed to increased access to electricity and a more reliable power supply which benefit women.

102. Overall, ADB support for the transmission subsector is rated effective.

c. **Efficiency**

103. **The subprojects of the first MFF were implemented as designed, although some tranches suffered delays.** There were significant cost savings as the procurement process attracted competitive bids that resulted in lower costs than budgeted. This allowed subprojects to be added, increasing the effectiveness of the program. However, after misprocurement was declared in some contracts of tranche 2 of the first

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MFF, ADB carried out a review of project procurement in 2014. NTDC implemented the recommendations from ADB and improved its fiduciary processes for future projects. The second MFF program is progressing slowly after having suffered some delays at inception.

104. **The economic impact of a more reliable transmission network, increased transmission capacity, and reduced technical losses is significant.** The two PCRs for tranches 1 and 2 of the first MFF had high EIRRs: 17.6% for tranche 1 and 13.9% for tranche 2, both of which were over the economic viability hurdle rate. The substantial economic benefits for the economy of a reliable power network suggest that ADB support for the transmission subsector was efficient.

**d.** **Sustainability**

105. **The programs supported increased transmission capacity and reduced losses.** These led to higher sales for distribution companies and increased their revenues. The FIRR from the financial analyses of the PCRs for tranches 1 and 2 showed values higher than their WACCs. Increased transmission capacity supported the investment in the new power generation capacity that is needed to reduce the demand–supply gap and load shedding. A strong and reliable transmission system is at the core of a sustainable power sector.

106. **The recent restructuring of NTDC and the creation of CPPA-G meant that the responsibility for market operations and payment to power generators was handed over to CPPA-G.** While, in principle, NTDC revenues would come from regulated wheeling charges, which would increase NTDC’s financial sustainability, this would only happen if NTDC is paid in full. This is unlikely if circular debt keeps increasing, as CPPA-G could not be the only sector entity completely shielded from circular debt payment delays. Nonetheless, support for the sustainability of the transmission subsector is rated likely sustainable for both MFF programs.

107. Overall, ADB support to the transmission subsector is considered successful.

4. **Distribution Systems**

**a.** **Relevance**

108. **The power distribution subsector in Pakistan has been neglected by most development partners.** ADB is the only development partner with significant presence in the distribution subsector. Both ADB distribution MFFs were structured in line with the government’s Power Distribution Sector Road Map for 2008–2017, which supports a more efficient power system, high-quality power supply, greater geographic coverage, and greater availability of and access to affordable electricity.

109. **Both MFFs aimed to support rehabilitation and expansion of subtransmission networks and to enhance the systems and commercial operations of the DISCOs.** The first MFF supported infrastructure investment for the rehabilitation and expansion of 132 kV subtransmission and 11 kV medium voltage networks, with the aim of removing bottlenecks, as well as supporting DISCOs to restructure and commercialize their operations. However, the design and monitoring frameworks of tranches 2 to 4 were not properly defined, whereas the overall program indicators are unrealistic both in timing and targets.

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109 The PVRs for both tranches report FIRR values higher than the WACCs. Tranche 1 has a FIRR of 9.6% higher than a WACC of 5.5%. Tranche 2 has a FIRR of 10.3%, higher than a WACC of 5.2%.

110 For tranches 2, 3 and 4, the impact and outcomes of each tranche’s DMF are copied from the outcomes and outputs of the program’s DMF.
and cannot be used for monitoring or evaluation purposes, which penalizes the relevance of the program. The second MFF aimed at reducing commercial losses, as well as improving collection through advanced metering systems, firstly implemented in the best performing DISCOs in Islamabad and Lahore, and later rolled out to the others in following tranches. The cost-benefit analysis done by the program’s feasibility study shows a financially viable program, with a FIRR of 8.9%, double the value of the estimated WACC. However, it is mentioned that benefits from eliminating losses from theft (so-called ‘kunda’) may not be solved by AMI, as assumed by the feasibility study. Also, it was missing a comparison of investments in AMIs vs aerial bundled conductors (ABC), as a counterfactual, which have been proven effective in reducing theft. A coordinated approach of ABC and AMI could be more effective in addressing both commercial losses through an appropriate metering and energy accounting system and electricity theft through the use of ABC in low voltage networks, by customizing the efforts according to each specific situation. Also, AMI require substantial capacity building, as well as new standard operational procedures and regulations in order to function properly. ADB support to reduced bottlenecks and overloaded substations and feeders, as well as an improved metering and energy accounting systems is rated relevant.

b. Effectiveness

110. The first distribution MFF program helped increase capacity and remove bottlenecks by upgrading and expanding networks in eight DISCOs, but did not achieve most of its outcome targets or reduce technical and commercial losses significantly. As of mid-2018, the four tranches had almost been completed. The program helped to rehabilitate the networks, increase voltage from 66 kV to 132 kV, and to expand medium voltage distribution lines. However, only one of the four program outcomes was achieved (an additional 12 terawatt-hours were distributed, but this was achieved 3 years late). Reducing outages, increasing access to achieve coverage of 90% of the population, and complying with DISCOs’ distribution licenses remain to happen. As noted in the paragraph above, some outcome indicators of the DMF were not well defined and could not be used to measure the effectiveness of the program accurately.

111. The number of grid customers increased 16% from 2013 to 2018, although average distribution losses have stagnated at around 18%. The number of villages that have been electrified increased by 24% during the evaluation period, although the electrification percentage remained at 82%, as the total number of villages also increased. The target of providing access to electricity to 90% of the population has not been achieved. However, the actual electrification rate is unclear because of the large number of illegal connections. The objectives of providing DISCOs with financial autonomy and ensuring compliance with the distribution code are still pending, and most likely will not have been achieved at completion of the program. The second MFF, on advanced metering systems has not yet started implementation, and its effectiveness cannot be evaluated as of now.

112. The MFF distribution program was categorized B for environment and B for social safeguards, and projects followed relevant ADB safeguard policies. Some issues related to the DISCOs’ capacity to ensure environmental and social safeguards were adhered to, and the project provided training and closely supported and monitored the work of DISCOs and contractors, so they followed ADB safeguard policies. The impact of the subprojects was minor and was mostly related to the right-of-way of subtransmission lines and areas in which new substations were to be built. No details on the affected people are available in the progress reports provided from June 2015, although adequate compensation was provided to them. Land acquisition and household displacement has been minor, as most projects were implemented in lightly populated and barren areas. Nonetheless, ADB provided appropriate support to the executing agencies through training activities and constant monitoring. Resettlement followed resettlement management plans and ADB’s safeguard policy statement requirements.

113. Regarding gender, results have been positive due to improvements to the power supply and increased access to electricity. Most projects had either no gender elements or some gender elements,
according to ADB’s gender mainstreaming categories.\textsuperscript{111} Infrastructure programs in distribution do not specify the gender of beneficiaries. However, such projects contribute to greater access to electricity and power supply reliability and these benefit women.

114. While some outcome indicators were not achieved, the support to the distribution subsector is still rated effective, since such indicators were overly optimistic.

c. Efficiency

115. Implementation of all four tranches of the first distribution MFF program are on track, with completion expected in 2018. Tranche 1 of the first distribution MFF required a major change of scope to utilize surplus loan proceeds to finance the purchase of additional equipment, due to substantial contract price drops in the wake of the global financial crisis.\textsuperscript{112} Overall, the expected economic benefits of the program are large, as it supported reduced outages and increased sales.

116. The second MFF on advanced metering systems has not yet commenced, as the government decided to withhold its implementation. It is noted that the 2\textsuperscript{nd} MFF was approved in November 2015 and the government has withhold its implementation until now. Recent reports, as of October 2018, show that the newly elected government has agreed to reinitiate the program. However, 3 years of delay has already been accumulated. This evaluation rates ADB support for the distribution subsector as efficient, but cautions its future efficiency depending on the implementation progress of the 2\textsuperscript{nd} MFF.

d. Sustainability

117. Although the first MFF program’s FIRR is higher than its cost of capital, there are concerns about the financial sustainability of most DISCOs, considering their huge levels of receivables and their current financial losses. Financial analyses of the MFF program tranches are not yet available, but increased electricity sales because of the reductions in forced outages and load shedding may render rates of return that are higher than the cost of capital. However, half of the DISCOs are running financial losses,\textsuperscript{113} and unless there is strong budget and institutional support from the government to improve their infrastructure and operations, so they can meet NEPRA’s tariff requirements, half of them will continue losing money every year. On top of cashflow problems, the receivables of DISCOs keep increasing as tariffs are unrealistic. Hence, ADB’s support to the distribution subsector is rated less likely sustainable.

