

SECTOR ASSESSMENT (SUMMARY): ENERGY¹

1. Sector Performance, Problems, and Opportunities

1. **Energy sector performance.** Myanmar has abundant energy resources, particularly hydropower and natural gas. Its hydropower potential is estimated to be more than 10,000 megawatts (MW). Natural gas plays an important role in earning foreign revenues from exports and is also a source for domestic power generation. Access to energy is a basic human need and a requirement for socioeconomic development.

2. However, the energy sector in Myanmar is underdeveloped because it lacks financial and technical capacity and investments. Inadequate electricity supply has emerged as one of the most serious infrastructure constraints on the country's sustainable economic growth. Myanmar has one of the lowest per capita electricity consumption rates in the world—263 kilowatt-hours (kWh) per person in 2016, one-tenth of the world average of 3,000 kWh. The country's electrification rate was 35% in 2016. Compared with the size of its population and economy, Myanmar's consumption level of modern energy resources is low. The low use of, limited availability of, and poor access to electric power are obstacles to improving living standards and expanding industrial activities.

3. **Gas, oil, and coal.** Myanmar has proven gas reserves of 10 trillion cubic feet and proven oil reserves of 135 million barrels. Oil consumption exceeds oil production, refinery capacity is inadequate, and imports of petroleum products (particularly gasoline and diesel) have been rising. The country's 33 major identified coal deposits have estimated reserves of 489 million tons.

4. **Power sector overview.** In 2017, Myanmar's total installed electricity generation capacity was 5,409 MW, including 3,221 MW from hydropower, 1,967 MW from gas, 120 MW from coal, about 100 MW from diesel, and 5 MW from renewable energy sources. The low efficiency of the aging power system and the high reliance on hydropower has led to frequent power black-outs, particularly during the dry season. For example, the power demand in dry season is expected to be 3,587 MW in 2018, exceeding the available generating capacity of 3,100 MW by almost 500 MW. Total electricity consumption was 17,116 gigawatt-hours in 2017, of which the city of Yangon accounted for about half. Consumption grew at an annual rate of 11%–12% since 2015.

5. **Generation system.** To meet the fast-growing future demand, the government will expand the generating system to reach about 23,600 MW in 2030. The 2030's generation mix will consist of 66% hydropower, 17% natural gas, 10% coal, and 7% renewable energies such as solar and wind. This plan faces obstacles, including the environmental impact and large up-front cost of large hydropower developments and the limited domestic availability of natural gas and the proper quality of coal.

6. **Transmission system.** The country's transmission system comprises a network of 66 kilovolt (kV), 132 kV, and 230 kV transmission lines totaling 10,058 kilometers (km). It includes (i) 44 230 kV lines totaling 3,979 km, (ii) 41 132 kV lines covering 2,334 km, (iii) 100 66 kV lines totaling 3,729 km, and (iv) 69 substations. Most of these lines run from the north, where most of the country's hydropower plants are located, to the Yangon area. New 500 kV transmission lines

¹ This summary is based on Myanmar: Energy Assessment, Strategy, and Road Map (ADB. 2016. *Myanmar: Energy Assessment, Strategy, and Road Map*. Manila. <https://www.adb.org/documents/myanmar-energy-assessment-strategy-road-map>.)

are being developed to create a transmission backbone connecting the northern generation centers to the major load centers in the South.

7. **Distribution system.** The distribution system comprises a network of 33 kV, 11 kV, and 6.6 kV lines and substations. Most of distribution facilities are outdated and inadequate for current loads. Many conductors are not insulated and vulnerable to external accidents that can cause power outages that last from a few minutes to a few hours. The system lacks automation and communications equipment, and mostly are operated manually. To improve efficiency and reduce losses, the government is phasing out 6.6 kV networks, upgrading them to 11 kV networks, and expanding the 33 kV networks.

