



Extended Annual Review Report

Project Number: 46941-014
Loan Number: 2996
November 2020

International Energy Corporation Sevan–Hrazdan Cascade Hydropower System Rehabilitation Project (Armenia)

This is an abbreviated version of the document, which excludes information that is subject to exceptions to disclosure set forth in ADB's Access to Information Policy.

Asian Development Bank

CURRENCY EQUIVALENTS

Currency unit	–	dram (AMD)		
			At Appraisal	At Project Completion
			(3 April 2013)	(5 March 2020)
AMD1.00	–	\$0.00239	\$0.00239	\$0.00209
\$1.00	–	AMD418	AMD418	AMD479

ABBREVIATIONS

ADB	–	Asian Development Bank
CJSC	–	common joint stock company
COVID-19	–	coronavirus disease
DEG	–	Deutsche Investitions- und Entwicklungsgesellschaft mbH (German Investment and Development Corporation)
DMF	–	design and monitoring framework
EBRD	–	European Bank for Reconstruction and Development
EIA	–	environmental impact assessment
ENA	–	Electric Networks of Armenia
EROIC	–	economic return on invested capital
ESIA	–	environmental and social impact assessment
ESMS	–	environmental and social management system
FMO	–	Nederlandse Financierings-Maatschappij voor Ontwikkelingslanden NV (Netherlands Development Finance Company)
GRM	–	grievance redress mechanism
GWh	–	gigawatt-hour
IEC	–	International Energy Corporation
kWh	–	kilowatt-hour
MW	–	megawatt
O&M	–	operation and maintenance
PIP	–	project implementation plan
PSRC	–	Public Services Regulatory Commission
ROIC	–	return on invested capital
SEP	–	stakeholder engagement plan
WACC	–	weighted average cost of capital

GLOSSARY

GWh	–	gigawatt-hour = 1,000,000 kilowatt-hours
MW	–	megawatt = 1,000,000 watts
kWh	–	kilowatt-hour = 1,000 watt-hours

NOTES

- (i) The fiscal year (FY) of the International Energy Corporation ends on 31 December. “FY” before a calendar year denotes the year in which the fiscal year ends, e.g., FY2019 ends on 31 December 2019.
- (ii) In this report, "\$" refers to United States dollars.

Vice-President	Ashok Lavasa, Private Sector Operations and Public–Private Partnerships
Director General	Michael Barrow, Private Sector Operations Department (PSOD)
Director	Maria Eufemia V. Apilado, Portfolio Management Division (PSPM), PSOD
Team leader	Ozden Onturk, Young Professional, PSPM, PSOD
Team members	Aida Khalil Gomez, Senior Safeguard Specialist, Private Sector Transaction Support Division (PSTS), PSOD
	Stefan Hruschka, Unit Head, Project Administration, PSPM, PSOD
	Manfred Kiefer, Senior Economist, PSTS, PSOD
	Sergey Mokrousov, Investment Specialist, PSOD
	Rhea Branzuela Reburiano-Javier, Social Development Officer, PSTS, PSOD

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BASIC DATA
Sevan–Hrazdan Cascade Hydropower System Rehabilitation Project
(Loan Number 2996 – Armenia)

Key Dates	Expected	Actual
Concept Clearance Approval		22 October 2012
Board Approval		3 April 2013
Financial Agreements (date of signing of the Loan Agreement/Subscription Agreement/Guarantee Agreement)	30 June 2013	15 May 2013
First Disbursement		12 July 2013
Final Disbursement		17 December 2014
Project Completion Date	December 2017	December 2018
Maturity (for loans) or Expiration (for guarantees)	10 September 2027	10 March 2020

Project Administration and Monitoring	Dates
Due Diligence/Fact-Finding/Appraisal	May 2012
Project Administration	24–25 March 2014 25–27 May 2015 March 2017 20 April–2 May 2019
Extended Annual Review Report Mission	N/A
Others	N/A

EXECUTIVE SUMMARY

In April 2013, the Board of Directors of the Asian Development Bank (ADB) approved a \$25 million loan to the International Energy Corporation (IEC) in Armenia. The loan was intended for financing the rehabilitation and modernization of the Sevan–Hrazdan Cascade Hydropower System, including four hydropower plants, the diversion channels for three plants, and electrical equipment replacement in all plants.

Built during 1930–1965, the system comprised seven hydroelectric power plants located on the Hrazdan River and supplied about 10% of the country's electricity, utilizing the natural flow of the river and water release from Lake Sevan, which also supplies irrigation for agricultural land and industrial water for the region.

Rehabilitation and restoration was completed in 2018. The original loan was intended to be repaid from 2017 to 2027. However, in March 2020, RusHydro, which owned 90% of the IEC, sold its stake to Tashir Group, which prepaid the remaining principal and interest payments as part of the conditions for the sale in March 2020.

The project has been evaluated for its (i) development results, (ii) ADB additionality, (iii) ADB investment profitability, and (iv) ADB work quality. The project's development results have been rated *satisfactory* based on its (i) contributions to private sector development and ADB strategic development objectives; (ii) economic performance; (iii) environmental, social, health and safety performance; and (iv) business success.

The project's contributions to private sector development and ADB strategic development objectives are rated *satisfactory*. The project restored 44.7 megawatts of the country's generation capacity, contributed to the modernization of its obsolete energy infrastructure, increased the use of renewable sources in its energy mix, and contributed to its energy security by utilizing local resources. The project also contributed to the local economy by creating new jobs and through local procurement and the payment of corporate taxes. With funding from ADB and the European Bank for Reconstruction and Development, the project also contributed to the development of an environmental and social management system for the IEC that did not exist before the investment.

The project's economic performance is rated *satisfactory*.

The project is rated *satisfactory* for environmental, social, health, and safety performance. The IEC prepared and adopted an environmental and social policy with procedures, programs, and plans to improve its environmental and social management system. Based on the review of safeguards monitoring reports and meetings with the company's environmental and social team, Deal Team concludes that there are no significant outstanding environmental and social safeguard compliance issues or claims.

The project is rated *satisfactory* for business success.

