

SECTOR ASSESSMENT (SUMMARY): ENERGY¹

1. Sector Performance, Problems, and Opportunities

1. A reliable and sustainable energy sector is essential to Pakistan's economic growth and well-being. Routine load shedding of 8–10 hours per day in urban areas and up to 18–20 hours per day in rural areas, increases security issues and social unrest, and reduces employment opportunities.² About one-third of the population lacks access to grid electricity, which lessens opportunities for inclusive growth. Power shortages are estimated to have reduced gross domestic product (GDP) growth by at least 2% in 2013 and 2014, and are considered the major cause of the slowdown in large-scale manufacturing.³ Major contributing factors to Pakistan's energy problems are (i) the gap between end-user and cost-recovery tariffs, (ii) limited private sector participation resulting from concerns about electricity payments, and (iii) lack of transparency.

2. **Sector performance and private sector participation.** In fiscal year (FY) 2015, electricity distribution and transmission losses reached 18.6% and collection amounted to 89.0% of total billing, compared with the National Electric Power Regulatory Authority (NEPRA) targets for losses (13.2%) and collection (100.0%).⁴ Gas distribution losses totaled 11.0% versus the 4.5% allowed by the Oil and Gas Regulatory Authority (OGRA). Public companies dominate the energy sector. Some progress on the reduction of losses has been made, however the poor performance of public sector companies and increasing costs caused further accumulation of unpaid electricity generation bills. In 2013, the government injected \$3.8 billion in equity into the distribution companies (DISCOs) to clear these losses. In FY2015, the accumulated unpaid amount increased by PRs209 billion, and it is projected to decrease to PRs88 billion in FY2016 as of December 2015. The proportion of power generated using expensive imported fuel oil has increased to 60.5% in FY2014 from 55.9% in FY2013, increasing the cost of electricity. Government subsidies reduced the impact on customers. The impact has also declined recently because of reduced oil prices. On the demand side, inefficiencies in industrial processes and equipment, household and commercial appliances, and buildings lead to suboptimal use of energy resources.⁵ Concerns about payments, unclear investment policies, and lack of transparent payment practices serve to reduce private participation in the energy sector. The Central Power Purchasing Agency (Guarantee) Limited was separated from the National Transmission and Despatch Company in 2015. Central Power Purchasing Agency (Guarantee) Limited is mandated to provide a transparent settlement system and to evolve a competitive electricity pricing platform, as the regulatory framework develops.

3. Pakistan's transmission system accounted for about 3% of the transmission and distribution losses in 2014, down from more than 7.6% in 2005. The system consists of over 14,000 kilometers of high-voltage transmission lines and 38,000 megavolt-amperes of transformer capacity. The system is overloaded, contributing to major blackouts, system trips, and supply constraints. Further investment is required to address the reliability and quality of supply of the system, and transform and transmit the projected new generation capacity,

¹ ADB. 2015. *Country Partnership Strategy: Pakistan, 2015–2019*. Manila.

² National Electric Power Regulatory Authority (NEPRA). 2016. *State of Industry Report, 2015*. Islamabad.

³ Government of Pakistan, Ministry of Finance. 2013. *Economic Survey 2012–13*. Islamabad. This figure is incorporated as an assumption in the macroeconomic framework for 2013–2014 in Government of Pakistan, Planning Commission. 2013. *Annual Plan, 2013–2014*. Islamabad.

⁴ NEPRA. 2015. *State of Industry Report, 2014*. Islamabad.

⁵ The National Energy Efficiency and Conservation Act, 2015 was prepared to provide for the establishment of institutions, mechanisms, and procedures to promote the effective conservation and efficient use of energy.

including strengthening the grid for renewable energy investments. While the transmission sector is expected to remain largely government owned, the regulatory framework allows private sector investment and public–private partnerships.

4. **Accountability and transparency.** Lack of transparency in the operation and payment mechanisms has made it difficult to hold public sector companies accountable for their performance. 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 Central Power Purchasing Agency (Guarantee) Limited discloses market settlement data on its website, and NEPRA is working on improving public awareness of the sector data.

