

SECTOR ASSESSMENT (SUMMARY): ENERGY¹

A. Sector Road Map

1. Sector Performance, Problems, and Opportunities

1. The country's total primary energy supply increased by 8.55% in 2018 compared with a reduction of 0.21% in 2013. The energy demand is projected to grow by 4%–6% per year up to 2043 (depending on the gross domestic product growth scenario).² The increase in primary energy supply is attributable to (i) the introduction of liquefied natural gas in the sector, following the signing of the 15-year agreement with Qatar for an annual purchase of 3.75 million tons; (ii) 13 gigawatts of generation added since 2013, with about 70% utilizing imported fuels (including coal); (iii) expedition of the works related to the exploitation activity in the Thar coal field; and (iv) the deployment of renewable energy sources. The country's depleting resources and low rate of discovery of fossil fuels have resulted in an increased share of imported energy to meet the deficit.

2. After economic growth averaging 4.8% during fiscal years (FY) 2014–2018, Pakistan's growth trajectory dipped to 1.19% in FY2019 and –0.38% in FY2020. Energy sector entities, with losses of more than \$2 billion per annum, continue to rely on significant regular fiscal transfers and sovereign credit guarantees to maintain their operations, with power distribution companies (DISCOs) being the major recipient—totaling nearly 1.5% of the gross domestic product. Shifting the burden of energy sector inefficiencies on businesses have cut the country's trade and export competitiveness, and the economy has persistent energy outages and high tariffs.

3. Pakistan's power mix is a combination of thermal, nuclear, hydroelectric, and renewable energy. In 2015, Pakistan was failing to provide either reliability of or access to electricity for its population. In 2012, a gap of 4,500–5,000 megawatts (MW) between demand and supply resulted in extensive load-shedding of about 12 hours in urban and industrial areas. Since 2016, significant progress has been made in reducing the gap between supply and demand, primarily through large investments in generation. The bulk of the new investment has been in thermal generation, based on imported fuel. Pakistan has systematically attempted to shift from expensive imported furnace oil to cheaper and more efficient gas generation by importing liquefied natural gas. These investments resulted in an electricity surplus for Pakistan in 2019, for the first time in many years. Peak demand in the National Transmission and Despatch Company (NTDC) system is projected to increase from 26,252 MW in 2020 to 35,422 MW in 2025.³

4. The country's current power generation mix is deeply skewed toward thermal generation from imported fuel, despite the availability of significant indigenous resources (hydropower, coal, gas, and renewable sources). In 2020, about 60% of the power generation mix comprised imported fuels, with an average generation cost of \$0.85 per kilowatt-hour. This imbalance has put severe pressure on the fragile balance of payments, undercut sector governance, consumed up sector liquidity, and created unfunded circular debt of \$14.40 billion (flow and stock) as of 31 December 2020. Of the independent power producers added since 2013, 70% utilize imported fuels under take-or-pay power purchase agreements. This has inflated capacity payments to unprecedented levels, and has been accentuated by a devaluation of nearly 47% in the Pakistan rupee since mid-2018.

¹ This summary is based on ADB. 2020. [Country Partnership Strategy: Pakistan, 2021–2025](#). Manila.

² Petroleum Institute of Pakistan. 2019. *Pakistan Energy Outlook 2019*. Karachi.

³ NEPRA. 2020. [State of Industry Report 2020](#). Islamabad.

5. On the downstream side, more than one-fourth of the electricity generated is lost because of the poor transmission and distribution infrastructure, theft, faulty metering, and inadequate energy accounting.⁴ The energy sector's inability to recover its full costs over long periods has spilled over to other sectors in the supply chain, including generators, fuel, and equipment suppliers. The cost of energy delivery to consumers (including generation, transmission, and distribution) is nearly 30% higher than the revenue recovered from consumers.⁵