ADB's additionality is rated *satisfactory*. ADB's involvement in the project (i) facilitated the entry of the Tashir Group, a local private sector player with long-term interest in the Armenian energy sector; (ii) provided long-term debt that was not easily accessible in the local market; and (iii) fostered investor confidence in the country's hydropower sector.

The project is rated *satisfactory* for ADB's investment profitability.

ADB's work quality is rated *satisfactory*.

ADB's effectiveness in screening, appraisal, and structuring is rated *less than satisfactory*. The project was in line with ADB's Strategy 2020 and Energy Policy, and Armenia's Energy Development Strategy. However, even though the Deal Team identified the risks correctly at appraisal and defined appropriate design and monitoring framework (DMF) outputs for the project, it set very optimistic DMF targets. Consequently, the project failed partially to account for unmitigated risks, such as hydrology risk and foreign exchange risks, which resulted in only partial achievement of the project's DMF targets.

ADB's monitoring and supervision quality is rated *satisfactory*. Throughout the life of the project, ADB remained up to date and well informed on its progress and performance. In addition, ADB's involvement provided significant additionality as the monitoring team successfully facilitated the entry of the Tashir Group. The Tashir Group provided an unconditional and comprehensive guarantee over ADB's loan as part of the sales agreement.

Overall, the project is rated *successful*.

The project's main issues and lessons learned are (i) hydrology risk is very difficult to evaluate and the supply risk for similar hydroelectricity projects should be mitigated, (ii) reliance on past hydrology data while setting generation targets is insufficient and additional stress-testing with a more cautious approach may be necessary, and (iii) additional coverage for regulatory as well as political risks may be necessary for similar projects.

Possible follow-up actions would be to continue to monitor the Tashir Group's activities in the Armenian energy sector, as the group is interested in starting a win-win dialogue with the public sector and the state for energy sector investments.

I. THE PROJECT

A. Project Background

1. In April 2013, the Board of Directors of the Asian Development Bank (ADB) approved a \$25 million loan with a 14-year tenor to the International Energy Corporation (IEC) in Armenia.¹ The loan was intended for financing the rehabilitation and modernization of (i) four hydropower plants, (ii) the diversion channels for three plants, and (iii) associated electrical equipment replacement at the substations of the Sevan–Hrazdan Cascade Hydropower System in Armenia.

2. In 2013, Armenia's obsolete energy generation infrastructure hindered its energy security,² and its hydropower sector lacked adequate investment and long-term financing needed to meet international technical and environmental standards despite the country's favorable hydrology.³

3. The project was aligned with the government's Energy Strategy,⁴ aiming to increase the share of renewable energy generation and promote private sector investment in energy infrastructure. The project is also consistent with ADB's Strategy 2020, emphasizing investments in infrastructure in relation to environmentally sustainable growth with further emphasis on promoting private sector participation while highlighting ADB's operational emphasis on expanding the use of clean energy sources and reducing greenhouse gas emissions.⁵

B. Key Project Features

4. Built during 1930–1965, the Sevan–Hrazdan Cascade Hydropower System comprised seven hydroelectric power plants located on the Hrazdan River.⁶ The plants supplied about 10% of the country's electricity with 565 megawatt (MW) installed capacity. The system utilized the natural flow of the river and water release from Lake Sevan, which also supplies irrigation for agricultural land and industrial water for the region. The project proposed the rehabilitation and modernization of 44.7 MW capacity, as only 390.0 MW was operational at the time of the investment because of old equipment and lack of investment since the 1960s.

5. The remaining \$25 million of the \$50 million total debt was provided by the European Bank for Reconstruction and Development (EBRD) (Appendix 1). The loans had a 14-year door-to-door tenor, including a 4-year grace period. The long tenor and grace period reflected a longer payback period, allowing the project to overcome cash flow challenges during the rehabilitation phase.

¹ 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.

² At the time of the investment, Armenia imported 60% of its energy needs (footnote 1).

³ Armenia's energy strategy in 2005 aimed to increase renewable energy generation from 3,600 gigawatt-hours (GWh) to 5,100 GWh by 2025.

⁴ Government of Armenia. 2005. *Energy Sector Development Strategy in the Context of Economic Development in Armenia*. http://www.inogate.org/documents/AM_2005_06_23_Energy_Strategy_Eng.pdf

⁵ ADB. 2008. *Strategy 2020: The Long-Term Strategic Framework of the Asian Development Bank, 2008–2020*. Manila.

⁶ Sevan, Hrazdan, Argel, Arzni, Kanaker, Yerevan 1, and Yerevan 3.

6. Power offtake was secured through a power purchase agreement signed by the IEC with Electric Networks of Armenia (ENA), the country's sole electricity distributor.⁷ The tariff payable by ENA under the agreement was subject to yearly review and approval by the Public Services Regulatory Commission (PSRC).⁸ The tariff provided reflects the amount of capital expenditures and operation and maintenance (O&M) expenses along with a foreign currency adjustment, which partly mitigated the foreign currency risk the project was exposed to. Key cost items of the project included administrative and O&M costs, as O&M was not outsourced.

7. The IEC, one of the main producers of electricity in Armenia, owned and operated the system. In 2010, RusHydro, 60.6% of which is owned by the Russian Federation government, acquired 90.0% of the IEC and provided a comprehensive irrevocable guarantee for the ADB loan.⁹ RusHydro's ratings were upgraded to investment grade BBB– by S&P Global Ratings and Fitch Ratings in 2018, and investment grade Baa3 by Moody's Investors Service in 2019.

C. Progress Highlights

8. The project was signed in May 2013 and the loan was disbursed during July 2013–December 2014. Because of a modification in the project implementation plan (PIP) in 2014, the project was completed in December 2018, a year later than originally planned, restoring 44.7 MW of capacity.¹⁰

9. Lower than projected generation levels, AMD depreciation higher than projected inflation, procurement delays, and optimistic cost projections affected the IEC's debt service capacity.¹¹ Unfavorable hydrology and low rain levels, as well as strict water use regulations affected power generation. In February 2014, IEC modified the PIP because of increasing costs for the rehabilitation of Yerevan I Hydropower Plant, increasing total project costs by 12%. Furthermore, new water regulations in July 2017 limited the maximum amount of water that could be used from Lake Sevan and imposed fees on overuse.¹² Accordingly, the IEC has been in breach of the long-term debt-to-equity covenant during 2014–2019, as well as the debt service coverage ratio requirement in 2013, 2017, and 2019.¹³ However, due to sponsor's unconditional guarantee on the loan, the IEC's financial covenant breaches did not lead to events of default.