118. Overall, ADB support to the distribution subsector is rated successful due to the performance of the first MFF program, although it cautions the rating depending on how the 2\textsuperscript{nd} MFF is implemented, since it has been stalled for over three years.

5. Renewable Energy and Energy Efficiency

a. Relevance

119. The benefits of using a programmatic MFF approach for both the renewable energy and the energy efficiency subsectors rather than stand-alone project loans are unclear. The renewable energy MFF and the energy efficiency MFF did not build on a previous plan or strategy. They were designed with very different scopes and implementing agencies, most of them without previous experience with ADB. The renewable energy MFF had a broad scope and a range of implementing agencies (provincial governments for mini-hydropower and AEDB for wind power guarantees) which made progress difficult. The energy

\textsuperscript{111} ADB. 2012. Guidelines for Gender Mainstreaming Categories of ADB Projects. Manila.

\textsuperscript{112} The first tranche was appraised just before the global financial crisis of 2008. In the following years, it was experienced substantial price drops of supplies and commodities, due to reduced demand and negative economic growth. This situation caused that contracts estimated in 2008 were much higher than actual values years later.

120. **NSO in wind and solar power were among the first renewable energy projects to achieve financial closure.** They were aligned with the ADB Energy Policy (2009), which encouraged private sector participation in power generation. They were also aligned with the ADB Medium-Term Development Framework, 2005-2010, which promoted low-cost energy generation through indigenous resources. Zorlu Enerji wind power project was also the first project in the country to be registered at the United Nations Framework Convention on Climate Change (UNFCCC) carbon market.114

121. **The access to clean energy loan was the first operation to use a results-based financing approach in Pakistan.** It was also the first to target access to electricity through off-grid solar power and micro-hydropower technologies. It was structured to build on government programs and disburse funds once certain outputs had been delivered and verified independently. RBLs require a more detailed design of the operational arrangements at appraisal, as their success depends on the appropriate indicators and verification processes. The design flaws of the two failed MFF programs mean that ADB’s support for the subsector is considered less than relevant.

b. **Effectiveness**

122. **Nonsovereign projects were effectively implemented, although the MFF programs failed to deliver the expected outputs.** The MFF on renewable energy could only deliver tranche 1, while the second was cancelled after approval, but before disbursement. Tranche 1 only delivered 40 MW out of the 325MW expected. The MFF on energy efficiency could only implement tranche 1. While it delivered all the bulbs that it intended, it is unclear if it achieved the targets of saved electricity or reduced emissions, as some studies suggest that additional hours of using energy efficient lights would offset the savings.115 The RBL has started implementation recently, and its effectiveness is not yet clear.

123. **All projects and programs were categorized B for environment and B for social safeguards. The energy efficiency MFF with CFL distribution has been flagged as potential problem.** The renewable energy MFF had a very limited impact on the environment as it concerned small run-of-river hydropower plants. Its RRP reported that land acquisition of tranche 1 (mini-hydropower development in KPK and Punjab) would affect 61 households, although there is no information on the actual compensation that was paid to the affected people.116 Only the mini-hydropower projects of tranche 1 of the renewable energy MFF affected indigenous peoples and the projects followed ADB’s Policy on Indigenous Peoples (1998). The energy efficiency MFF (CFL distribution) was categorized B for environment due to the environmental risk posed by the discarded lamps, which contain mercury. While the project provided for the construction of a waste management facility to lower the health risks associated with residual mercury, the contract for the construction of the facility had not been awarded by end of 2017. As a result, ADB has flagged the project as a potential problem.117 The three private wind power projects have not reported any safeguards issues to date.

124. **Regarding gender, the only program of the portfolio in category II: effective gender mainstreaming is the RBL on Access to Clean Energy, as its second output targets increased opportunities for women and girls to obtain energy services and benefits.** Still under implementation, the RBL program

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114 The project was registered in March 2014 at the UNFCCC with an amount of emission reductions of 98,172 tCO2 equivalent per annum. Project 9849: Zorlu Enerji Wind Project. [online] Available at https://cdm.unfccc.int/Projects/DB/BVQI1388809991.59/view

115 ADB. 2012. Adoption of CFLs and Electrical Lighting Usage in Pakistan. Manila.


117 As per ADB memorandum for minor change of scope of July 2017, procurement is expected to take 7 months and construction 12 months. As of September 2017, the consultant to prepare the bid documents for procurement of the lamp waste facility was not yet hired. Hence, the expected commissioning of the facility would be end of 2019 or beginning of 2020.
strongly supports women through increased access to off-grid electricity, which would increase time available for productive livelihood activities, family welfare, or education.\textsuperscript{118}

125. Overall, the support to renewable energy and energy efficiency is less than effective.

c. Efficiency

126. The experience with the Zorlu Enerji wind power project indicates that NSO in wind power can be broadly considered economically efficient. The validation of the PCR for the Zorlu Enerji wind power\textsuperscript{119} reported a high EIRR (19.3\%), as wind power had replaced the construction of oil-fired generation, reducing CO\textsubscript{2} emissions. Similar assumptions can be made for the Triconboston and Foundation wind power projects, as they are also expected to have a high economic impact. On the other hand, the Zorlu Solar project has been stalled due to policy changes in January 2018 that halted the development of new renewable energy projects, as well as changed the pricing structure from cost-plus basis to competitive bidding in upcoming projects.\textsuperscript{120}

127. However, the renewable energy and energy efficiency MFFs have run into long delays, a tranche cancellation, and the discontinuation of both programs. The renewable energy MFF tranche 1 was extended for 5 years due to security issues in KPK and to a cost reexamination by the Punjab government; tranche 2 was cancelled after 3 years of the availability period, as the government decided not to pursue the project after it was approved. The only tranche of the energy efficiency MFF has still not been closed 8 years after implementation because of pending issues with lamp disposal, due to the mercury content of CFLs. In view of the inefficient implementation of these two major programs, the overall support to renewable energy and energy efficiency is considered less than efficient.

d. Sustainability

128. NSO for wind power have been affected by circular debt issues, as CPPA-G has recently delayed payments, which increases the receivables of such projects. The wind power projects are expected to have higher FIRR\textsubscript{s} than their cost of capital, as showed by the Zorlu Enerji validation report (an FIRR of 8.7\% and a WACC of 6.1\%), if CPPA-G pays according to the power purchase agreements (PPAs). However, this has not been the case, and CPPA-G has delayed payments recently increasing the receivables of the wind power IPPs; e.g., by March 2018, the Foundation I and II projects had over PRs1 billion of accumulated receivables each, with average days’ sales outstanding of 189 days. From January to March 2018, receivables increased by about 35\% as only one payment was received in the quarter for both projects. Such delays raise concerns about the sustainability of such projects.\textsuperscript{121}

129. The long-term future of mini-hydropower projects under the renewable energy MFF is unclear, and compact fluorescent lamps (CFLs) are being replaced by light emitting diode (LED) lamps which calls the results of the energy-efficiency MFF into question. The sustainability of the mini-hydropower projects financed by the renewable energy MFF is unclear. Government subsidized CFLs were discontinued after the project, as they are available in the market at competitive prices and are currently being replaced by LEDs. The access to clean energy RBL builds on government programs in Punjab and KPK, although it is unclear what will happen once the RBL program is closed. Hence, ADB support for renewable energy and energy efficiency is considered less likely sustainable.

\textsuperscript{118} ADB. 2012. Gender tool kit: Energy—Going beyond the meter. Manila.
\textsuperscript{120} As reported by the Power Division, Ministry of Energy during the consultation mission in November 2018.
Overall, ADB support for renewable energy and energy efficiency is considered less than successful, because of the failure of the two major MFF programs.