5. **Sector structure and reforms.** Reforms have been ongoing in Pakistan since 1992, but the pace has been slow and the expected efficiencies have yet to materialize fully. The reforms include the unbundling and corporatization of the Water and Power Development Authority (WAPDA) into 10 regional DISCOs, four government-owned thermal power generation companies, and a transmission company, the National Transmission and Despatch Company. The hydropower plants were retained by WAPDA as WAPDA Hydroelectric. All are fully owned by the government. Privately owned K-Electric is responsible for power generation and distribution in the Karachi area. Privately-owned independent power producers generate 53% of the country's power (footnote 2). NEPRA was established to determine tariffs, issue licenses, and regulate and ensure the long-term sustainability of the sector. The Ministry of Water and Power sets sector policies, including notifying the tariffs paid by electricity customers.

6. The fuel sector is dominated by public sector companies—two gas transmission and distribution companies, a gas import company, two exploration companies, and one oil marketing company. The Ministry of Petroleum and Natural Resources provides the policy framework and administrative oversight. OGRA was set up to foster competition, increase private investment and ownership in the midstream and downstream petroleum industry, protect the public interest while respecting individual rights, and provide effective and efficient regulations. OGRA's primary role is to set prices and issue operating licenses. The private sector has developed a liquefied natural gas terminal for re-gasification at Port Qasim, with a maximum capacity of 690 million cubic feet of gas per day. In early 2016, about 400 million cubic feet of gas per day were supplied through liquefied natural gas imports into Pakistan.

7. **Tariffs, pricing, and subsidies.** The government does not charge electricity customers the full cost of service, and subsidizes distribution companies for the difference between the customer tariff and the tariff determined by NEPRA. The government has paid over PRs1.2 trillion in tariff differential subsidies since 2008. In FY2014, subsidies amounted to PRs309.0 billion, which is 1.15% of GDP—a substantial drop from over 2% in 2013. In FY2015, it was further reduced to 0.8% of GDP. The difference between the customer tariff and the cost-recovery tariff, costs not covered by the NEPRA tariff, and the delay in determining and applying the cost-recovery tariff, have caused (i) substantial payment arrears to fuel suppliers and generators, (ii) efficiency losses resulting from insufficient funds for maintenance and augmentation of system capacity, and (iii) concerns regarding the creditworthiness of private investors and their financiers.

8. Pakistan's natural gas reserves are diminishing and development of hydropower generation is slow, resulting in greater reliance on imported fuel oil for electricity generation.⁶

⁶ Hydropower's share declined from 72% in 1980 to 31% in 2014. The share of gas in the thermal generation fuel mix fell from 56% in 2006 to 39% in 2014, while heavy fuel oil increased from 42% to 60% during the same period.

This has increased power generation costs and worsened the power shortage, with the demand–supply gap reaching one-third of demand in 2014.

9. Industrial and large-volume retail customers, including power generators, subsidize gas prices for fertilizer producers and small and medium-sized volume retail customers. This cross-subsidization leads to uneconomic allocation and wastage of scarce resources. Gas tariffs for consumers are set on the basis of the average cost of gas production in the country, regulated transmission and distribution expenditures, and a return on assets for the two state-owned gas distribution companies.

10. Prices of petroleum products in Pakistan are market-based and linked to fluctuations in prices for petroleum products in the international market. However, except for fuel oil and high-speed diesel, petroleum product prices are determined by OGRA based on a fixed formula agreed between the government and marketing companies. Refineries are allowed to fix their ex-factory prices on the basis of import parity prices under a revenue protection regime. In 2011, the government deregulated the prices of motor fuels and jet fuels. As a result, refineries and oil marketing companies fix the prices of these products. The oil marketing companies are allowed to charge a distribution margin of 3.5% and a dealer's commission of 4.0% to protect their returns. The government controls the prices of these products through adjustment in the petroleum development levy charged in the end-user prices.

