

SECTOR OVERVIEW

A. Background

1. Since the restoration of independence from the former Soviet Union in 1991, Armenia has undertaken numerous reforms to strengthen its economy, especially in the energy sector. In the mid-1990s the sector was in a critical state, with electricity available for only a limited number of hours per day. Armenia's energy sector is now largely characterized by affordable, reliable electricity service, with 100% access to electricity 24 hours per day. (Confidential information redacted.) However, although the performance of the energy sector has improved, energy security remains a priority for Armenia. With no fossil fuel reserves, the country is dependent on natural gas and oil imports from the Russian Federation (via Georgia) and Iran. Despite improved access to electricity, Armenia's electricity generation, transmission, and distribution assets are in poor condition and require rehabilitating and upgrading. The key priorities of the Asian Development Bank (ADB) for the country are diversifying energy sources, upgrading the electricity distribution network, and supporting cross-border power interconnections.¹

2. **Sector structure.** The power system of Armenia is unbundled but tightly regulated. The sector has been partially privatized and operates as a "single buyer" model, where the privately owned Electric Networks of Armenia (ENA) Closed Joint-Stock Company (CJSC) has rights to buy electricity from generators at regulated tariffs and exclusively distribute electricity to consumers. ENA also owns and operates all distribution assets in Armenia.

3. The Ministry of Territorial Administration and Infrastructure (MTAI) is the primary body responsible for formulating and implementing energy sector policy, including developing strategies for renewable energy sources such as wind, solar, and geothermal. The state-owned High Voltage Electricity Network CJSC owns all high voltage transmission assets in the country,² and is responsible for the transmission of power from those assets, including cross-border transmissions. The state-owned company Electro Power System Operator CJSC is responsible for system operations, control, and centralized dispatch.³ As part of electricity market liberalization efforts, the Settlement Center CJSC, a state-owned company that was historically responsible for overseeing the operational and process interaction of the power system and dispatch control, has transformed into the Electricity Market Operator. The Electricity Market Operator handles electronic communications and trades across Armenia's electricity market.⁴

4. The Public Services Regulatory Commission (PSRC) performs regulatory operations for the energy sector, including regulating tariffs; overseeing service quality, licensing, and compliance with licensee obligations; mediating disputes between licensees and customers; defining electricity market rules; and setting, monitoring, and enforcing quality standards. The PSRC is ENA's regulator, regulating its tariffs and setting orders for its investment programs.

5. **Electricity generation.** Power generation in Armenia has dropped substantially since its peak in 1988, but most of the generation assets that were in use then are still operating today. More than two-thirds of the existing electricity generation capacity and distribution system has been fully depreciated. Although investments have been made to maintain these assets,

¹ ADB. 2019. *Country Partnership Strategy: Armenia, 2019–2023*. Manila.

² International Energy Agency. 2015. *Eastern Europe, Caucasus and Central Asia: Energy Policies beyond IEA Countries*. Paris.

³ United States Agency for International Development. 2016. *Armenia Gap Analysis with List of Market Challenges and Legal Barriers*. Washington, D.C.

⁴ International Trade Administration. 2020. *Armenia—Country Commercial Guide*. Washington, D.C.

substantial additional capital expenditures are needed to renovate and upgrade the entire energy system.⁵ In 2018, ADB funded the construction a private power plant with an installed capacity of 250 megawatts (MW) that utilizes natural gas as fuel, which is expected to be operational in 2022. Armenia has no fossil fuel reserves and relies on gas imports from the Russian Federation and Iran, and nuclear fuel imports from the Russian Federation; together these provide fuel for about 66% of Armenia's electricity.

6. Several thermal power plants have been mothballed and one of the two reactors at the Metsamor Nuclear Power Plant (MNPP) has been shut down; MNPP has an installed capacity of 407 MW and continues to generate baseload electricity. The plant was scheduled for retirement in 2016; however, because of insufficient replacement capacity, it was decided to maintain operation of one of its reactors until 2026. Construction of a new 1,000 MW nuclear power plant to replace MNPP has been under discussion for some time,⁶ but the details have not yet been finalized. When MNPP is offline for maintenance, thermal power plants (e.g., the Hrazdan and Vorotan hydropower plants) cover peak periods and baseload demand.