6. Overall Performance of ADB’s assistance

There are two differentiated groups in terms of implementation progress, operations completed or almost completed, and operations under early stages of implementation. The only fully completed operations are the SESRP PBL and 6 NSO projects. Four MFFs are almost completed with tentative closing date in 2018 or 2019. Other operations, such as Jamshoro project loan, the second MFFs on transmission and distribution, and the RBL are considered at early stages of implementation, and evaluated only for relevance and efficiency as of now. Hence, it is not assured that the actual performance at completion will be the same as estimated at this stage. Table 7 below summarizes the overall performance assessment of ADB operations.

The overall performance of ADB’s assistance is based on the evaluation of completed or almost completed operations, and the relevance and efficiency to date of operations at early stages of implementation. Whereas NSO operations and the first MFFs on transmission and distribution have been successful, the performance of the PBL, and the two failed MFFs on EE and RE weigh down the overall performance rating to less than successful. As such, all NSO operations and the 2 MFFs on transmission and distribution are considered successful, whereas the PBL have not achieved the expected outcomes and the 2 MFFs on RE and EE were cancelled after the first tranche, both with limited impact. Thus, the overall performance of ADB’s assistance is considered less than successful, as more than half of the Board approved amounts have been less than successful. Also, almost all operations are considered less likely sustainable, due to the impact of circular debt on the financial sustainability of the power sector entities, both public and private.

The operations currently at early stages of implementation are evaluated in real time, considering only their relevance and efficiency to date. The second MFF on Distribution and the Jamshoro clean coal project loan are considered less than efficient due to the already accumulated delays of 3 years. Also, there are some financial sustainability issues related to circular debt that penalize the rating of all operations, except for the RBL.

Table 7: Performance of Operations, almost Completed and Under Implementation

<table>
<thead>
<tr>
<th>Programs</th>
<th>Relevance</th>
<th>Effectiveness</th>
<th>Efficiency</th>
<th>Sustainability</th>
<th>Overall Performance</th>
<th>Board approvals ($ million)</th>
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<tr>
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<td></td>
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<tr>
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<td>E</td>
<td>E</td>
<td>LS</td>
<td>S</td>
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<td>780</td>
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<tr>
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<td>E</td>
<td>E</td>
<td>LS</td>
<td>S</td>
<td>810</td>
</tr>
<tr>
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<tr>
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<td>LS</td>
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<td>Operations under implementation (performance to date)</td>
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<tr>
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<td>R</td>
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</tr>
</tbody>
</table>

E = effective or efficient; L = less than; R = relevant; S = likely sustainable or successful

Note: For operations under early stages of implementation, only relevance and efficiency indicators are evaluated to date. Effectiveness, sustainability and overall performance cannot be evaluated until maturity. All NSO are considered together as ratings are very similar among them.

Source: Independent Evaluation Department.
B. Results

134. The analysis of the results follows the outcome structure of the theory of change as well as the overarching question: to what extent has ADB contributed to (i) addressing the causes of circular debt and increasing financial sustainability of the power sector, (ii) increasing the institutional efficiency of the power sector, (iii) improving the reliability and efficiency of the power supply, (iv) increasing access to electricity, and (v) increasing the share of clean energy.

1. Addressing the causes that underlie circular debt and increasing financial sustainability

135. To date, the overall results of ADB’s work to address the causes that underlie circular debt and increase the financial sustainability of the sector have been very modest and have had a limited impact on the circular debt flow, which keeps increasing rapidly.

136. Despite numerous attempts by ADB and other development partners to address the circular debt problem in Pakistan’s energy sector, the debt has risen substantially since the federal government settled the stock in 2013. ADB renewed its support for sector reform in 2014 after the government fully settled the circular debt of PRs480 billion in 2013.122 The PBL was fully coordinated with the IMF’s Extended Fund Facility and with the World Bank. While several policy actions were carried out, most outputs have not yet been fully delivered, and outcomes have not been achieved. It is too early to discern whether the policy actions that have been achieved, such as the reduction and elimination of the delay between tariff determination by NEPRA and notification by the government, will help reduce it. The total debt has risen rapidly over the last year, reaching unprecedented levels.

![Figure 9: Evolution of Circular Debt, FY2013–FY2018 (PRs billion)](image)

Figure 9: Evolution of Circular Debt, FY2013–FY2018 (PRs billion)

FY = fiscal year
By June 2018, the accumulated circular debt amounted to PRs499 billion. The debt parked at the Power Holding Private Limited was PRs 533 billion, as reported by the media.
Source: Ministry of Energy and media reports.

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122 The government financed the PRs480 billion payment settlement to the Ministry of Water and Power through: (i) Pakistan Investment Bonds (PRs128 billion), (ii) expenditure savings (PRs135 billion), (iii) dividends from SOEs (PRs20 billion), (iv) cash from the Federal Consolidated Fund (PRs59 billion), and (v) recovery of payables to the government from SOEs (PRs138 billion).
Source: Ministry of Finance of Pakistan.
137. **ADB’s interventions have supported financial sustainability of DISCOs by helping improve infrastructures and operations, although losses have not yet decreased as expected, and half of the DISCOs keep running losses.** Half of DISCOs (as well as half of GENCOs) are running financial losses, and private IPPs are not being paid as per contract, which requires expensive short-term financing to keep operating. Further, most power sector participants, both public and private, continue facing substantial financial risks, as the overall sector revenues do not cover all the costs.

138. **While the difference between the determined and notified tariffs, i.e., the tariff differential subsidy, has been reduced in recent years, this appears to be more related to lower oil prices than to ADB support.** ADB has helped the transmission subsector to reduce losses effectively, although distribution sector losses have not changed substantially, and in some cases have increased. ADB has pushed for tariff surcharges to reduce subsidy requirements, through a circular debt management plan supported by the Sustainable Energy Sector Reform Program PBL, but this has failed to meet targets to date. Similarly, efficient tariff determination and notification, tariff surcharges, and other improvements were expected to stem from the amendment to the NEPRA Act, but these remain to be seen, which allows the stock and flow of circular debt to keep increasing.

139. **Despite the recent decrease in tariff differential subsidies from FY2013 to FY2016 (Figure 10), subsidies to the power sector as budgeted for FY2019 have increased by 30% over the previous year, rising to Rs149 billion (US$1.2 billion), equivalent to 85% of the total government budget for subsidies, with food and agriculture sectors taking the remaining 15%.** As shown in Table 8, tariff differential subsidies for DISCOs, K-Electric and the Balochistan tube wells increased by 82% from the revised FY2018 to the current FY2019 budget. Although the budgeted amount may be revised by the middle of the fiscal year, this substantial increase from the previous budget shows that the financial sustainability of the power sector is deteriorating rapidly. As of now, reforms supported by the Sustainable Energy Sector Reform Program (and associated programs) have not helped reduce subsidy requirements by the power sector.

**Figure 10: Evolution of Determined and Notified Tariffs, Correlated with Oil Price Fluctuations, 2009–2016**

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**NEPRA** = National Electric Power Regulatory Authority.

Source: Independent Evaluation Department, calculations based on reports from Energy Division, Central and West Asia Department on average tariff values, and global oil Brent prices (calculated in Pakistan Rupees, using the foreign exchange rate at the end of each quarter).
140. **ADB made a modest and indirect contribution to reducing circular debt accumulation by supporting generation projects that reduced the average cost of generation.** The ADB-supported IPP portfolio is focused on technologies that are helping to diversify the energy mix away from expensive oil-fired generation. As a result of ADB’s investments, 1,600 MW of gas-fired, 156 MW of hydropower, and 84 MW of hydropower, wind, and solar PV are expected to further reduce the average generation cost.

2. **Increasing the Institutional Efficiency of the Power Sector**

141. **Although some institutional changes have been implemented, ADB’s efforts to date have been much delayed and only limited improvements can be seen.** Key institutional reforms recommended as long as 10 years ago have been implemented within the last year, and efforts to commercialize DISCOs have been recently stalled.