6. **Sector structure.** Energy sector reform in Pakistan started in 1992 with a plan to unbundle and privatize the Water and Power Development Authority (WAPDA), the government-owned integrated utility at the time. The Policy Framework and Package of Incentives for Private Sector Power Generation Projects in Pakistan allowed private independent power producers participation in the sector for the first time,⁶ and the government created the Private Power and Infrastructure Board to promote private investment in the energy sector. A new energy (electricity) sector regulator—the National Electric Power Regulatory Authority (NEPRA)—was established in 1995 and approved by Parliament in 1997. This was followed by sector unbundling. WAPDA's hydroelectric generation was separated from the thermal operations, which were split into government-owned generating companies. A new NTDC was set up to manage the grid, and nine (now 10) DISCOs were established to provide electricity to customers in different parts of the country. All are fully owned by the government except for K-Electric Limited (formally Karachi Electric Supply Company), which is responsible for power generation and distribution in the Karachi area and is privately owned and listed on the Pakistan Stock Exchange. The hydropower plants were retained by WAPDA, which now reports to the Ministry of Water Resources after the bifurcation of the Ministry of Water and Power in 2017. The Alternative Energy Development Board was established in May 2003 to facilitate, promote, and encourage the development of renewable energy in Pakistan. Finally, in 2015, the Central Power Purchasing Agency Guarantee Limited (CPPA-G) was separated from the NTDC to act as the system operator responsible for being the single buyer of electricity from generators and seller to the DISCOs, while the NTDC focused on the management of the transmission and distribution system. NEPRA determines tariffs, issues licenses, and regulates and ensures long-term sector sustainability. The Ministry of Energy (Power Division) sets sector policies, including the tariffs paid by electricity customers.

7. Through an amendment to the Constitution of Pakistan in 2010, each federating unit (province) was empowered to formulate the policy framework for the development of power generation in both the public and private sectors. This has led to the formation of dedicated provincial departments and renewable specialized companies to foster and execute power projects in public, private, and public–private partnership modes with indigenous power resources.

8. **Accountability and transparency.** Concerns about payment to power suppliers, unclear demarcation between federal and provincial investment policies, and lack of transparent payment practices are an obstacle to enhanced private sector participation in the energy sector. On the other hand, public sector companies are not held accountable for their performance because of lack of transparency in operation and payment mechanisms. Better access to energy sector data will foster demand for information and a culture of transparency. This will lead to the monitoring of sector developments by stakeholders. The CPPA-G provides a transparent settlement system and will develop into a competitive electricity pricing platform. It also discloses market settlement data on its website, while NEPRA is working on improving public awareness of the energy sector data.

⁴ DISCO transmission and distribution losses averaged about 18.0% in the last 5 years compared with the NEPRA target of 15.3%.

⁵ This refers to the gross billing minus the unrecovered amount and unfunded subsidies.

⁶ Government of Pakistan. 1994. [*Policy Framework and Package of Incentives for Private Sector Power Generation Projects in Pakistan*](#).

9. **Hydropower potential and historical trends.** The sector finances will improve once the average generation tariff is reduced by optimizing the generation mix with indigenous supplies such as hydro and renewables. Pakistan has about 60,000 MW of hydropower potential, but only 9,861 MW of installed hydroelectric power capacity. Hydroelectric power's share of the total installed generation capacity in 2019 is only 25.47%, compared with about 67.00% in 1985. The share of hydropower in the total power generation mix was 29.00% in FY2020, compared with 24.15% in FY2019. The public sector owns most of the country's installed hydropower capacity, with the private sector having only 472 MW (footnote 3).

10. **Climate change.** Pakistan is vulnerable to the negative impacts of climate change. During 1995–2015, landslides and erosion resulted in the siltation of water reservoirs. Changes in rainfall patterns and glacial melt have also reduced hydropower generation capacity. Although Pakistan's greenhouse gas emissions are low by global standards, carbon emissions rose from 182.73 million tons in 1990 to 361.98 million tons in 2012.⁷ The significant increase in greenhouse gas emissions, particularly carbon dioxide, is mainly attributed to the burning of fossil fuels for electricity, transport, and manufacturing.