10. In March 2020, RusHydro sold the IEC to Hrazdan Power Company, a part of the Tashir Group. The remaining portion of ADB's loan was prepaid as a condition for the sale. The Tashir Group is one of Armenia and Russian Federation's leading private businesses, with presence in real estate, manufacturing, and energy. In addition to the IEC, its assets in Armenia's power sector include ENA, a power distribution company, and the Hrazdan Thermal Power Plant. The Tashir

⁷ ENA is an ADB client, with two current projects—one approved in 2017 and the other in 2020. ADB approved the most recent project as part of the Faster Approach to Small Nonsovereign Transactions framework to relieve the financial stress caused by the delayed payment of electricity bills as a result of coronavirus disease (COVID-19).

⁸ With the exception of 2012–2013, because of presidential elections. The debt service coverage ratio (DSCR) breach occurred with ratio at 0.9x in 2013 (threshold was 1.10x) as the tariff did not fully reflect in the investment costs.

⁹ RusHydro was rated below investment grade at BB+ (S&P and Fitch) and Ba1 (Moody's) at the time of the investment and was upgraded to investment grade BBB– (S&P and Fitch) in 2018 and Baa3 (Moody's) in 2019. With 38 gigawatts of installed electricity generation capacity, RusHydro is one of Russian Federation's largest power generating companies.

¹⁰ The original plan at the RRP stage was 2012–2017. The lenders' engineer, Stucky Limited, confirmed the completion in December 2018.

¹¹ The company incurred high foreign exchange losses in 2015 because of an AMD depreciation of about 15%.

¹² The new regulations (i) set the maximum quantity of water release from the lake at 270 million cubic meters and (ii) required the IEC to pay fees for any water use exceeding 170 million cubic meters.

¹³ The remedial plans of 2015 and 2019 proposed to modify the covenants, but negotiations were unsuccessful.

Group prepaid the remaining principal and interest payments as part of the conditions for the sale in March 2020. HSBC provided debt financing to refinance the ADB and EBRD loans.

II. EVALUATION

A. Project Rationale and Objectives

11. The project's objectives were, as stated in the RRP, (i) to restore 44.7 MW of the hydropower plants' capacity, (ii) improve the plants' reliability and safety standards, (iii) reduce the IEC's operational and maintenance expenses, (iv) reduce water leakage from the diversion channels, and (v) increase power generated by the system. The project's objectives were consistent with ADB's Strategy 2020, Armenia's Energy Sector Development Strategy, and ADB's Energy Policy.¹⁴

B. Development Results

1. Contributions to Private Sector Development and ADB Strategic Development Objectives

12. The project has been a good fit for ADB's Strategy 2020 and the government's Energy Sector Development Strategy, helping promote private sector investment in Armenia's power sector and energy infrastructure—at the time of the investment, 70% of the installed equipment in the hydropower plants had been in operation for more than 30 years (footnote 4).¹⁵ The project also supported increasing the use of renewable energy sources in Armenia's energy mix and the country's energy security by promoting indigenous energy sources, which is consistent with ADB's Energy Policy. Armenia's total hydro capacity in 2017 reached 1,324 MW in 2017, from 1,000 MW in 2005, making up 31% of total generation.¹⁶

13. The project restored 44.7 MW of generation capacity.¹⁷ The lenders' engineer report from December 2018 confirmed completion of the project based on the findings that (i) the rehabilitation works planned in phase 1 were completed step-by-step during 2014–2018 in accordance with the PIP, (ii) the power plants of the Sevan–Hrazdan Cascade are in operation, and (iii) as of December 2018, no major failures in operation have been reported by the company.¹⁸ Completion was achieved after a 1-year delay,¹⁹ which was caused by an increase in Yerevan 1 Hydropower

¹⁴ ADB. 2007. *Energy Policy*. Manila.

¹⁵ The system's operational capacity (only 390 MW of the 559 MW installed) accounted for 16% of Armenia's total operational capacity at the time of the investment (footnote 1).

¹⁶ As of the end of 2019, Armenia's electricity generation from hydro and renewable sources reached 2,332 GWh and 2,353 GWh, accounting for 31.9% and 32.2% of total generation, up from 1,500 GWh in 2005 (AESDS 2005) respectively. As of the end of 2019, Armenia's electricity generation from hydro sources reached 2,332 GWh, accounting for 31.9% of total generation while the generation from renewable sources reached 2,353 GWh, accounting for 32.2% of total generation—up from 1,500 GWh in 2005 (Armenia Energy Sector Development Strategy 2005).

¹⁷ This figure represented 1.4% of the country's total capacity at the time of the investment.

¹⁸ Most of the planned rehabilitation works on four power plants—Sevan, Hrazdan, Argel, and Arzni—in phase 1 were completed by the end of 2014. Delays of about 6–9 months were recorded on Sevan and Hrazdan hydropower plants (electrical works). A major delay (about 3 years) occurred in Yerevan 1 Hydropower Plant because of (i) the delay in procurement procedures (it took almost 1 year to select the best supplier) and (ii) technical difficulties during the installation and commissioning works.

¹⁹ The project's completion, scheduled for 2017, was delayed until 2018 because of the modification to the PIP as a result of changes in Yerevan 1 Hydropower Plant's total costs and procurement procedures. ADB and the Public Services Regulatory Commission approved the changes.

Plant's costs and problems in procurement procedures.²⁰ Given the system's old age, the restoration of capacity was in itself a significant achievement, which had a proof-of-concept effect that was followed by the investment into the Vorotan Cascade rehabilitation project,²¹ the only other hydropower cascade in the country (paras. 30–35).