142. **ADB led the ESTF which recommended many institutional reforms in 2010, some of which have been implemented recently.** However, sector reforms and restructuring that began in the 1990s have not progressed. In line with the ESTF report recommendations, some restructuring aspects have occurred, such as the creation of the unified Ministry of Energy in October 2017 and the separation of CPPA-G from NTDC in 2015. Benefits from those institutional reforms in the form of better interagency coordination under the Ministry of Energy or improved wholesale market operations remain to be seen.

143. **It is too early to gauge the benefits from the amended NEPRA Act and the creation of CPPA-G.** Since the restructuring of NTDC and the creation of CPPA-G as market operator, the national power utility has not absorbed payment risks. Currently, payment defaults are transferred upstream to generation and fuel supply companies, although it is unclear how long NTDC will be spared from sharing the burden of the circular debt. However, inefficiencies are still in place and it is unclear how the power market will evolve from a single buyer structure toward a competitive market given the ongoing take-or-pay PPAs (which guarantee capacity payments, even if no electricity is generated), which still have several more years of validity. Other ADB’s interventions aimed to increase the operational efficiency of DISCOs by helping improve their infrastructure and operations, although losses have not yet decreased as expected.

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123 ADB has supported K-Electric’s gas power generation through the KESC post-privatization project, where, together with IFC and other donors, it helped upgrade and install 1,030 MW of gas power generation capacity. The other two projects that expanded gas power generation were the Uch-II and Daharki gas-fired combined cycles.
Nevertheless, CPPA-G has added transparency to the sector by eliminating discretionary payment decisions to generators and publishing such payments regularly on their website, although publication of payments to generators are only available online until June 2017.

144. While privatization of DISCOs and GENCOs remains high on the agenda of the government and ADB, progress has been slow and is currently stalled. The only privatized utility is K-Electric, an integrated utility which was privatized in 2005, and has been supported by ADB through infrastructure investments. ADB’s most recent attempt to support the privatization of power sector entities was through the Sustainable Energy Sector Reform Program, where ADB sought to implement market-oriented reform to improve sector performance and pave the way for the commercialization and ultimately the privatization of some DISCOs. However, in 2017, the federal government suspended plans to privatize DISCOs and GENCOs through strategic sales or public offerings.

145. Efforts to strengthen transparency and accountability have delivered some preliminary results, but there is still limited information available, as such efforts have not been sustained. Currently CPPA-G, NEPRA, and the DISCOs publish information on their respective websites, but the latest published figures are from June 2016. Information on circular debt is difficult to find, particularly financial information related to PHPL and how its debt is being financed. Also, ADB efforts to install better metering systems across the transmission and distribution networks that would help measure energy flows accurately are missing. The opportunity of creating a virtuous circle of supply of information thereby bringing greater transparency to the sector has been lost.  

3. Improving the Reliability and Efficiency of the Power Supply

146. ADB’s efforts to increase power supply reliability have been highly satisfactory in transmission, with high voltage capacity substantially increased and technical losses reduced; by contrast, results in distribution have been modest, as losses have not decreased as expected. The effect the added generation capacity has had on improving reliability has not been significant as ADB supported only about 21% of the generation capacity that was added during the evaluation period.

147. ADB’s contribution to new generation capacity has been satisfactory, but modest when compared with capacity increases supported by CPEC. During the evaluation period, ADB approved support for about 3,000 MW of generation capacity, of which 1,840 MW has been commissioned to date. This is about 21% of the total capacity additions during the evaluation period. This is a small amount compared with the 3,140 MW of power generation capacity has been already commissioned since 2013 under the CPEC program. Other CPEC priority projects with a combined capacity of over 5 GW are expected to come on stream by 2021.

148. The generation capacity additions during the evaluation period were mostly provided by private sector investments in oil-fired generation, with limited additions by hydropower. Figure 11 shows the limited growth of the public sector power plants with most of the generation additions undertaken by thermal IPPs. Hydropower installed capacity has been almost constant since 2004, with just a 7% increase in the past 12 years, including both WAPDA (439 MW added) and hydropower IPPs (183 MW added). This is equivalent to 15% of the 4,081 MW of added thermal power generation capacity, which increased 56% during the same period.

ADB’s contribution to improving the performance of the transmission network has been highly satisfactory, with 42% added to the total NTDC transforming capacity within the evaluation period. ADB support helped address the immediate priorities by removing bottlenecks, evacuating power from new power stations, reducing brownouts and transmission losses, and improving compliance with the grid code. ADB support was essential for the reported elimination of load shedding during early 2018, as the increased generation could not be evacuated without improvements to transmission and distribution systems. The increase to NTDC’s transmission capacity during the evaluation period was financed by only two tranches of the first ADB transmission program, which also contributed to loss reduction. The percentage may increase as it does not include subprojects completed in tranches 3 and 4 of the MFF program, as this information is not yet available. As Figure 12 shows, the added high voltage transforming capacity at 500 kV and 220 kV in 2008–2015 was almost fully financed by the ADB MFF program. Results of improvements to the operational control and processes in the transmission system and grid operation remain to be seen, as some were only recently implemented (CPPA-G as market operator) and others are being put in place (the SCADA system at NTDC).
150. **Nonetheless, following such large capacity additions in the past few years, the transmission network is still substantially overloaded.** During FY2016, NTDC reported over 125,000 voltage variations outside prescribed limits, whereas frequency variations outside permissible limits\(^{125}\) ranged from +2.94\% to -10\%, which led to two major system collapses in January 2016. Such voltage and frequency fluctuations generated instability in the network and caused 336 forced outages at 220kV (with associated blackouts lasting up to 2 days) and 122 outages at 500kV (with associated blackouts lasting 9 days).\(^{126}\) However, without the added transforming capacity supported by ADB, the number and duration of forced outages would have been much larger.

151. **ADB has contributed to increase the subtransmission capacity of DISCOs, but their operational performance has not improved as expected.** While 8 DISCOs have benefited from ADB support, which added 31\% of its total transforming capacity at 132kV, their technical and commercial losses have not decreased as expected, and all DISCOs but one breach NEPRA’s losses targets (IESCO). ADB’s contribution to improving performance of DISCOs has been relatively less satisfactory. Given the urgent needs of the sector, most of the subprojects target existing and evolving system bottlenecks, but such approach could be suboptimal when considering medium- and long-term expansion plans. Such integrated power system planning should also look at developing networks for reliability, which would also improve efficiency, particularly loss reduction.

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\(^{125}\) The Pakistan Grid Code specifies limits for frequency variation limits of ±1\%; i.e., lower limit of 49.5 Hz and higher of 50.5 Hz.

The distribution system is overloaded at key points and suffers severe technical and commercial losses, although some DISCOs perform better than others. There are substantial differences between better performing DISCOs, such as FESCO or GEPCO, with contained losses and full recovery, and worse performers, such as PESCO or SEPCO. The alarming number of fatalities in FY2017 (155 fatal accidents) indicates that DISCOs and K-Electric have failed to implement safety standards as prescribed in the distribution code. Without ADB support, overloading and outages at the subtransmission level would have been substantially larger.
Table 9: Performance indicators of DISCOs and K-Electric in FY 2017