2. Government's Sector Strategy

11. The sector has inadequate tariffs and inefficient subsidies, high generation costs, unsustainable commercial and technical losses, weak governance, and lack of integrated planning. The current government has developed reform action plans with the support of major development partners. A large part of these reform efforts will be on optimizing the use of tools that were developed in previous efforts. The Asian Development Bank (ADB) is supporting these reforms through a proposed programmatic approach policy-based program with three subprograms during 2019–2022. The first of these subprograms was approved in 2019 and the second is planned for 2021. In developing the program, ADB has undertaken multiple diagnostic and analytical studies since 2018. The findings recommended prioritizing the recurring financial sustainability issues to streamline the tariff notification cycle; strengthening energy accounting; and reducing generation costs by inducting solar, wind, and hydropower without capacity charges as well as by addressing the sector's governance and infrastructure constraints (details of the program are in para. 23).

12. In 2013, the government announced the National Power Policy, outlining its sector strategy to support the development of hydropower projects and encourage the development of renewables.⁸ However, policy targets were never met, and the mobilization of international capital resources remained a challenge, particularly for provincial projects. The government announced the Power Generation Policy 2015 to (i) empower the provincial governments to function as a facilitator for IPPs, (ii) simplify investment decision-making by local and federal authorities, (iii) identify zones of responsibility in processing and implementing generation projects, and (iv) extend the federal government's support of backing up the power purchaser payment obligation and political and other risks in the projects to the provincial government-initiated projects when conforming to certain requirements.⁹ The new Alternative and Renewable Energy Policy 2020, approved in July 2020, and the draft National Electricity Policy 2021 feed into the drafting of the Indicative Generation Capacity Expansion Plan, 2047 to reduce dependence on imported fuels and focus on indigenous resources, accelerate private sector participation in supply chain investments, divest assets, and secure financial sustainability through stronger reforms and policy support from development partners.¹⁰

⁷ World Resources Institute. CAIT Climate Data Explorer. [Climate Analysis Tool 2.0 \(accessed 1 September 2019\)](#).

⁸ Government of Pakistan. 2013. [National Power Policy 2013](#). Islamabad.

⁹ Government of Pakistan, Ministry of Water and Power. 2015. [Power Generation Policy 2015](#). Karachi.

¹⁰ NEPRA. 2020. [Indicative Generation Capacity Expansion Plan \(IGCEP\) 2047](#). Islamabad.

13. In line with the federal policies, provincial governments formalized their own policies. The Government of Khyber Pakhtunkhwa announced the KP Hydropower Policy in 2016, identifying Pakhtunkhwa Energy Development Organization (PEDO) as the single facilitator of all investments in hydropower projects in the province.¹¹ As part of its 10-year road map for Khyber Pakhtunkhwa's energy sector, PEDO developed an investment plan identifying 21 run-of-river hydropower projects with a funding requirement of \$11 billion. PEDO aims to develop these projects using both public and private investments.

14. As the sector lacked commercial discipline and operational effectiveness, the investments under these policies were mainly limited to generation and did not yield the expected benefits for the sector as the underlying issues related to system losses, collection, tariff setting, and subsidies were not addressed. The shortcomings in the operations of DISCOs are direct and major causes of the circular debt and combined with the added generation capacity and the rise in crude oil prices, increased the government's energy sector liabilities exponentially.

B. Major Development Partners: Strategic Foci and Key Activities

15. The Integrated Energy Sector Recovery Report, finalized in October 2010 by a task force of Friends of Democratic Pakistan, guided the investments of international financial institutions to priority subsectors and projects to achieve an integrated recovery of the energy sector in the shortest possible time.¹² Since then, all the major development partners have been engaged in Pakistan's energy sector, with the Asian Infrastructure Investment Bank as the new entrant cofinancing a hydropower project with the World Bank. The development partners engaged in Pakistan's energy sector are the ADB, the Agence Française de Développement (AFD), the European Union, the European Investment Bank, the Islamic Development Bank, Japan International Cooperation Agency (JICA), German Development Cooperation through KfW, the United States Agency for International Development, and the World Bank.