14. The project achieved the output target to create employment for 400 workers during the rehabilitation and reconstruction (2013–2017). The project achieved this target by employing 405 persons throughout the life of the project, 285 of which were employed for the reconstruction of the Yerevan 1 Hydropower Plant, others mostly for replacement of electrical equipment in the Sevan, Hrazdan, Argel, Arzni, and Kanaker hydropower plants.

15. The project achieved another output target by implementing the appropriate environmental and social mitigation measures in accordance with ADB's Safeguard Policy Statement (2009) and international best practice, including (i) the development and implementation of an environmental and social management system (ESMS) based on ISO14001²² at the corporate level and at all hydropower plants, and (ii) the establishment of an environmental monitoring and reporting system in accordance with these ESMS objectives (Appendix 5).²³

16. The project partially achieved the output target to increase the amount of locally purchased goods and services to \$10 million by 2017. The highest amount spent on local purchases was \$2.8 million in 2014, averaging \$0.67 million from 2014 to 2019.

17. The project, however, did not fully achieve the DMF outcome target, which was to dispatch an annual production of 600 gigawatt-hours (GWh) of energy from the system starting from 2018, increasing the domestic supply of renewable energy from 2,500 GWh in 2011 to 3,100 GWh in 2020. The project averaged a dispatch of 430 GWh during 2014–2019. The low energy generation was mainly because of unfavorable hydrology and unpredictable precipitation levels for Lake Sevan throughout the life of the project. Average electricity production during 2002–2016 was 536 GWh, which is significantly higher than the average after project approval. Moreover, production levels were much higher right before this investment, with 727 GWh produced in 2010, 651 GWh in 2011, and 621 GWh in 2012. It should also be noted that the system's energy output not only depends on natural hydrology, but also on the unpredictable irrigation requirements around the lake and the river, with the volatility in precipitation strongly affecting the amount of water available for power generation.²⁴

18. The combination of these uncertain factors (future precipitations, future irrigation needs, future policy for water management) made it quite difficult to reliably estimate the future amount of water available for energy generation. Because the target generation level was defined according to past hydrology data as well as production figures from the period immediately before the investment, the project's generation levels fell short of the target with unfavorable hydrology immediately after investment approval. This is not to deny the necessity for designing an adequate risk mitigation framework for supply and regulatory risks for similar projects, as the hydrology risk

²⁰ Procurement procedures were sometimes extended because of the nature of the selection process, e.g., extension of deadlines, additional clarifications required by bidders, and re-tendering.

²¹ IFC Sorts \$140 million Funding Deal for Vorotan Cascade, Armenia. February 2017.

<https://www.contourglobal.com/news/ifc-sorts-140-million-funding-deal-vorotan-cascade-armenia>.

²² ISO = International Organization for Standardization.

²³ Equilibrium Engineers LLC. 2019. *Status of Implementation of Environmental and Social Action Plan*. 31 July.

²⁴ Stucky Limited. 2017. *Sevan–Hrazdan Hydropower Plant Cascade Rehabilitation Technical Due Diligence Report*. 17 May.

is highly unpredictable and reliance on projections exposes the project to natural risks that may require additional mitigation. Accordingly, the outcome target to increase revenue contributed to the government annually from \$0.013 million in 2011 to \$1.1 million by 2018, was also only partially achieved as the project's corporate taxes averaged about \$29,000 during 2014–2019 because of low generation and revenues.

19. The project achieved all other outcome targets, which were (i) to improve the company's O&M practice to international good practice and safety standards, and (ii) to upgrade electricity generation and transmission equipment to meet international technical and environmental performance standards by 2018. Stucky Limited confirmed that the quality of the performed works, including all electromechanical equipment (such as generators, step-up transformers, spiral cases, turbines, and cubicles) was good and acceptable, citing that the equipment supplied corresponds to modern international standards. Stucky's technical due diligence report also confirmed that the main O&M costs, including materials, works, services, and payrolls, were comparable only to those power plants in Commonwealth of Independent States (CIS) countries.²⁵

20. The project also achieved its target of promoting additional investments in Armenia's power sector by fostering confidence among potential investors and lenders, promoting further private sector investment in Armenia's power sector, such as the \$140 million investment in Vorotan Hydropower Cascade in 2017.²⁶ Apart from this proof-of-concept effect, additional developmental impact was achieved by facilitating the entry of the Tashir Group, a local private sector player with long-term interest in the Armenian energy sector that is also the owner of ENA, further enabling future private sector investments in the country's energy infrastructure. The synergy from ADB's recent transaction with ENA, which is the IEC's offtaker, also contributed to the successful entry of the Tashir Group.

21. The economic importance of achieving the project's output targets despite the system's challenging age, the proof of concept it provided for another cascade rehabilitation, and the development impact derived from the Tashir Group replacing RusHydro make for a strong development story. In this evaluation's view, these additional factors more than compensate for the fact that project outcomes were achieved only partially—thus, the project's contribution to private sector development and ADB strategic development objectives is rated *satisfactory*.

2. Economic Performance

22. The project's economic performance is rated *satisfactory*.

3. Environment, Social, Health, and Safety Performance

23. The project is rated *satisfactory* for environmental, social, health, and safety performance. In compliance with ADB's Safeguard Policy Statement (2009), the project was classified category B for environment, category C for involuntary resettlement, and category C for indigenous peoples and was processed as a standard project loan. The IEC prepared and adopted an environmental and social policy with procedures, programs, and plans to improve the company's ESMS. No material environmental, health, and safety issues occurred or were raised by third parties or

²⁵ The Sevan–Hrazdan Cascade Hydropower System includes seven plants with a total installed capacity of about 560 MW. This causes higher O&M costs than plants with a similar capacity but only one powerhouse (footnote 23).