7. Hydropower from the Hrazdan River and other small hydropower plants with a combined installed capacity of about 1,264 MW, supply stable baseload power to Armenia; the country also has 3 MW of generation capacity from wind energy, with an additional 4 MW under construction. The economically viable wind power potential is estimated at 500 MW.⁷

8. Small solar power plants with a capacity of up to 500 kilowatts (50 MW of total installed capacity combined) are connected to the network. The Masrik-1 utility-scale solar photovoltaic power plant with 55 MW of installed capacity is scheduled to be operational by July 2022. The Ayg-1 photovoltaic solar power plant with installed capacity of 200 MW is scheduled to be operational by the end of 2023. The Ayg-2 photovoltaic solar power plant with installed capacity of 200 MW, and five solar photovoltaic power plants with total installed capacity of about 120 MW are planned to be operational by the end of 2024 (footnote 7).

9. The power operation mix in Armenia as of 2020 is in the table below:

Installed Operating Capacity and Ownership Structure		
Generation Capacity by Type	Ownership	MW
Hrazdan	Tashir Capital	410
Hrazdan – Unit 5	CJSC Gazprom Armenia	467
Yerevan TPP CJSC	MTAI	229
Total Thermal Power Plants		1,106
IEC (Sevan–Hrazdan Cascade)	Hrazdan Energy Company	561
Vorotan	Contour Global USA	404
Small Renewable Power Plants	Private	400
Total Renewable Power Plants		1,365
Metsamor Unit 2	MTAI	408
Total Nuclear		408
TOTAL		2,879

CJSC = Closed Joint-Stock Company, IEC = International Energy Corporation, MTAI = Ministry of Territorial Administration and Infrastructure, MW = megawatt, TPP = thermal power plant.

Source: Republic of Armenia Energy Sector Development Strategic Program to 2040.

⁵ Armenia Renewable Resources and Energy Efficiency Fund. 2011. *Renewable Energy Roadmap for Armenia*. Yerevan.

⁶ World Nuclear Association. [Nuclear Power in Armenia](#).

⁷ Ministry of Territorial Administration and Infrastructure. 2021. [Republic of Armenia Energy Sector Development Strategic Program to 2040](#). Yerevan.

10. **Electricity supply and demand.** Armenia is a net exporter of energy, having sufficient electricity generating capacity to meet domestic needs. The total operating capacity of all generation units is about 2,879 MW. Peak electricity demand is about 1,300 MW and is observed during winter, from November through February. Summer peak demand is about 1,040 MW (footnote 6). There are no seasonal deficits. Household demand accounts for about 35% of total annual consumption; large customers (i.e., industry, transport, water supply, and irrigation) make up 30%; and public and small to medium-sized businesses make up the remaining 35%. End-user tariffs are differentiated by voltage levels for daytime and nighttime tariffs. (Confidential information redacted.)

11. **Distribution.** ENA's distribution network combines 31,980 kilometers (km) of overhead distribution lines and underground cables at 110-kilovolt (kV), 35 kV, 10 kV, 6 kV, and 0.4 kV. There is almost 100% access to the grid. ENA serves about 1 million customers. Distribution system losses are below 8%. The total number of electronic meters installed in ENA's network as of March 2020 was about 530,000, of which 315,000 were already connected to the Automated System of Commercial Metering of Electricity, with the rest in the process of being connected. (Confidential information redacted.)

12. **Transmission.** High Voltage Electricity Network CJSC's transmission system is well developed and consists of 13 220 kV substations, two 110 kV substations, and one switching point on the border with Iran; in addition, it operates 1,960 km of electrical transmission lines with 5,600 towers. Five substations of 220 kV have been completely reconstructed. An additional five substations are under reconstruction, with financing provided by different international organizations. Investments aimed at system automation in the high-voltage electric network are being conducted. A supervisory control and data acquisition (SCADA) automated control system, to be operated by Electro Power System Operator CJSC, will be installed by 2023, which will ensure a new level of dispatch (footnote 7). (Confidential information redacted.)

13. **Interconnections.** Armenia's power grid is interconnected with its neighbors in the Caucasus region, including 220 kV connections with Georgia and Iran.⁸ Armenia and Iran have built an additional 400 kV power transmission line connecting the two countries' power grids. Cross-border trading in Armenia is organized between the Iran–Armenian interconnection and the Georgian–Armenian interconnection. The Iran–Armenian interconnection plays an important role in electricity transit in the so-called North–South corridor systems. (Confidential information redacted.)

14. **Sector challenges and opportunities.** The key challenges in Armenia's energy sector are a lack of domestic fuel; poor use of renewable energy resources; low efficiency of thermal power plants; and high operation and maintenance costs and low reliability of big hydropower plants. The electricity generation, transmission, and distribution assets are outdated and in poor condition; they have deteriorated because of insufficient funding resulting from the state's limited ability to borrow. Energy security and reliability are a concern because Armenia is heavily dependent on fuel imports from neighboring countries (footnote 8).