16. ADB provides broad support to the energy sector—including power generation, transmission, and distribution. Ongoing ADB financing to Pakistan's energy sector totals \$2.2 billion, which is 40% of its active portfolio funding to the country. ADB also supported policy and governance related reforms through three subprograms of the Sustainable Energy Sector Reform Program loan (2014–2017) in concert with the International Monetary Fund (IMF)-assisted Extended Fund Facility and cofinancing from the AFD, JICA, and World Bank.

17. The World Bank provides funding to hydropower and other renewable power generation, power transmission, energy efficiency, intra- and inter-regional power trade, and water resources management. The IMF provided \$6.6 billion in support to the government during 2013–2017 through its Extended Fund Facility, and the IMF board is expected to approve another facility of \$6 billion–\$7 billion in July 2019. German development cooperation through Deutsche Gesellschaft für Internationale Zusammenarbeit and KfW focuses on hydropower, renewable energy, and energy efficiency. The AFD is providing support for small- to medium-scale hydropower plants and transmission projects. JICA is funding the expansion of electricity transmission and is assisting the

¹¹ Government of Khyber Pakhtunkhwa. 2016. [KP Hydropower Policy 2016](#). Peshawar.

¹² Friends of Democratic Pakistan—Energy Sector Task Force. 2010. [Integrated Energy Sector Recovery Report and Plan](#). Islamabad. Friends of Democratic Pakistan has 26 members. In addition to Pakistan, these are: ADB, Australia, Canada, People's Republic of China, Denmark, Egypt, France, Germany, Iran, Islamic Development Bank, European Union, Italy, Japan, Republic of Korea, Netherlands, Norway, Saudi Arabia, Spain, Sweden, Turkey, United Arab Emirates, United Kingdom, United Nations, United States, and World Bank.

NTDC in the development of an integrated power Transmission Master Plan. The United States Agency for International Development's ongoing support is limited compared with the support provided in the past and focuses mainly on the development of efficient systems in all the subsectors of the energy sector. The Islamic Development Bank is supporting energy generation projects and providing a facility to the government for the purchase of petroleum products.

Major Development Partners

Development Partner	Project Name	Duration	Amount (\$ million)
Energy sector reforms			
ADB, WB, JICA, Sustainable Energy Sector Reforms Program and AFD		2014–2017	2,413.00
Hydropower development			
ADB	New Bong Escape Hydropower Plant Project	2005–2013	37.30
(Private sector)	Star (Patrind) Hydropower Plant Project	2011–2017	97.00
	Gulpur Hydropower Plant Project	2015–2019	65.00
AFD	Jaggran II Hydropower Project (48 MW)	2013–2019	77.27
	Upgradation and Rehabilitation of Dargai and Chitral Hydropower Plants	2016–2023	56.81
AFD and KfW	Harpo Hydropower Project (35 MW)	2014–2019	79.54
AFD, KfW, and EU/EIB	Rehabilitation of Warsak Hydropower Plant	2015–2022	147.70
KfW and EU/EIB	Keyal Khwar Hydropower Project (128 MW)	2014–2024	113.00
KfW	Glacier Monitoring Research Center	2016–2021	6.81
	Hydropower and Renewable Energy Project, Khyber Pakhtunkhwa	2012–2019	11.36
	Hydropower and Renewable Energy Project, Gilgit Baltistan	2019–2022	14.20
IDB	Hydropower Projects of Alai Khawar, Khan Khawar, and Dubair Khawar	2008–2019	150.20
	Neelum–Jhelum Hydropower Plant Project	2009–2018	357.64
USAID	Satpara Hydropower Plant Project (17.6 MW)	2012–2016	3.42
	Gomal Zam Hydropower Plant Project (17.4 MW)	2012–2016	7.63
	Golen Gol Hydropower Plant Project (106 MW)	2015–2019	16.50
WB	1,410 MW Tarbela Fourth Extension Hydropower Project (IBRD and IDA)	2012–2019	725.00
	2,160 MW Dasu Hydropower Stage 1 Project (IDA)	2014–2022	1,048.00
	Khyber Pakhtunkhwa Hydropower Development Program (IDA)	2020–present	450.00
WB and AIIB	1,410 MW Tarbela Fourth Extension Hydropower Project	2017–2022	690.00