11. **Climate change.** Pakistan is vulnerable to the negative impacts of climate change. During 1995–2015, landslides and erosion resulted in the siltation of existing 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 grew by 105% from 156.87 million tons in 1990 to 320.02 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

12. In July 2013, the government approved the National Power Policy to support current and future energy needs. In the short term, the policy intends to establish (i) efficiency through a system-wide merit order (e.g., in fuel allocation, dispatch, payments, and the energy mix); (ii) transparency through the provision of seamless access to information via public websites; and (iii) accountability by (a) hiring professionals based on competency, (b) signing performance contracts, and (c) adopting a zero-tolerance approach to corruption and poor performance. Competition will be based on infrastructure development, up-front tariffs, competitive bidding, and key client management. Since its inception, NEPRA has made significant progress in providing investors the opportunity to create a competitive market and improve the efficiency of energy enterprises. Sustainability will be achieved through the use of low-cost energy, fair treatment of stakeholders, rationalization of tariffs, and demand management via pricing and regulatory instruments.

13. The emphasis in the medium term will be on the implementation of low-cost gas pipeline, coal, and hydropower projects. The long-term focus is on the completion of large hydropower projects, and the retirement of existing high-cost energy plants and contracts—ensuring more affordable electricity generation.

⁷ The values are 182.73 million tons in 1990 and 341.65 million tons in 2012, including land use change and forestry. World Resources Institute. CAIT Climate Data Explorer. <http://cait2.wri.org/wri/Country> (accessed 1 October 2015).

14. Under the Petroleum Exploration and Production Policy, 2012, the government enhanced the wellhead pricing terms for natural gas producers. The response from local companies have been positive, however, the response from foreign companies remained subdued. A tight gas policy for exploration and production was announced in May 2011. The policy gives a 40% premium over the respective price for each zone under the 2009 policy. Under the 18th Constitutional Amendment, 2010, provinces were awarded greater authority in the approval process for oil and gas sector affairs, which has delayed exploration in some cases. The Petroleum Rules 2013 have been modified to disburse the royalty share directly to the provinces instead of channeling it through the federal government, which was a long-standing provincial grievance.

15. The government is committed to lowering its emissions. In 2013, it requested Asian Development Bank (ADB) assistance to support the implementation of its national climate change policy, in particular the mitigation of climate change through a variety of control technologies such as the installation of emission analyzers and controls for the construction of new coal-fired power plants, assessment of the potential for carbon capture and sequestration, and the adoption of a waste recycling system.⁸ The government is also promoting the development of renewable energy sources, with several projects ongoing and in the pipeline. It has also taken steps to encourage responsible energy use and the adoption of energy-efficient measures by all consumers.