²⁶ Additional investments in 2017: \$140 million in ContourGlobal Hydro Cascade. The RRP target was to achieve an additional \$175 million by 2020.

government during construction or operation. There were no incidents or fatalities. The IEC submitted an annual environmental and social monitoring report in compliance with the safeguard requirements and the environmental and social action plan. No additional land was acquired under the project and the IEC confirmed that they were not involved in any resettlement activity. The IEC complies with labor standards regulated by national laws, including core labor standards. The IEC implemented a stakeholder engagement plan, which describes the process for engaging stakeholders, including information disclosure and consultation with potentially affected people and other stakeholders.

24. Based on the review of safeguards monitoring reports and meetings with the IEC's environmental and social team, it is concluded that there are no significant outstanding environmental and social safeguard compliance issues or claims.

4. Business Success

25. The project is rated *satisfactory* for business success.

C. ADB Additionality

26. ADB's presence in the deal and in the country facilitated the entry of the Tashir Group, as well as new debt financing from an international commercial bank, HSBC. The Tashir Group, which is also the owner of ENA, the offtaker of the IEC and an ADB borrower, bought RusHydro's 90% stake in the IEC and prepaid the ADB and EBRD loans as part of the sales agreement in March 2020. Even though ADB had planned for a longer investment period with loan maturity in 2027, it exited the investment when local capital was available and willing, with ADB's facilitation, to support the rehabilitation of energy infrastructure and the development of the hydropower sector of Armenia. The Tashir Group is committed to improving the operational, ecological, and social standards of the IEC, which will continue to be guided by the policies and procedures adopted with ADB's assistance.

27. Since the project closure, the Tashir Group has been promoting its new strategy, which focuses on cooperation in the sector, possibly through a public-private partnership, aiming at reducing the tangible losses in the irrigation canals around Lake Sevan and the Hrazdan River. The IEC is identifying all possible stakeholders who may benefit from such cooperation and who are aiming to gain from increased water flows available for power generation and higher efficiency of the irrigation system for agricultural areas downstream of the Hrazdan River basin. Accordingly, the IEC continues to be interested in additional partnerships with ADB.

28. ADB's involvement in the project fostered confidence among potential investors and lenders, as the hydropower sector attracted additional investments in the following years. In 2017, the International Finance Corporation, together with the Netherlands Development Finance Company (FMO), arranged for a \$140 million debt package for the upgrade of the 404 MW Vorotan Hydropower Cascade—Armenia's only other hydropower cascade—which, along with Sevan-Hrazdan, makes up 60% of the country's generation from renewable sources.²⁷

29. ADB provided long-term financing, which was essential for the successful implementation of the project and was unavailable in the local market at the time of the investment. The nature of

²⁷ The funding includes a loan of \$45 million for the International Finance Corporation's own account and parallel loans of \$65 million from the FMO and \$30 million from DEG, the German Investment and Development Corporation. <https://www.contourglobal.com/news/ifc-sorts-140-million-funding-deal-vorotan-cascade-armenia>.

the project, with a long construction period and high upfront capital expenditures, required long-tenor debt to better match with the cash-flow profile, which was made possible by the involvement of ADB and other development financiers (EBRD).

30. ADB's involvement in the project facilitated tariff discussions between the PSRC and the IEC. Because of the unavailability of local currency long-term funding in the local market, the project was to be financed by United States dollar-denominated long-term debt. ADB worked closely with the IEC to ensure that the tariff approved would include a foreign currency component to support the system's sustainability. At the time of the investment, the PSRC provided a cost-recovery model tariff that covered fixed and variable operational costs, a partial foreign currency component, and a return on assets (footnote 23).

31. ADB's involvement in the project contributed to the strengthening of the IEC's policies on environment, health, and safety in accordance with ADB's safeguard standards. ADB monitored the implementation of appropriate environmental and social mitigation measures, while also improving the company's O&M activities in line with international good practice and safety standards in an effort to build up the IEC's capacity to implement the plan appropriately.²⁸

D. ADB Investment Profitability

32. ADB's investment profitability is rated *satisfactory*.

E. ADB's Work Quality

33. ADB work quality throughout the project has been *satisfactory*, taking into consideration the team's performance at different stages of the project, including screening, appraisal, and monitoring.

34. **Screening and appraisal quality is rated *less than satisfactory*.** During the screening and appraisal stages, ADB evaluated the fundamentals of the project, its expected development impact, and the implementation plan and the budget. Even though the deal team identified appropriate DMF outputs for the project, the DMF targets were very optimistic, failing partially to account for unmitigated risks, such as hydrology risk, regulatory risks, and foreign exchange risks, which resulted in the project only partially meeting some of its DMF targets.

35. ADB's pricing and fees were at par with those of co-financiers and were above cost recovery pricing. The project was appropriately structured with a comprehensive and irrevocable sponsor guarantee. At the time of the investment, the transaction team identified a reliable sponsor known for its strong business fundamentals (RusHydro is the Russian Federation's largest low-cost hydropower generator) and well positioned to benefit from the power market liberalization through 60% ownership by the government.

36. The deal team correctly identified the main risks of the company's business, including the borrower's and sponsor's credit risk, construction and completion risks, hydrological and supply risks, offtake risk, foreign exchange risk, and regulatory and political risks. Reliance on hydrological data, partial mitigation of foreign exchange risk, and regulatory and political risks at the time of the investment resulted in the project's underperformance.

²⁸ Stucky Limited. 2017. *Sevan–Hrazdan Hydropower Plant Cascade Rehabilitation Technical Due Diligence Report*. 17 May; and Equilibrium Engineers LLC. 2019. *Status of Implementation of Environmental and Social Action Plan*. 31 July.

37. **Monitoring and supervision quality is rated *satisfactory*.** The monitoring team successfully facilitated the entry of the Tashir Group. The Tashir Group, a local private sector player with long-term interest in Armenia's energy sector that is also the owner of ENA, the offtaker of the IEC, bought RusHydro's 90% stake in the IEC in March 2020, along with prepaying the remaining principal and interest payments on the ADB loan.

38. Throughout the life of the project, ADB has been up to date and well informed on its progress and performance. ADB received the necessary update reports on the financial and operational aspects of the project, including the audited financial statements, updates on the PIP, development effectiveness monitoring reports, and environmental and social monitoring reports. The report submissions and negotiations regarding remedial plans were conducted through additional communication, complementing regular communications with the project's management team, missions, and site visits.