<table>
<thead>
<tr>
<th>DISCO</th>
<th>T&amp;D Losses (%)</th>
<th>Recovery (%)</th>
<th>SAIFI (number per year)</th>
<th>SAIDI (Minutes per year)</th>
<th>Average Daily Load Shedding (Hours)</th>
<th>No. of Fatalities</th>
</tr>
</thead>
<tbody>
<tr>
<td>IESCO</td>
<td>9.0</td>
<td>91.0</td>
<td>0.0</td>
<td>0.8</td>
<td>3.4</td>
<td>15</td>
</tr>
<tr>
<td>FESCO</td>
<td>10.6</td>
<td>100.1</td>
<td>32.4</td>
<td>1,714.0</td>
<td>3.5</td>
<td>15</td>
</tr>
<tr>
<td>GEPCO</td>
<td>10.2</td>
<td>100.0</td>
<td>35.4</td>
<td>59.5</td>
<td>4.0</td>
<td>16</td>
</tr>
<tr>
<td>LESCO</td>
<td>13.8</td>
<td>99.7</td>
<td>45.8</td>
<td>2,926.3</td>
<td>1.7</td>
<td>29</td>
</tr>
<tr>
<td>MEPCO</td>
<td>16.9</td>
<td>100.0</td>
<td>203.0</td>
<td>17,592.0</td>
<td>3.2</td>
<td>10</td>
</tr>
<tr>
<td>QESCO</td>
<td>23.1</td>
<td>71.6</td>
<td>107.0</td>
<td>7,290.0</td>
<td>2.8</td>
<td>11</td>
</tr>
<tr>
<td>HESCO</td>
<td>26.5</td>
<td>72.4</td>
<td>184.0</td>
<td>12,623.0</td>
<td>3.3</td>
<td>3</td>
</tr>
<tr>
<td>PESCO</td>
<td>32.6</td>
<td>88.6</td>
<td>261.7</td>
<td>24,927.1</td>
<td>2.3</td>
<td>20</td>
</tr>
<tr>
<td>SEPCO</td>
<td>37.9</td>
<td>55.2</td>
<td>216.7</td>
<td>1,879.3</td>
<td>1.0</td>
<td>20</td>
</tr>
<tr>
<td>TESCO</td>
<td>15.4</td>
<td>82.9</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>K-EL</td>
<td>25.2</td>
<td>90.0</td>
<td>19.6</td>
<td>1,142.5</td>
<td>2.5</td>
<td>8</td>
</tr>
</tbody>
</table>


Notes: The T&D losses figure includes both technical and commercial (theft) losses, although it is not clear how much of each contributes to the total, due to limited metering and energy accounting systems.

Regarding fatalities, there is no information available whether they are occupational and/or community fatalities, or whether such fatalities were on ADB-funded infrastructures.


4. Increasing Access to Electricity

ADB’s contribution to increasing access to the grid through power distribution programs has been modest, while support for off-grid electricity access is still being implemented and has not yet delivered results. ADB’s distribution MFF did not focus on extending access to electricity through the expansion of medium and low voltage networks, but it indirectly supported access through subtransmission networks and substations at 132 kV. The extension of the subtransmission network indirectly supported associated medium- and low-voltage networks, which helped increase the number of electrified villages, an increase of 16% in the past 5 years. However, even though about 20,000 more villages were electrified, the percentage of villages with electricity remained at 82% of the total because of the increasing number of villages. The total number of consumers has increased by about 16% since FY2013, with the number of domestic connections increasing by 17.5%. However, illegal connections are still widespread; these are effectively unaccounted for consumers with access to electricity that do not appear in statistics but contribute to the commercial losses of DISCOs.

Table 10: Villages and Consumers with Grid Electricity Supply, FY2013-FY2017

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>No. of Villages Electrified</th>
<th>Portion of Villages Electrified (%)</th>
<th>No. of Consumers ('000)</th>
<th>Annual Increase (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>120,651</td>
<td>82.0</td>
<td>21,875</td>
<td>3.9</td>
</tr>
<tr>
<td>2014</td>
<td>125,158</td>
<td>78.9</td>
<td>22,588</td>
<td>3.3</td>
</tr>
<tr>
<td>2015</td>
<td>126,655</td>
<td>79.1</td>
<td>23,519</td>
<td>4.1</td>
</tr>
<tr>
<td>2016</td>
<td>133,732</td>
<td>80.6</td>
<td>24,517</td>
<td>4.2</td>
</tr>
<tr>
<td>2017</td>
<td>140,262</td>
<td>82.0</td>
<td>25,572</td>
<td>4.3</td>
</tr>
</tbody>
</table>


In 2016, ADB started supporting off-grid electricity access through the Access to Clean Energy Program, but it has not been going for long enough to deliver results. ADB support was in the form of
solar photovoltaic (PV) and micro-hydropower projects to provide off-grid power supply to schools and clinics in rural areas. The project builds on the development programs of the provincial governments of Punjab and KPK, but significant increases in off-grid access have not yet occurred, as the project has only recently started implementation.

5. Increase share of clean energy

155. **ADB NSO have made a satisfactory contribution to increasing the share of renewable energy.** ADB was one of the first development partners to support wind power in Pakistan. However, sovereign support for renewable energy and energy efficiency has been very limited. ADB NSO supported about 750 MW of hydropower, wind and solar capacity during the evaluation period, among others, the first hydropower (New Bong Escape) and wind power (Zorlu Enerji) IPPs. Under sovereign operations, ADB has supported 40 MW of small hydropower projects in Punjab and KPK. ADB-supported capacity additions were only about one-fourth of the 1,300 MW of renewable energy capacity expected to come on stream under the CPEC program priority projects, of which 600 MW have been commissioned already.

156. **ADB supported the draft of the renewable energy policy and helped build capacity building at AEDB through TA.** ADB TA-4881 helped draft the medium-term Renewable Energy policy and provided capacity development assistance to AEDB, which at the time was short of staff and changed chief executive officer three times.

157. **The RBL will promote off-grid access to electricity through solar PV in schools and health clinics in rural Punjab and KPK, as well as off-grid micro-hydro plants in KPK.** This is ADB’s first sovereign loan operation targeting off-grid access to electricity in rural areas using renewable energy to reach the rural population. It can easily be scaled up and contribute to the achievement of universal access in Pakistan. However, implementation started only recently, and few results have been achieved to date.

158. **Regarding energy efficiency, ADB’s support for demand-side energy efficiency has consisted of distributing free CFLs to DISCOs’ consumers, which has had a very limited impact.** A small component to promote energy efficiency in the public sector under the RBL has not yet started. While the energy efficiency MFF distributed about 30 million CFLs, the impact was very limited as several consumers were already using CFL lamps, which were already available in the market. Further, the reported benefits of reduced CO₂ emissions are unclear, as energy savings from lower consumption devices tend to be offset by longer usage times.128

6. Overall Results

159. **ADB’s contribution has been limited in terms of addressing the circular debt problem, improving the financial sustainability of the power sector, and improving institutional efficiency.** While some regulations have been recently passed and some institutional changes have been implemented, efforts to improve financial sustainability and reduce circular debt have had very limited impact, as receivables and circular debt flows keep increasing rapidly.

160. **ADB has made satisfactory contributions to increasing conventional and renewable energy generation capacity and to improving the transmission network, which has helped increase power supply reliability.** However, ADB’s contribution to improving the performance of the distribution system and increasing consumer access to electricity has been modest. Compliance with environmental and social safeguards has been satisfactory in general, with a positive impact on women, due to the improved reliability of the electricity supply.

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127 During implementation, it was reported that several of the targeted consumers did not have incandescent bulbs to switch for CFLs, as they had already purchased them in the market.

128 ADB. 2012. Adoption of CFLs and Electrical Lighting Usage in Pakistan. Manila.
LESSONS, ISSUES, AND RECOMMENDATIONS
CHAPTER 4

Lessons, Issues, and Recommendations

161. This chapter presents key lessons from this evaluation, external and internal issues, and offers recommendations for improving ADB performance and results on-the-ground.

A. Lessons

162. Incomplete policies and timid reforms cannot fully address the underlying causes of circular debt. After over a decade of accumulating circular debt, the problem is far from being resolved and the debt is expected to continue increasing, despite attempts by the government assisted by its development partners, to contain it. Forthcoming additions to the generation capacity will increase circular debt flows, and, unless reforms are made, the only solution for the government will be to keep financing it through the PHPL, although the debt flows will keep coming. The financial situation of the sector and the country is jeopardized by the circular debt problem, and it cannot be further ignored or delayed. Together with the debt parked at PHPL, the circular debt stock has reached PRs1 trillion in FY2018, equivalent to 3% of GDP.