3. ADB Sector Experience and Assistance Program

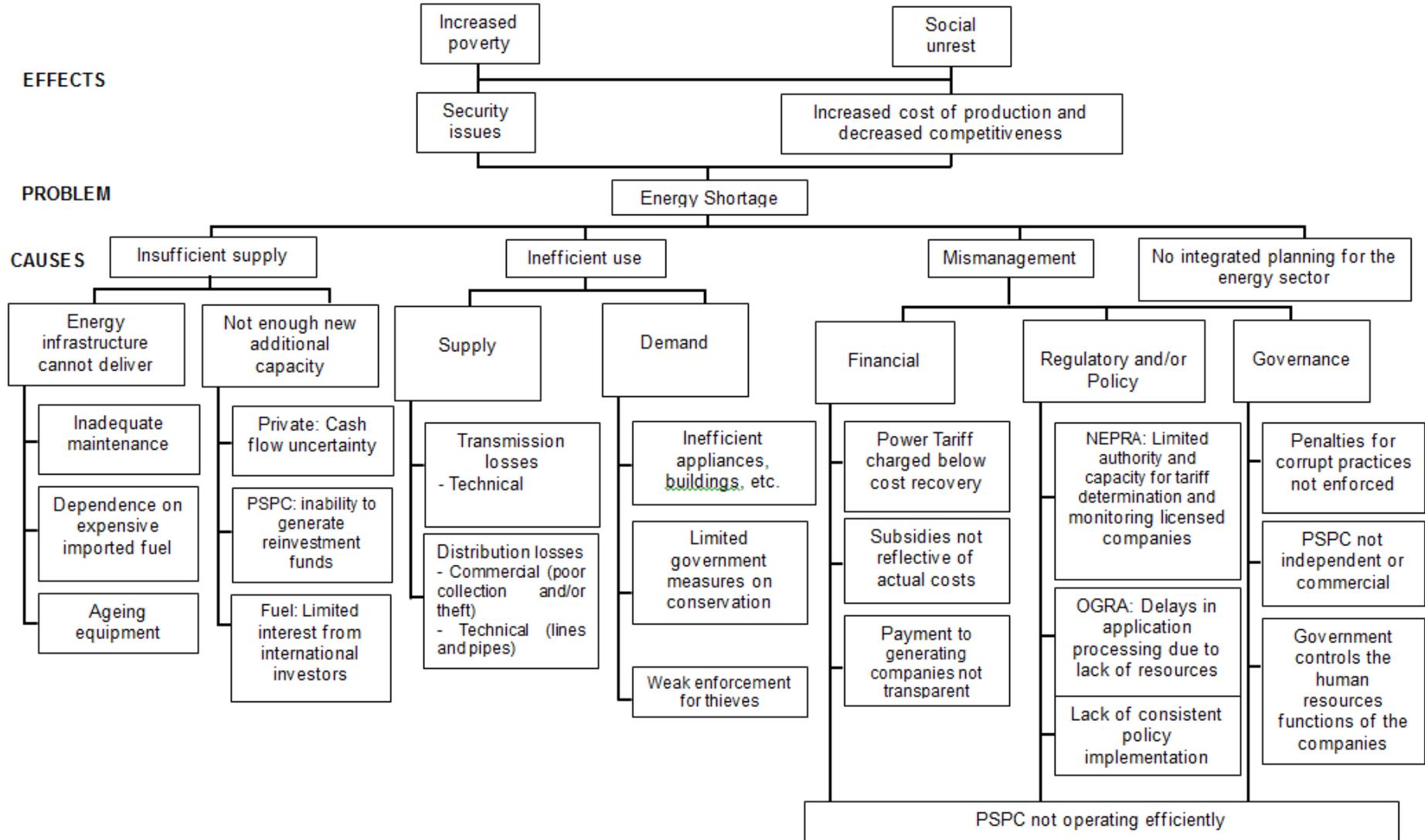
16. ADB has approved five multitranche financing facilities (MFFs) to finance energy efficiency, transmission, distribution, and renewable energy projects. Each MFF includes an Asian Development Fund loan that supports capacity development and performance improvement. In addition to the MFFs, ADB approved the Jamshoro Power Generation Project to finance a 660-megawatt supercritical coal-fired power plant. As the sector's largest development partner, ADB holds regular policy dialogues, and provides periodic sector assessments to the International Monetary Fund country reviews on request. The government and donors developed a framework for resolving the energy crisis through the Energy Sector Task Force of Friends of Democratic Pakistan in 2010, which formed the foundation for the National Power Policy, 2013. ADB approved the Sustainable Energy Sector Reform Program⁹ in April 2014 to support the reforms set out in the policy for the following 5 years.

17. ADB's energy sector operations will focus on reforms, energy efficiency, and increasing access to sustainable and affordable energy supply. Through the Sustainable Energy Sector Reform Program, ADB will support reforms to establish an enabling environment for private sector participation. Investments will be made in the transmission and distribution network to reduce technical losses and theft. The best source of low-cost energy in the long term is hydropower. Through private and public sector operations, ADB will work to leverage its interventions to bring much needed funds for developing these projects. ADB will continue to work with the government to increase gas supply through policy support and imports via the Turkmenistan–Afghanistan–Pakistan–India gas pipeline project, and other regional projects.