39. Throughout the life of the project, necessary waivers requested by the IEC were processed according to both ADB's and the project's needs and necessities. ADB processed only one waiver for the project in 2014 for the modification of the PIP, which resulted in a completion delay of 1 yr and a budget overrun of 12% that the PSRC partially mitigated by adjusting the tariff.

F. Overall Evaluation

40. The project is rated *successful* overall.

Table 1: Evaluation of the Project

Indicator	Less than			
	Unsatisfactory	Satisfactory	Satisfactory	Excellent
A. Development Results			X	
(i) Contributions to private sector development and ADB strategic development objectives			X	
(ii) Economic performance			X	
(iii) Environment, social, health, and safety performance			X	
(iv) Business success			X	
B. ADB Additionality			X	
C. ADB Investment Profitability			X	
D. ADB Work Quality			X	
(i) Screening, appraisal, and structuring		X		
(ii) Monitoring and supervision			X	
Overall Rating				Successful

ADB = Asian Development Bank.

Source: ADB.

III. ISSUES, LESSONS, AND RECOMMENDED FOLLOW-UP ACTIONS

A. Issues and Lessons

41. The project did not fully meet its DMF outcome target regarding electricity generation set out in the RRP. It should be noted that because the hydrology risk is very difficult to evaluate, the supply risk for similar hydroelectricity projects should be mitigated. Part of the reason for the failure to achieve the generation target was the strict water regulations. As such, it may be necessary to obtain additional coverage for regulatory as well as political risks for similar projects.

42. While setting DMF targets, reliance on past hydrology data and production figures from the period immediately before the investment has proven to be insufficient and additional stress-testing with a more conservative approach may be necessary. The generation target of 600 GWh per year by 2018 was very optimistic and resulted in the project's failure to meet its targets.

B. Recommended Follow-Up Actions

43. The Tashir Group remains very interested in investing in the replacement and rehabilitation of equipment with the overall goal of increasing electricity generation to 500 GWh per annum. The Tashir Group is also interested in starting a win-win dialogue with the public sector and the state directed at cutting the losses in the irrigation sector and thus increasing the water inflows for power generation.

RESULTS AND RATINGS FOR PROJECT CONTRIBUTIONS TO PRIVATE SECTOR DEVELOPMENT AND ADB STRATEGIC DEVELOPMENT OBJECTIVES—INFRASTRUCTURE

Results Area	Actual Achievements^a	Rating^b	Justification	Potential Future Achievements^c	Risk^d
1. Within company PSD effects					
1.1 Improved skills. New or strengthened strategic, managerial, operational, technical, or financial skills.	The IEC notably aligned its procedures and operations to international best practices, policies, and procedures.	Satisfactory	Lenders' engineer, Stucky Limited, confirms in due diligence report in 2017	The new shareholder remains committed to the goals of improving the operational, ecological, and social standards of the company	Low
1.2 Improved business operations. Improved ways to operate the business and compete, as seen in investee operational performance against relevant best industry benchmarks or standards.	The IEC notably aligned its operations to international best practices.	Satisfactory	Lenders' engineer, Stucky Limited, confirms in due diligence report in 2017	The new shareholder remains committed to the goals of improving the operational, ecological, and social standards of the company	Low
1.3 Improved governance. As evident in set standards related to corporate governance, stakeholder relations, ESHS fields and/or energy conservation, and their implementation.	The IEC developed an ESMS with assistance from the EBRD and ADB. The company created a unit responsible for an environmental and social policy.	Satisfactory	Project compliant with all relevant regulations and ADB requirements	Further reduction in emissions, further improvements in product outputs, further strengthening of environmental and social standards and governance	Medium
1.4 Innovation. New or improved infrastructure design, technology, service delivery, ways to cover or contain cost, manage demand or optimize utilization, improved risk allocation between private company and government, financial structure, etc.	Modern equipment replaced technologies that dated back to 1930–1960.	Satisfactory		New initiatives for water management can improve availability of water for power generation and agriculture	Low
1.5 Catalytic element. Mobilizing or inducing more local or foreign market financing or foreign direct investment in the company.	The project resulted in new debt investment from HSBC and an equity investment from the local private sector (by Tashir Group).	Excellent		Possible further investments by the Tashir Group in technical and operational capabilities, sector-wide cooperation for higher efficiency in the irrigation system	Medium
2. Beyond company PSD effects					
2.1 Private sector expansion. Contribution by a pioneering or high-profile project that facilitates	The project was followed by an investment to rehabilitate Armenia's only	Excellent		The IEC is searching for possible opportunities for sector-wide cooperation	Low

Results Area	Actual Achievements^a	Rating^b	Justification	Potential Future Achievements^c	Risk^d
in its own right, or paves the way, for more private participation in the sector and economy at large.	other cascade of hydropower plants (Vorotan) by ContourGlobal, an international power-generation company, in 2016.			(such as a PPP scheme), whereby the company would gain from increased water inflows and the state may gain from higher efficiency of the irrigation system	
2.2 Competition. Contribution of new competition pressure on public and/ or other sector players to raise efficiency and improve access and service levels in the industry.	None				
2.3 Demonstration effects. Adoption of new skills, improved infrastructure assets and services, more efficient processes, maintenance regimes, improved standards, risk allocation, and mitigation beyond the project company.	The project was followed by rehabilitation of the Vorotan Cascade.	Satisfactory		The Tashir Group is initiating a win-win dialogue with the public sector and the state directed at cutting the losses in the irrigation sector and thus increasing the water inflows for power generation	Low
2.4 Linkages. Relative to investments, the project contributes notable upstream or downstream linkage effects to business clients, consumers, suppliers, key industries, etc., in support of growth.	The project enables the production of affordable energy using local resources and fuels the local economy via domestic purchases and/or taxes paid.	Less than Satisfactory	The project created tax revenues and facilitated local purchases during its life.	The project may further fuel the local economy via domestic purchases and contributes to government revenue through corporate taxes	Medium
2.5 Catalytic element. Mobilizing or inducing more local or foreign market financing or foreign direct investment in the sector (beyond the company) through pioneering or catalytic finance.	The project was followed by an investment by ContourGlobal, an international power-generation company, into Armenia's hydropower sector.	Excellent			
2.6. Affected laws, frameworks, and regulation. Contributes to improved laws and sector regulation for public private	None				