8. **Electricity tariff.** The government increased tariffs twice in 2013 (30% increase) and in 2015 (40% increase). However, Myanmar's electricity tariff remains below the actual cost of supply. In 2016, for example, the average supply cost was MK92 per kWh, well above the average retail tariff of MK71 per kWh. The government plans to implement measures to make tariffs cost-reflective. Rates are MK35–MK50 for residential consumers and MK100–MK150 for industrial and business consumers, depending on consumption.

9. **National electrification.** Only 35% of Myanmar's people had access to electricity in 2016. The regions and states with highest electrification rates were Yangon (78%), Nay Pyi Taw (65%), Kayah (46%), and Mandalay (40%). The lowest rates were in Tanintharyi (9%), Rakhine (13%), Ayeyarwady (14%) and Kayin (16%). The government, which considers the low electrification rate in rural areas a priority concern, aims to electrify the whole country by 2030.

2. Government's Sector Strategy

10. **Energy sector policy framework.** The Asian Development Bank (ADB) and other development partners have been helping the government update the energy policy framework since 2012. These efforts have focused on formulating (i) an energy sector policy, (ii) an energy sector master plan, (iii) an electricity law, (iv) a national electrification plan, and (v) a national electricity master plan. Myanmar's President approved the energy sector policy in March 2014, and the new electricity law was promulgated in 2014. The law envisages the establishment of an electricity regulatory committee to prepare rules and regulations for the power industry. The Ministry of Electricity and Energy (MOEE) is updating the National Power Master Plan and the National Electrification Plan.

11. **Sector problems and challenges.** Myanmar needs to reform the governance structure and institutional arrangements in the sector to improve business performance. The energy enterprises responsible for business operations remain operational departments under the ministries and are not financially autonomous. For example, the Department of Power Transmission and System Control (DPTSC), which oversees power transmission, is a department under MOEE. It receives a government budget allocation for its investment and operations and turns over its income and revenues to the MOEE. In addition, the sector is not able to mobilize the capital required for the investments prescribed by the government's ambitious energy plan. The energy enterprises cannot access commercial financing resources because they are not financially autonomous. Further, the sector lacks human resources and technical capacity. Technical training and education in the electrical and resource engineering fields are in short supply in Myanmar, and the research and statistical capacities needed to plan and implement investments are generally weak.

3. ADB Sector Experience and Assistance Program

12. **ADB's sector experiences.** ADB has been a lead development partner in Myanmar's energy sector since it reengaged with the country in early 2012, particularly in helping to strengthen government capacity and improve sector policies, strategies, plans, and laws through technical assistance (TA) and policy dialogue. ADB has provided TA and grants in areas including (i) developing capacity and institutions; (ii) developing policies, strategies, master plans, and legal and regulatory frameworks; (iii) demonstrating off-grid renewable energy use in Chin, Kayah, and Rakhine states; (iv) assessing financial management in the energy sector; (v) strengthening the country's safeguard system; and (vi) developing a public–private partnership framework.² Since 2013, ADB approved two public sector loans. The first loan for \$60 million was to help the government rehabilitate the distribution network in five townships in Yangon region, four districts in Mandalay region, five districts in Sagaing region, and two townships in Magway region. The other loan for \$80 million was to help strengthen the 230 kV transmission lines and substations in Yangon. ADB also provided a nonsovereign loan and guarantee for a combined-cycle power plant.³

13. **ADB's sector assistance strategy.** The government completed the energy sector master plan in 2015 with ADB support. The national electricity master plan (completed with support by Japan International Cooperation Agency) and the national electrification plan (supported by the World Bank) set clear directions and strategies to develop energy resources sustainably, expand energy infrastructure economically, and provide reliable services for domestic consumption and export. ADB is playing a key role in facilitating the dialogue between the Ministry of Electricity and Energy and the development partners to align partner assistance with the government priorities through the Sector Coordination Group. ADB foresees a need for greatly increasing assistance for power sector development (paras. 16–18).