163. Continued and strong political support and guidance is essential if the government is to implement significant reforms. In the past, sudden changes of direction have negatively affected the progress of improvements and reforms. The government has cancelled a number of ADB investment programs (e.g., the energy efficiency MFF and the renewable energy MFF) and reform programs (e.g. the AETP, together with the IMF’s Standby Arrangement). Some of these political decisions have slowed down or blocked reforms that were agreed previously and were included in the development plans. Considering the internal resistance for change within the power sector, significant reforms will never happen unless key decision makers at federal and provincial governments support the change. Strong political support for structural reforms is needed in order to stop circular debt flows and ensure the sustainability of the power sector.

164. Neglecting integrated energy sector planning contributes to inefficient sector development. In Pakistan many of the solutions attempted were suboptimal and short-term in nature. Integrated energy planning across all subsectors and long-term planning for generation, transmission and distribution networks are all essential for the efficient development of the power sector. Instead, pressed to reduce load shedding, as a short-term solution the government turned to the private sector to build power generation plants without appropriate planning. Adding oil-fired capacity and relieving system bottlenecks without looking at the overall long-term system needs have proved to be short-term solutions to a structural problem; they have pushed problems into the future and may have aggravated the situation further.

165. Incomplete restructuring and unbundling of the vertically-integrated power utility WAPDA prolongs reliance on government subsidies and bailouts to the power sector. The incomplete unbundling of the power sector has allowed corporatized SOEs (independent only in theory) to delay efficiency
improvements because they benefit from government bail-outs and subsidies. Some regulatory and institutional changes have occurred, but the results are not yet apparent. For instance, it took 10 years for the amendment to the NEPRA Act to pass since it was first proposed under the AETP. DISCOs continue to be coordinated through PEPCO, which was officially dissolved in 2012. The appointment of key managers and directors, staff seniority lists, and general oversight is carried out by the Ministry of Energy and PEPCO, with the companies having limited independence.

B. Issues

1. External

166. **Upcoming power generation capacity may overload the transmission and distribution networks, unless these systems are expanded, and may threaten the financial sustainability of the sector.** Overcoming transmission and distribution capacity constraints gains a sense of urgency as several 500 kV and 220 kV transmission substations and medium voltage feeders are already overloaded, while the distribution system has become the bottleneck and weakest link of the power network, and the chances of forced outages and system failures in the power networks will increase as more generation capacity comes on-stream over the next three years, and with the expected growth in demand due to increased power availability, transmission and distribution networks will become the bottleneck. Further, such new generation will increase energy sales volumes substantially, which will increase the flow of circular debt, exacerbating losses and the unpaid debt travelling upstream from DISCOs to power generation companies and fuel suppliers. Unless the factors that contribute to circular debt (e.g., tariffs at below cost-recovery, and technical and commercial losses) are eliminated or substantially reduced, this circular debt accumulation will increase significantly as electricity sales increase.

167. **Power sector SOEs do not have sufficient incentives to improve their financial and operating performance, whereas IPP operations have been adversely affected by delayed payments from CPPA-G.** The circular debt cash shortfall starts at the DISCOs, which do not receive enough revenues to cover their operating and capital costs. This revenue shortage is caused by tariffs that are set below cost-recovery and only partial collections of electricity bills. However, DISCOs are not independent corporations (as intended during the sector reform that started in 1992 with the unbundling of WAPDA) but SOEs that are bailed-out regularly by the government, through substantial subsidies and by paying off receivables, which are later transferred to the PHPL balance sheet or upstream to power generation companies through CPPA-G. Hence, DISCOs have few incentives to become financially sustainable, since they expect that the government will eventually pay off their debts. At the same time, delayed payments result in the IPPs having to borrow to meet their working capital requirements, which increases their operating costs. IPPs that need to purchase fuel have resorted to delaying payments to fuel suppliers as well, which transfers debt along the supply chain. Although IPPs have government guarantees for payments, many have resorted to arbitration or litigation as their liquidated damages have not been covered by capacity payments when plant availability is forcibly reduced because enough fuel cannot be procured owing to delayed payments by CPPA-G. Renewable energy IPPs have also suffered from delayed payments, although their operating costs are much lower. Private developers may lose confidence in investing in power generation if the situation deteriorates further.

168. **Inter- and intra-agency coordination is poor, which hinders a coordinated approach to problem solving.** There is limited communication between the Planning Commission, which is responsible for integrated energy planning, PPIB, which provides licenses to prospective IPPs, and NTDC, which designs the power sector development plan. Energy planning is not integrated: PPIB provides licenses for unsolicited project offers, and NTDC focuses on bottlenecks rather than on long-term planning. Further, departments within the same agency or even the same company do not cooperate efficiently. For

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129 NEPRA reports that during FY2017, 39% of transformers were overloaded over 80% capacity at 500kV, and 55% of transformers at 220kV.
instance, DISCO departments dealing with subtransmission at 132 kV have limited communication with
departments handling medium- and low-voltage networks. This makes it impossible to put in place
integrated development of the sector, leading to inefficiencies.

169. Reliance on imported fuel leads to excessive cost of generation, which calls for increased use of
domestic energy sources, as well as increased share of renewable energies to meet the targets for GHG
emission reduction. Power generation using domestic resources would contribute to supply base-load
generation capacity, increase energy security, and improve the balance of payments and foreign reserves,
due to avoided oil imports. Investments in generation using domestic resources will reduce the average
cost of generation and increase energy security. Given the long gestation period of hydropower projects,
this will require a medium- to long-term integrated energy planning approach. Suitable hydropower
project sites for development (with manageable environmental and social impacts) will need to be
identified. Also, there is a need to step up support for expanding renewable energy investments and for
energy conservation to help achieve the government’s commitment to reduce GHG emissions by 20% by
2030. Renewable energies, due to their declining and competitive generation costs, will help reduce the
average cost of supply, as well as improve energy security.

170. Political economy factors that support the status quo and resist reforms and transparency, have
slowed down reforms in the power sector, as can be seen by the unchecked circular debt problem. The
DISCOs’ receivables keep increasing, requiring the government to keep bailing them out, and it is unclear
why the government does not make a stronger push to reduce this financial bleeding. The weak measures
that have been undertaken under various sector reforms imply that political economy factors have
affected the implementation of essential reforms. These factors are the result of the incomplete
unbundling of WAPDA, which created power sector companies that are independent only in theory.
DISCOs, GENCOs and other sector SOEs are still directed by the Ministry of Energy (formerly Ministry of
Water and Power), they are regularly financially rescued by the government, and they have directors who
are appointed politically. These companies are also staffed by public servants with little or no incentive
to improve operations, since their compensation is not related to the sustainability of the company.
Experience at K-Electric showed great resistance to change by public service staff and labor unions. Poor
governance has contributed to the financial losses of the power sector entities, due to their limited
accounting systems and transparency.

2. Internal

171. ADB has provided insufficient analytical and capacity building support to improve power sector
performance in a sustainable way. While ADB provided financial support to all segments of the power
sector (policy, regulatory, generation, transmission, distribution, efficiency) through a combination of
sovereign and nonsovereign modalities, there has not been enough analytical back-up. More
comprehensive analysis should be done on: (i) developing the intended wholesale market by CPPA-G, (ii)
building long-term planning capacity that would lead infrastructure investments, (iii) commercializing
public sector entities to increase their efficiency, and (iv) defining effective policies and plans to enable
the sector to reach financial sustainability.

172. Design flaws of MFF programs have reduced effectiveness of the portfolio, as only two of the
four MFFs approved before 2010 will be fully completed. While the MFF modality helps establish a longer-
term partnership with the borrower and the executing agency (e.g., MFF Transmission with NTDC), it may
not be the most appropriate modality in all circumstances. MFFs are better suited to finance existing
long-term plans by one executing agency, rather than working with various unrelated executing agencies
or designing new tranches during implementation. Further, implementation risks need to be carefully
assessed during appraisal to avoid cancellations or excessive delays. The MFFs for renewable energy and
energy efficiency did not achieve successful results as second and follow-up tranches were cancelled or
not proposed, which effectively became stand-alone projects.
173. **ADB policy-based loan programs have failed to trigger substantial reforms and contain the accumulation of circular debt.** As exemplified by the Sustainable Energy Sector Reform Program PBL, the $2.4 billion provided to the government (including co-financing from WB, JICA and AFD), achieved only a few visible changes with limited results to date. Previous PBLs did not result on significant improvements on the ground and have effectively become budget support operations, rather than targeted reform operations, with no monitoring of use of funds. The issues underlying the accumulation of circular debt have not been addressed sufficiently well to date.