Results Area	Actual Achievements ^a	Rating ^b	Justification	Potential Future Achievements ^c	Risk ^d
partnerships, concessions, joint ventures, and build–operate–transfer projects; and liberalizing markets as applicable for improved sector efficiency.					
3. Contribution to other ADB strategic objectives					
3.1 Sector development (outputs). Contribution to other sector development outputs and outcomes not captured under point 2., such as capacity or network expansion.	The project increased Armenia’s hydropower capacity by 45 MW.	Excellent			
3.2 Sector development (outcomes). Contribution to other sector development outputs and outcomes not captured under point 2., such as increased infrastructure utilization or consumption, improved in-country connectivity, and improved energy security.	The project contributes to the country’s energy security by increasing the share of renewables and the use of local sources in the energy mix.	Satisfactory	The government’s target for increasing the share of renewable energy in the energy mix is on track	Further improvement in the energy mix is possible through increasing the IEC’s generation increase; other renewable investments may be possible after the Tashir Group’s entry	Low
3.3 Inclusion. Improved access to availability or affordability of infrastructure services for the poor and other disadvantaged groups.	The project modernized obsolete infrastructure in one of the country’s two hydropower cascades, restoring 44.7 MW of generation capacity.	Satisfactory	Generation from the Sevan–Hrazdan Cascade Hydropower System averages more than 400 GWh during 2014–2019 (though below the target of 600 GWh)	Further contribution to the availability and affordability of energy and/or energy infrastructure when the IEC’s new target of 500 GWh is met	Medium
3.4 Job creation. Creation of additional sustainable jobs or self-employment. Distinguish between jobs created within and beyond the company.	During its life, the project contributed to additional job creation.	Satisfactory	The project created 405 jobs during the reconstruction		
3.5 Environmental sustainability. Project net impact on GHG emissions. Any other contributions to environmental improvements.	The project contributed to reducing GHG emissions by generating renewable energy.	Satisfactory	Emissions of nitrogen oxides were stated as being below annual permissible emission values defined by air emission permission number 101 issued by the Ministry of Nature Protection	Further reduction of GHG emissions may be made possible through the increased generation and the IEC’s improved O&M and equipment standards	Medium

Results Area	Actual Achievements ^a	Rating ^b	Justification	Potential Future Achievements ^c	Risk ^d
3.6 Regional integration: Project contributions to regional cooperation and integration by facilitating trade, cross-border mobility, cross-border power supplies, etc.	None				
4. Overall Rating^e		Satisfactory			

ADB = Asian Development Bank; EBRD = European Bank for Reconstruction and Development; ESHS = environment, social, health, and safety; ESMS = environmental and social management system; GHG = greenhouse gas; GWh = gigawatt-hour; IEC = International Energy Corporation; MW = megawatt; O&M = operation and maintenance; PPP = public–private partnership; PSD = private sector development.

^a **Achievements to be assessed for all result areas.** Highlight (in bold font) achievements in areas that have been specifically referred to as project outputs, outcomes, and impacts in the report and recommendation of the President and the design and monitoring framework (DMF) for the project.

^b **The rating scale for each results area is: Unsatisfactory, Less than Satisfactory, Satisfactory, Excellent, Not applicable.** Consider already manifest actual outputs, outcomes, and impacts (positive or negative). “Excellent” reflects a high level of achievement, usually exceeding targets. “Satisfactory” denotes a good level achievement in line with expectations and set targets. “Less than satisfactory” reflects a low level of achievement below expectations. “Unsatisfactory” reflects no achievement or significant negative effects. “Not applicable” should only be used, if the project report and recommendation of the President does not mention this aspect in its presentation of envisaged project development results, project justification, ADB’s additionality, or the DMF itself, and if negative effects are not apparent.

^c Potential for further achievements considering relevant developments in the medium term or external to the project.

^d **Assess risk to the realization of further potential achievements on a scale of high, medium, low.** Add further explanations in the box, particularly if risks are assessed to be low.

^e **The overall rating scale is: Unsatisfactory, Less than Satisfactory, Satisfactory, Excellent.** The overall rating is not an arithmetic mean of the individual indicator ratings and does not have fixed weights. It will be primarily based on the level of achievement of envisaged project outcomes as stated in the DMF, provided these and associated indicators are meaningful for contributing to envisaged development impacts in the DMF.

Sources: 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; International Energy Corporation; Stucky Limited; Equilibrium LLC; and Armenian Energy Agency.

SECTOR REVIEW

A. Overview

1. With a large deficit of indigenous resources, Armenia imports natural gas and oil for most of its energy needs, with an external dependency ratio of 66% as of 2017.¹ Following earlier electricity supply crises in the mid-1990s, Armenia transformed the electricity sector, including privatizing parts of it. The government's increased focus on energy accessibility has brought about significant improvements in households' access to gas, and the government has also introduced cost-reflective tariffs. These efforts encouraged increased investment in capacity and networks, which in turn significantly improved the reliability of Armenia's energy system. Armenia's energy policy is focused on developing indigenous energy sources, mainly renewables.

2. The government has authorized the Ministry of Energy Infrastructures and Natural Resources to implement state policy in the energy sector and to regulate the industry, and it has authorized the Public Services Regulatory Commission—a self-regulated independent state body—to regulate the electricity market. The Public Services Regulatory Commission determines the tariffs of distribution and transmission, the tariffs of system operators and service provision, and the maximum tariffs for the importation of electric energy and natural gas; it also grants licenses for activities undertaken in the energy sector.

3. Total installed capacity in the sector is at about 4,140 megawatts (MW), with about 1,815 MW thermal capacity, 408 MW nuclear, and about 1,330 MW hydro sources (data as of 2018). The average annual growth rate of electricity consumption was 1.15% from 2000 to 2018, with largest growth in hydropower generation (3.5%) and thermal generation (2.1%), with 2%–3% annual growth in consumption going forward.