14. **Energy infrastructure rehabilitation and expansion.** Myanmar needs to accelerate the rehabilitation and expansion of all generation, transmission, and distribution facilities to meet the government's 100% electrification target in 2030. ADB will mobilize financial resources for investment projects identified in the master plans that involve (i) transmission and distribution rehabilitation and expansion and (ii) electrification in poor rural areas. ADB will provide investment and TA from its sovereign lending resources to MOEE as well as assistance from its nonsovereign resources to support private sector investments.

15. **Sector governance and management improvement.** The governance and management structure of the energy sector, involving MOEE, the Ministry of Industry, and the Department of Rural Development, needs reform to clearly separate the mandates of policy development, rule-making and enforcement, and business operations. ADB will continue to help

² ADB. 2012. *Technical Assistance to the Republic of the Union of Myanmar for Capacity Development and Institutional Support*. Manila (TA 8244-MYA); ADB. 2013. *Technical Assistance to the Republic of the Union of Myanmar for Enhancing the Power Sector's Legal and Regulatory Framework*. Manila (TA 8469-MYA); ADB. 2013. *Technical Assistance to the Republic of the Union of Myanmar for Financial Management Assessment of Energy Sector*. Manila (TA 8216-MYA); ADB. 2014. *Technical Assistance to the Republic of the Union of Myanmar for Support for Public–Private Partnership Framework Development*. Manila (TA 8624-MYA); and ADB. 2014. *Technical Assistance for Off-Grid Renewable Energy Demonstration Project*. Manila (TA 8657-MYA).

³ ADB. 2013. *Report and Recommendation of the President to the Board of Directors: Proposed Loan to the Republic of the Union of Myanmar for the Power Distribution Improvement Project*. Manila (Loan 3084-MYA [SF]); ADB. 2015. *Report and Recommendation of the President to the Board of Directors: Proposed Loan to the Republic of the Union of Myanmar for the Power Transmission Improvement Project*. Manila (Loan 3330-MYA). ADB. 2015. *Report and Recommendation of the President to the Board of Directors: Proposed Loans and Guarantee for the Myingyan Natural Gas Power Project*. Manila (Loan 3359-MYA).

the government corporatize ministry-owned energy enterprises when needed and improve their efficiency and operational capacity.

16. **Capacity development and institutional support.** The government's capacity needs to be improved if it is to carry out its new policies and master plans successfully. ADB will continue to help enhance government institutions and build their abilities in (i) the development and implementation of policies, plans, and laws; (ii) research and statistical, technical, and engineering work; (iii) financial management and economic evaluation; (iv) public–private partnership management; and (v) environmental impact assessment and social impact assessment to ensure that energy resources are developed sustainably.

17. Because support from development partners and the private sector in power generation is substantial, ADB's sovereign operations will focus on power network expansion and increasing electrification through a long-term programmatic approach. ADB's nonsovereign operations will explore opportunities to support private sector power generation initiatives.

18. ADB's program to support Myanmar's power subsector is planned for 2017–2021, based on the country partnership strategy⁴ the government and ADB agreed upon in 2017. The program will build on ADB's existing portfolio, concentrating on the expansion and strengthening of transmission and distribution infrastructure. It will also address the strong need for rural electrification by helping to expand the grid and off–grid power supply in areas where renewable energy sources can be developed. Cross-border power transmission projects will be considered under Greater Mekong Subregion initiatives and plans and activities of the Association of Southeast Asian Nations. ADB's Private Sector Operations Department is exploring with other private investors opportunities to assist in power generation projects—particularly gas-fired and liquefied natural gas-fired power generation—and renewable energy such as solar-based or hydro-based generation facilities. To help the government mitigate the challenge of financing, ADB is assisting in operationalizing the public-private investment partnership led by the Office of Private Public Partnership. ADB will align its assistance with the priorities the government has set in its energy plans and others it may identify under policies it is preparing.

⁴ ADB. 2017. *Country Partnership Strategy: Myanmar, 2017-2021—Building the Foundations for Inclusive Growth*. Manila.

Problem Tree for Energy Sector