⁸ In February 2013, Pakistan launched its first National Climate Change Policy, which underscores the need to develop low-carbon technologies to reduce carbon intensity in agriculture, transport, and industry.

⁹ ADB. 2015. *Report and Recommendation of the President to the Board of Directors: Proposed Loan to the Government of Pakistan for the Sustainable Energy Sector Reform Program*. Manila.

Problem Tree for the Energy Sector



NEPRA = National Electric Power Regulatory Authority, OGRA = Oil and Gas Regulatory Authority, PSPC = public sector power company.

Sector Results Framework (Energy, 2015–2019)

5

Country Sector Outcomes		Country Sector Outputs		ADB Sector Operations	
Outcomes with ADB Contribution	Indicators with Targets and Baselines	Outputs with ADB Contribution	Indicators with Incremental Targets	Planned and Ongoing ADB Interventions	Main Outputs Expected from ADB Interventions
Reliable and affordable energy services through the development of indigenous energy resources (hydropower, renewable energy, coal, and gas) and strengthening transmission and distribution networks	<p>Access to energy^a increased Baseline: 68.6% of the population (2011) Target: 75% (2018)</p> <p>Load shedding reduced Baseline: 5,000 MW (2013) Target: 0 (2018)</p>	Increased efficiency, both technical and financial, of the power and natural gas systems	<p>6,035 km (500 kV and 220 kV) of transmission lines installed by 2018 from 14,135 km (2013)</p> <p>8,735 km (132 kV) of transmission line added by 2018, from 27,890 km in 2013</p> <p>70,888 km of distribution lines installed by 2018 from 37,203 km in 2013</p> <p>Average electricity cost reduced from \$0.12 (2013) to \$0.10 per kWh (2018)</p> <p>Collections increased from 85% (2013) to 95% (2018)</p> <p>Power distribution and transmission losses reduced from 23% (2013) to 16% (2018)</p>	<p>Planned key activity areas Clean energy, including hydropower Electric power transmission and distribution, and energy efficiency Policy reforms</p> <p>Pipeline projects with estimated amounts Sustainable Energy Reform Program II, III, IV (\$800.0 million) MFF Second Power Distribution Enhancement Investment Program, Tranche 1 (\$400.0 million) MFF Second Power Distribution Enhancement Investment Program, Tranche 2 (\$150.0 million) MFF Power Transmission Enhancement Investment Program II, Tranches 1 and 2 (\$200.0 million) MFF National Grid Connectivity/Hydro, Tranche 1 (\$220.0 million) MFF National Grid Connectivity/Hydro, Tranche 2 (\$150.0 million)^b MFF Power Distribution Enhancement Investment Program II, Tranche 3 (\$200.0 million)^b</p> <p>Ongoing projects with approved amounts MFF tranches for renewable energy, power distribution, power transmission, and energy efficiency (\$1,380.0 million) Jamshoro Power Generation Project (\$900.0 million)</p>	<p>Planned key activity areas Hydropower and other power generation Energy efficiency and strengthening of transmission and distribution Enhanced enabling environment for private sector investment in the energy sector, with reforms of policy and regulations</p> <p>Pipeline projects 600 MW of hydro and other power installed and/or upgraded 1,300 km of transmission lines installed</p> <p>Ongoing projects Five small hydropower projects being installed 1,634 km (500 kV and 220 kV) of transmission lines being installed and/or upgraded 1,577 km of distribution and transmission lines being installed and/or upgraded 30 million fluorescent lamps distributed 600 MW supercritical coal-fired power generation unit constructed</p>

ADB = Asian Development Bank, km = kilometer, kV = kilovolt, kWh = kilowatt-hour, MFF = multitranche financing facility, MW = megawatt.

^a Defined as households with reliable and affordable access to a minimum level of electricity consumption and clean cooking facilities. International Energy Agency. 2014. *World Energy Outlook: Methodology for Energy Access Analysis*. Paris. http://www.worldenergyoutlook.org/media/weowebiste/EnergyAccess_Methodology_2014.pdf

^b 2017 standby project.

Source: Asian Development Bank.