ADB = Asian Development Bank, AFD = Agence Française de Développement, AIIB = Asian Infrastructure Investment Bank, EIB = European Investment Bank, EU = European Union, IBRD = International Bank for Reconstruction and Development, IDA = International Development Association, IDB = Islamic Development Bank, JICA = Japan International Cooperation Agency, MW = megawatt, USAID = United States Agency for International Development, WB = World Bank.

Source: Asian Development Bank.

C. Institutional Arrangements and Processes for Development Coordination

18. ADB, as the anchor and largest development partner of Pakistan in the energy sector, facilitates interaction between the energy sector development partners by hosting regular meetings to coordinate policy dialogue and discuss sector and project issues. Monthly meetings are held with the IMF and the World Bank to monitor progress on sector reforms and investments. ADB was part of the consultation process that the IMF led while reaching the staff level agreement with the government, under the IMF's Extended Fund Facility, to curtail the energy sector's burden on the annual state budget and to stem its negative impact on economic growth.

19. Support from multiple development partners for the government's planned reforms, along with parallel investment in sector efficiency improvement and clean energy generation projects,

represents good coordination among development partners and the government, and brings greater focus to country ownership and its results framework for the sector.

20. The project builds on lessons from previous ADB and development partner investments in hydropower generation projects in Pakistan, and the successes generated by their complementary approach and multi-partner dialogue. The project's implementation strategy is based on continuing dialogue between the government and development partners to support the government's goal of achieving its development objectives.

D. ADB Sector Experience and Assistance Program

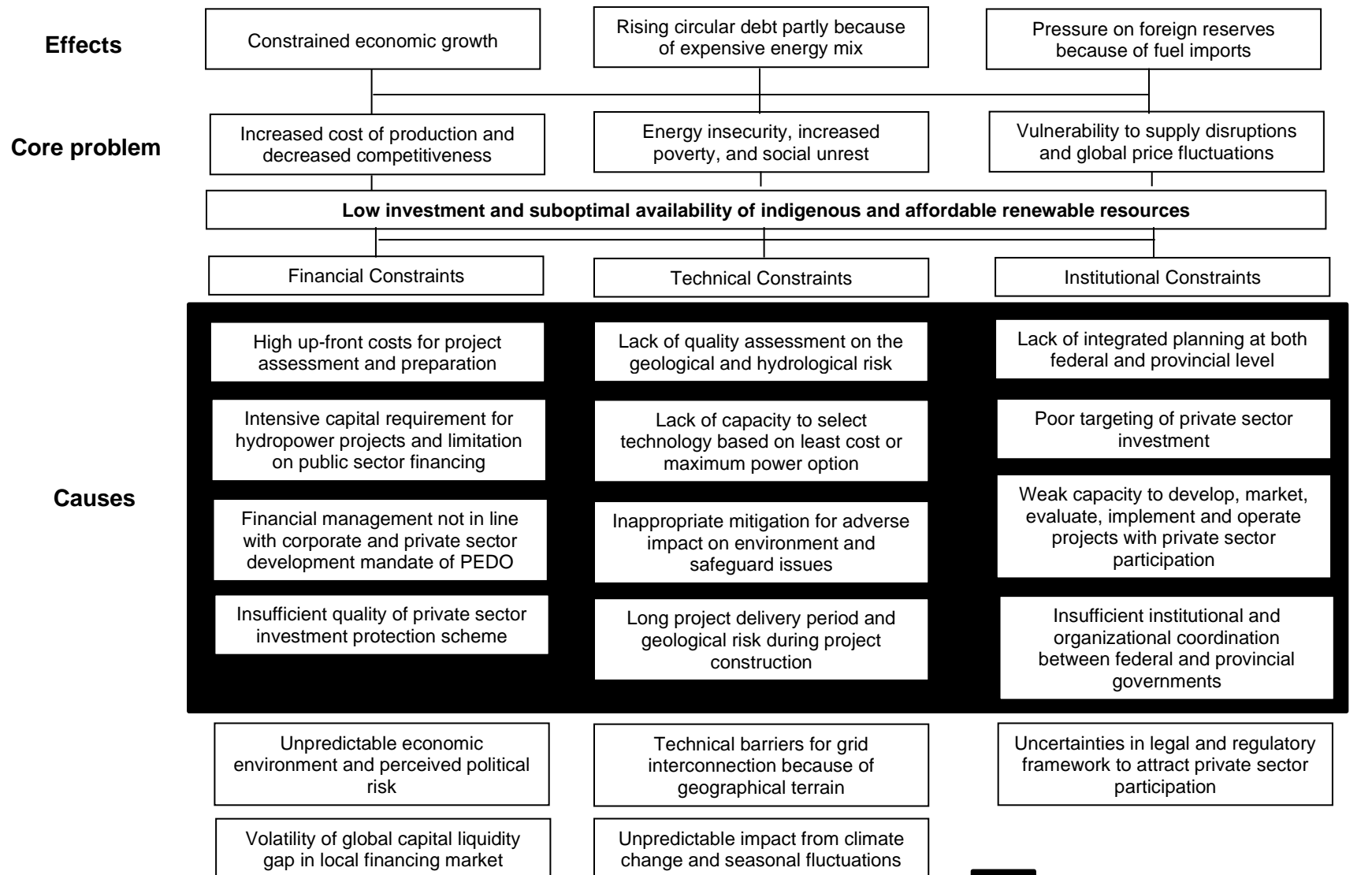
21. ADB support to Pakistan's energy sector has employed an integrated approach that has included investments in projects related to conventional and renewable energy generation, energy efficiency, and power transmission and distribution, apart from providing program support for institutional and regulatory reforms. The sector assistance program evaluation conducted by the Independent Evaluation Department acknowledged ADB's contribution in increasing the power system's reliability and efficiency, and in initiating important sector reforms, but highlighted the limited progress in strengthening the financial sustainability of the energy sector.¹³