174. **ADB’s internal reporting and availability of information on the Pakistan energy portfolio has not been adequate.** As most projects did not have a project completion report available (only 2 out of 28 sovereign loans), it was required to access back-to-office-reports and Aide Memoires. However, when requested, only a few were available. Due to the lack of updated project information readily available during the preparation of this evaluation, there was a need for several specific requests to project officers in order to obtain updated information, which made the process inefficient and time consuming to all parties involved.

### C. Recommendations

175. This evaluation provides the following four strategic and four operational recommendations. Pakistan government authorities have confirmed these recommendations, after a consultation mission fielded in November 2018. In order to increase the effectiveness of ADB support to the power sector in Pakistan, ADB should:

#### Strategic

1. **Emphasize support to the improvement of governance in the power sector, strengthening the regulator so it has sufficient power and authority, promoting mechanisms in sector operations that remain in effect through political changes, and supporting interagency coordination.** The unbundling of WAPDA and corporatization of the various power companies was intended to improve their operational and financial performance. However, the power companies continue to be heavily influenced by political economy factors, and it has hindered institutional reforms and performance improvements of these companies. ADB should support strengthening governance through institutional changes and frameworks that allow the sector’s corporatized entities to make independent investment and operational decisions through mechanisms that continue to be effective during political changes. Also, ADB should foster an interagency coordinated approach to address the key problems that hinder sector development.

2. **Assist Pakistan in addressing the accumulation of circular debt by targeting its underlying causes, implementing the amended NEPRA Act, and establishing an effective system of cost-recovery tariffs.** Active policy dialogue and discussions, knowledge transfer, and financial support are needed to address effectively the circular debt situation. ADB should provide analysis to address tariff and subsidy issues, through effective implementation of the amended NEPRA Act; and support the increase of technical and operational efficiency of the DISCOs. Together with some analytical studies recently initiated under TA-9357, ADB should:

   (i) **Support the government, NEPRA and DISCOs to design and implement a verifiable mechanism incorporating agreed performance parameters that would help promote efficiency and rationalize subsidies.** The current tariff and subsidy system does not support efficient performance. It is essential for the government to promote reduction of electricity subsidies, while still supporting low consumption households (below 300 kWh/month), sectors such as agriculture and manufacturing, as well as incentivize operating efficiency at DISCOs. ADB should provide analytical and financial support to help establish and implement an agreed performance system to incentivize DISCOs, by for instance linking subsidy payments to performance achievement, which would align financial incentives
with increased efficiency, reduced technical and commercial losses, and reduced non-collections.

(ii) **Support implementation of new provisions of the amended NEPRA Act.** The current legal framework allows the government to introduce tariff surcharges to reduce circular debt, which to date have been challenged in civil courts and stalled. Establishment of appellate tribunals, as provisioned in the amended NEPRA, will reduce implementation delays due to legal proceedings. ADB should support capacity development for the appellate tribunals, and analytical work to quantify the level of surcharges.

(iii) **Support DISCOs to reduce theft through adequate infrastructure investments.** A potential way of reducing commercial losses and theft is by introducing ABCs, which would make very difficult to tap the wires illegally.\(^{130}\) Similarly, DISCOs should assess whether higher voltage distribution at 11kV would be acceptable for their networks, specifically in Balochistan where a large number of tubewells connect illegally to low voltage distribution systems.

(iv) **Carry out independent audits of power generation assets to ascertain capacity factors and efficiencies, particularly of old generation plants.** It is essential to ascertain the actual available capacity to update capacity ratings. ADB should support the engagement of independent energy auditors to measure actual values of the capacity and efficiency of all power plants in Pakistan.

(v) **Support the design and implementation of a competitive tariff system for prospective power generation projects and workable market rules, as well as the separation of technical and retail responsibilities at DISCOs, as outlined in the amendment to the NEPRA Act and the forthcoming energy policy.** It is essential for the government to reduce the average cost of supply, and current take-or-pay PPAs pull on the opposite direction, as many IPPs are paid for certain minimum fixed costs even without generating electricity. Appropriate market rules and a tariff system would support CPPA-G to transition towards a competitive market.

3. **Support long-term planning and management systems through TA and continue providing infrastructure investments in transmission and especially distribution, for being the weakest link of the power system.** ADB should continue providing support to NTDC and DISCOs to enhance power infrastructures, as well as improving management systems and system operations, to avoid increased outages and load shedding. For that, ADB should support capacity building to relevant agencies and utilities, to help them build an integrated energy sector plan and a long-term integrated system plan that would lead the development of infrastructures.

4. **Strengthen support to clean energy and conservation through investments in renewable energy generation and energy efficiency, as well as review the Renewable Energy Policy and associated regulations, to increase the share of renewable energies in the mix, reduce cost of generation, and mitigate impact on climate change.** The Pakistan’s Intended Nationally Determined Contribution (INDCs) submitted to the 2015 Paris Agreement aimed to reduce Pakistan’s GHG emission by up to 20% by 2030. However, the increased subcritical coal and gas generation capacity under construction and the greater demand from air conditioning and cooling systems will make such targets unachievable without strong improvements in clean energy and energy efficiency. Renewable energy generation has become cheaper than oil-fired power plants, and investments in low GHG emission technologies would help tackle climate change and increase its environmental sustainability. A stronger focus on demand- and supply-side energy efficiency

\(^{130}\) K-Electric has introduced ABC in the past few years and positive results have been reported.
will help reduce technical and commercial losses, as well as reduce the need for investment in generation capacity. Further, increased access to electricity through off-grid technologies would help reduce time poverty for women. Both actions would support the second and third priorities of ADB’s Strategy 2030.

Operational

1. **Continue supporting the government with advisory services towards developing a competitive electricity market and achieving financial sustainability of the power sector.** Due to the urgent need of large investments in generation, transmission, distribution, renewable energies and energy efficiency, the country’s financial sustainability depends on selecting adequate projects and negotiating appropriate financing conditions of such projects. Through a comprehensive and coordinated approach with other key partners, ADB should provide advisory services to (i) help develop a transparent regulatory environment and a competitive market to attract private sector investors, (ii) build capacity in managing competitive tenders for generation projects; and (iii) support technical and financial due diligence, and negotiation of unsolicited projects.

2. **Promote sovereign investments for lowering the cost of base-load power generation, building on sound integrated energy planning to increase Pakistan’s energy security by reducing its dependency on imported fuels.** Nationwide integrated energy planning should lead the investments, and not let the investor community define which and where power plants and transmission lines are built. In addition to NSO, sovereign investments should support base-load power plants using domestic resources to reduce dependency on imported fuels, increase energy security and improve the country’s balance of payments and foreign reserves.

3. **Support implementation of an action plan for DISCO commercialization, including efficient infrastructures, energy accounting, theft reduction through ABC, improved energy accounting through AML, area planning and coordination, commercialization and privatization analysis and a potential pilot project to attract private investors.** As shown by previous reform programs, it is not enough to put DISCOs on sale. Building on the One ADB approach, various departments should support the following actions to support commercialization and privatization of DISCOs: (i) investments in power infrastructures to reduce technical losses and improved energy accounting through sovereign operations; (ii) enhanced area-wise planning and coordination between 132 kV and medium voltage expansion plans for DISCOs, as well as analysis of options and market assessment for potential privatization through sovereign TA; (iii) address theft and wire-tapping by extending the use of aerial bundled conductors (ABC) in high loss areas; (iv) advisory services on commercialization options and privatization processes through the Office of Public and Private Partnerships; (v) design and implementation of a pilot showcase privatization project to raise interest among private investors, through NSO instruments.