15. Armenia must continue to focus on diversification of energy sources to increase its energy independence and security. Enhancement of transmission infrastructure and expansion of cross-border interconnections with neighboring countries are its main priorities. Furthermore, by

⁸ Energy Charter Secretariat. 2016. [The Role of the Energy Charter in Promoting Electricity Cooperation in the South Caucasus](#). Brussels.

rehabilitating, upgrading, or replacing its electricity generation, transmission, and distribution assets, Armenia can benefit from efficiency gains across its energy supply chain.

B. Policy and Regulatory Framework

16. **Oversight and regulatory bodies.** MTAI governs the energy sector (para. 3), including the development of renewable energy sources and formulation of maintenance and safety requirements for energy infrastructure. PSRC is an independent regulatory body established in 1997 that regulates licensing, tariffs, and service standards, and establishes the market rules and contractual provisions for power sector companies. The State Nuclear Safety Regulatory Commission is the regulator for nuclear energy. The Renewable Resources and Energy Efficiency (R2E2) Fund is responsible for implementing renewable energy projects.⁹

17. **Key legislation and policies.** The main legislation governing Armenia's energy sector is the Energy Law of Armenia (2001), which contains provisions for the structure and role of sector participants, and rules that govern these participants and their ownership.

18. The Energy Law was modified in 2013 to improve licensing and administrative requirements for captive generation and small solar power plants. In 2018, it was modified again to define the framework of Armenia's market liberalization strategy. As a result, the functions of the distributor, supplier of energy, and guaranteed supplier of energy (that is, the supplier of last resort) were redefined as categories of licensed entities separate from the distributor. The role of the distributor is to distribute electricity; in essence, its tasks involve planning, operation, maintenance, and any other services (e.g., connection of new users) related to the distribution network. The universal supplier is, in essence, a retailer that buys electricity from the wholesale electricity market and resells to its customers.

C. ADB Sector Experience and Assistance Program

19. ADB has been active in Armenia's energy sector since 2006. In April 2013, ADB approved a nonsovereign loan of \$25 million to rehabilitate a hydropower plant.¹⁰ In July 2014, ADB approved a \$37 million sovereign loan to rehabilitate substations and expand a SCADA and energy management system.¹¹ In November 2016, ADB approved a sovereign loan of \$90 million to support reforms to improve infrastructure operation and promote sustainability in the power sector.¹² In June 2017, ADB approved a nonsovereign loan of \$80 million to ENA for rehabilitation of the distribution network.¹³ In March 2018, ADB approved a nonsovereign loan of \$68.4 million to construct and operate a combined cycle thermal power plant.¹⁴ In May 2020, ADB approved the second nonsovereign loan to ENA for a working capital support facility to ensure vital supplies

⁹ R2E2 Fund projects include wind, solar, geothermal, and biomass sources but, not hydro or nuclear sources.

¹⁰ ADB. 2013. *Report and Recommendation of the President to the Board of Directors: Proposed Loan to the International Energy Corporation for the Sevan–Hrazdan Cascade Hydropower System Rehabilitation Project in Armenia*. Manila.

¹¹ ADB. 2014. *Report and Recommendation of the President to the Board of Directors: Proposed Loan to Armenia for the Power Transmission Rehabilitation Project in Armenia*. Manila.

¹² ADB. 2016. *Report and Recommendation of the President to the Board of Directors: Proposed Loan to Armenia for the Infrastructure Sustainability Support Program (Phase 2) in Armenia*. Manila.

¹³ ADB. 2016. *Report and Recommendation of the President to the Board of Directors: Proposed Loan to Electric Networks of Armenia CJSC for the Distribution Network Rehabilitation, Efficiency Improvement, and Augmentation Project in Armenia*. Manila.

¹⁴ ADB. 2018. *Report and Recommendation of the President to the Board of Directors: Proposed Loan to ArmPower CJSC for the Yerevan Gas-Fired Combined-Cycle Power Project in Armenia*. Manila.

of energy as the country was managing the impact of the novel coronavirus disease (COVID-19) pandemic.¹⁵

20. The ADB country partnership strategy, 2019–2023 for Armenia (footnote 1) supports diversified growth and inclusiveness in the energy sector with sovereign and nonsovereign financing in priority infrastructure investments. The strategy calls for developing Armenia's renewable energy sector and tapping the country's potential for solar and wind projects through private sector investment. Energy efficiency improvements also remain a key priority through public and private sector investments in generation, transmission, and distribution assets.

¹⁵ ADB. 2020. *Report and Recommendation of the President to the Board of Directors: Proposed Loan to Electric Networks of Armenia CJSC for the COVID-19 Working Capital Support Project*. Manila.