22. ADB's current portfolio for the energy sector consists of two multitranche financing facilities (MFFs) (para. 16). The transmission MFF supports network expansion while the distribution MFF introduces advanced metering infrastructure in the distribution grid. Each MFF includes an Asian Development Fund loan that supports capacity development and performance improvement. In addition to the MFFs, ADB is supporting the development of renewables through the Access to Clean Energy Program and is financing a 660 MW supercritical coal-fired power plant (the Jamshoro Power Generation Project).

23. ADB is working with the government and development partners to implement the \$1 billion programmatic approach through the Energy Sector Reforms and Financial Sustainability Program. It builds on earlier policy-based interventions undertaken by ADB and supplemented by development partners. The program assists Pakistan to reduce financial, technical, and governance deficits in the energy sector, which adversely impact sector sustainability and affordability and Pakistan's fiscal balance and macroeconomic stability. It will (i) secure financial sustainability by controlling the accumulation and addressing the reduction of circular debt; (ii) strengthen governance by rationalizing a competitive market road map, separating policy and regulatory functions in hydrocarbons, appointing appellate tribunals, implementing multiyear tariffs, and unbundling the gas segment; and (iii) reinforce infrastructure improvements through integrated planning to facilitate public and private sector investment across the energy supply chain. These reforms will be underpinned by a strong ongoing and future investment project pipeline, totaling nearly \$2.5 billion during 2019–2022, to support the expansion and metering of transmission and distribution systems, generation through indigenous resources, and the development of gas infrastructure and storage to bring efficiency and to ensure continuity and safeguard against sudden import price spikes.

¹³ Independent Evaluation Department. 2019. [*Sector Assistance Program Evaluation: ADB's Support to Pakistan Energy Sector, 2005–2017*](#). Manila: ADB.

Problem Tree for Energy



PEDO = Pakhtunkhwa Energy Development Organization