4. **Strengthen ADB’s internal monitoring and reporting system in order to consolidate all project-related information, to enable easy access and continuous ongoing management and reporting.** In order to ensure timely availability of all relevant information, as well as save time for the various teams involved along the project cycle of ADB operations, it is essential to optimize the access to ADB’s document repository, as well as ensure an adequate maintenance of project documentation. Therefore, following confidentiality and privacy policies, ADB officials with adequate clearances should be able access any document relevant to implementation, monitoring and evaluation of ADB’s operations in a timely manner.
## APPENDIX: LIST OF SOVEREIGN LOANS, NONSOVEREIGN OPERATIONS, AND TECHNICAL ASSISTANCE

### Table A1.1: ADB Sovereign Loans in the Pakistan Energy Sector, 2005–2017
(in $ million)

<table>
<thead>
<tr>
<th>Loan Number</th>
<th>Modality</th>
<th>Approval Date</th>
<th>Approved Loan Amounts</th>
<th>Project Title</th>
<th>Original Closing Date</th>
<th>Closed (Y/N)</th>
<th>Actual Closing Date</th>
<th>PCR Available</th>
</tr>
</thead>
<tbody>
<tr>
<td>3126</td>
<td>PBL</td>
<td>24-Apr-14</td>
<td>400.0</td>
<td>Sustainable Energy Sector Reform Program (SesrP)</td>
<td>30-Jun-15</td>
<td>Y</td>
<td>03-Jun-15</td>
<td>n/a</td>
</tr>
<tr>
<td>3321</td>
<td>PBL</td>
<td>20-Nov-15</td>
<td>100.0</td>
<td>SESRP-Subprogram 1</td>
<td>30-Jun-16</td>
<td>Y</td>
<td>03-Jun-16</td>
<td>n/a</td>
</tr>
<tr>
<td>3322</td>
<td>PBL</td>
<td>20-Nov-15</td>
<td>300.0</td>
<td>SESRP-Subprogram 2</td>
<td>30-Jun-16</td>
<td>Y</td>
<td>03-Jun-16</td>
<td>n/a</td>
</tr>
<tr>
<td>3537</td>
<td>PBL</td>
<td>15-Jun-17</td>
<td>300.0</td>
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<td>2553</td>
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<td>14-Dec-13</td>
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<td>3091</td>
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<td>Jamshoro Power Generation Project</td>
<td>30-Jun-24</td>
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<td>3092</td>
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<td>09-Dec-13</td>
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<td>Jamshoro Power Generation Project</td>
<td>31-Mar-19</td>
<td>N</td>
<td>n/a</td>
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</tbody>
</table>

MFF = multitranche financing facility, n/a = not applicable, PCR = project completion report, PBL = Policy Based Loan; RBL = Results-Based Lending, Y = yes.

Notes:
- PCRs of closed loans and subprograms may not be available because the associated operations or programs have not closed for more than 2 years.
- There are a total of 28 loans representing 19 operations: Programmatic PBL (3), RBL (1), MFF (14), Project loan (1).
- Y* means that two loans share the same PCR for belonging to the same operation.

Source: Asian Development Bank database.
Table A1.2: ADB Nonsovereign Operations in the Pakistan Power Sector, 2005–2017
(in $ million)

<table>
<thead>
<tr>
<th>Investment No.</th>
<th>Modality</th>
<th>Date Approved</th>
<th>Total Amount</th>
<th>Company</th>
<th>Project</th>
<th>Planned COD</th>
<th>Actual COD</th>
<th>Available XARR</th>
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<tbody>
<tr>
<td>7265</td>
<td>Equity Guarantee</td>
<td>30-Oct-07</td>
<td>46.75</td>
<td>Daharki Power Holdings Ltd</td>
<td>Daharki Power Project</td>
<td>Oct 2009</td>
<td>16-May-11</td>
<td>Y</td>
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<tr>
<td>7326/2722</td>
<td>Loan</td>
<td>13-Dec-10</td>
<td>100.00</td>
<td>Uch II Power Ltd</td>
<td>Uch II Power Project</td>
<td>April 2014</td>
<td>-</td>
<td>n/a</td>
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<tr>
<td>7254/2329</td>
<td>Loan</td>
<td>29-May-07</td>
<td>150.00</td>
<td>Karachi Electric Supply Corp. Ltd</td>
<td>KESC Postprivatization Rehabilitation, Upgrade, and Expansion</td>
<td>Aug 2008 (KTPS)</td>
<td>Sep 2009 (KTPS)</td>
<td>Y</td>
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<td>7443/3247</td>
<td>Loan</td>
<td>24-Feb-15</td>
<td>30.00</td>
<td>Engro Energy Terminal Private</td>
<td>Engro Fast-tracked LNG Regasification Project</td>
<td>Mar 2015</td>
<td>29-Mar-15</td>
<td>n/a</td>
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<td>7445/3252</td>
<td>Loan</td>
<td>17-Apr-15</td>
<td>65.00</td>
<td>Mira Power Ltd</td>
<td>Gulpur Hydropower Project</td>
<td>Mar 2019</td>
<td>-</td>
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<td>7222/2198</td>
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<td>21-Nov-05</td>
<td>37.00</td>
<td>Laraib Energy Ltd</td>
<td>New Bong Escape Hydropower</td>
<td>Dec 2008</td>
<td>23-Mar-13</td>
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<td>7339/2792</td>
<td>Loan</td>
<td>11-Oct-11</td>
<td>97.00</td>
<td>Star Hydro Power Ltd</td>
<td>Patrind Hydropower Project</td>
<td>Mar 2015</td>
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<td>7348</td>
<td>Guarantee</td>
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<td>33.43</td>
<td>Foundation Wind Energy I Ltd</td>
<td>Foundation Wind Project I</td>
<td>Dec 2012</td>
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<td>Foundation Wind Project II</td>
<td>Dec 2012</td>
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<td>7487/3448</td>
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<td>27-Oct-16</td>
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<td>Triconboston Consulting Corporation (Private) Ltd</td>
<td>Triconboston Wind Power</td>
<td>Nov 2018</td>
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BQTPS = Bin Qasim Thermal Power Station, COD = Commercial Operations Date, KESC = Karachi Electric Supply Corporation, KTPS = Korangi Thermal Power Station, LNG = liquified natural gas, n/a = not applicable, XARR = extended annual review report, Y = yes.

Note: XARR may not be available because the operation is not considered mature for self-evaluation.

Source: Asian Development Bank Database.
Table A1.3: ADB Sovereign Technical Assistance in the Pakistan Energy Sector, 2005–2017  
(in $ million)

<table>
<thead>
<tr>
<th>TA Number</th>
<th>TA Type</th>
<th>Approval Date</th>
<th>Approved Amount</th>
<th>TA Title</th>
<th>Original Closing Date</th>
<th>Closed (Y/N)</th>
<th>Actual Closing Date</th>
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<tr>
<td>4610</td>
<td>AOTA</td>
<td>14-Jul-05</td>
<td>0.15</td>
<td>Operational Support to the Office of the Energy Advisor</td>
<td>31-Oct-06</td>
<td>Y</td>
<td>27-Mar-08</td>
<td>Y*</td>
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<td>4852</td>
<td>AOTA</td>
<td>23-Oct-06</td>
<td>0.15</td>
<td>Formulation of Strategy for Development &amp; Utilization of Coal Reserves at Thar and Badin</td>
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<td>Y</td>
<td>31-Dec-07</td>
<td>Y*</td>
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<td>4870</td>
<td>AOTA</td>
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<td>0.95</td>
<td>Establishment and Commencement of Operations for the CPPA</td>
<td>30-Apr-08</td>
<td>Y</td>
<td>30-Nov-09</td>
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<td>4881</td>
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<td>Renewable Energy Policy Formulation &amp; Capacity Building Development of the AEDB</td>
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<td>10-Jul-09</td>
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<td>4982</td>
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AOTA = advisory operational technical assistance, CDTA = capacity development technical assistance, KSTA = knowledge and support technical assistance, N = no, n/a = not applicable, PATA = policy and advisory technical assistance, TA = technical assistance, TCR = TA completion report, Y = yes.

Notes: Y* indicates that a summary monitoring report is available for each of the two small-scale TA projects.
This table does not include project preparatory technical assistance.
Source: Asian Development Bank Database.