B. Sector Structure

4. The current structure of the electricity sector in Armenia comprises (i) generator companies—i.e., nuclear, thermal, and hydropower generation companies (nuclear power plants, thermal power plants, and hydropower plants) (see Table A4); (ii) High-Voltage Electric Networks, a common joint stock company (CJSC) with a monopoly on the transmission segment and the primary role of transmitting the electricity produced from the generation companies to the distribution network; and (iii) Electric Networks of Armenia, a CJSC with a monopoly on the purchase and sale of electricity through use of the distribution network (figure on p. 20).

¹ International Atomic Energy Agency. Country Nuclear Power Profiles. <https://cnpp.iaea.org/countryprofiles/Armenia/Armenia.htm>. External dependency ratio: net import/total energy consumption.

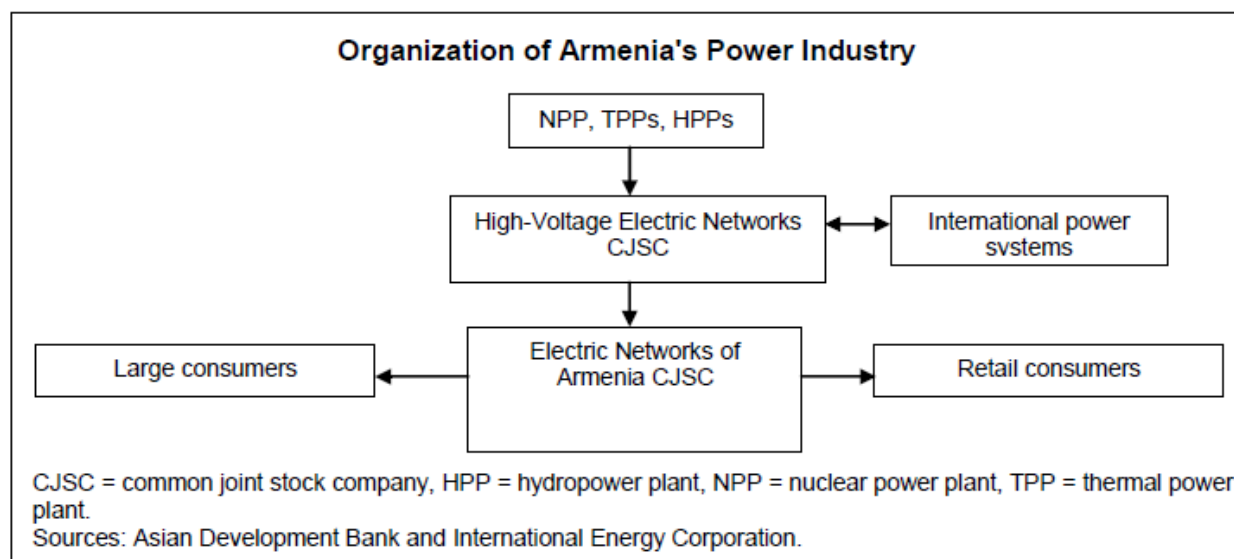


Table A4: Installed Capacity and Energy Generation in Armenia, 2018

Power Plant	Installed Capacity (MW)	Electricity Production (million kWh)
Nuclear	408	2,029
Armenian Nuclear Power Plant	408	2,029
Thermal	1,815	2,913
Yerevan TPP	238	1,541
Hrazdan TPP	1,110	467
Gazprom Armenia (Hrazdan 5)	467	905
Hydropower	1,324	2,358
Sevan–Hrazdan Cascade	560	414
Vorotan Cascade	404	984
Small HPPs	360	961
Total	3,547	7,300

HPP = hydropower plant, kWh = kilowatt-hour, MW = megawatt, TPP = thermal power plant.
Sources: Armenian Energy Agency; Hrazdan Energy Company and International Atomic Energy Agency.

C. Renewable Energy and Hydropower Sector

5. In 2019, 32.2%—2,358.2 million kilowatt-hours (kWh)—of the 7,308.5 million kWh of electricity generated in Armenia came from renewable energy resources, 27.8% came from nuclear power plants, and 39.9% came from thermal power plants. The development of renewable energy is one of the most significant aspects of Armenia's energy strategy.

6. Hydropower has historically been one of Armenia's main resources for electricity production. At present, the total capacity of Armenia's hydropower stations is 1,324.4 MW, 37% of the total installed capacity of 3,547 MW.

7. There are two major hydropower plants in Armenia—Sevan–Hrazdan Cascade and Vorotan Cascade—making up 964 MW of the total installed capacity. The two cascades produced 1,397 million kWh in 2019, making up 19.1% of Armenia’s total generated electricity of 7,308.5 million kWh.

8. With 560 MW installed capacity and production and technological capacity of 500 million kWh, the Sevan–Hrazdan Cascade produced 413.5 million kWh in 2019, 5.7% of all generation. The Sevan–Hrazdan Cascade comprises seven hydropower plants: Sevan (34 MW), Hrazdan (81 MW), Argel (224 MW), Arzni (70 MW), Kanaker (102 MW), Yerevan 1 (44 MW), and Yerevan 3 (5 MW). The plants utilize the natural flow of the Hrazdan River as well as the irrigation water discharges from Lake Sevan. The Sevan–Hrazdan Cascade’s total production capacity is about 10% of Armenia’s domestic consumption.

9. Vorotan Cascade, with 404 MW total capacity, owned and operated by ContourGlobal CJSC, produced 983.6 million kWh in 2019. The Vorotan Cascade comprises three hydropower plants—Spandaryan (76 MW), Shamb (171 MW), and Tatev (157 MW)—constructed on the Vorotan River in the region of Syunik and is supplied by river and stream water. The Vorotan Cascade produced 13.5% of all electricity generated in Armenia, as well as 70% of all hydropower generated electricity.

10. Small hydropower plants make up the balance of the country’s hydropower capacity. As of 2018, there were 186 small hydropower stations with a total installed capacity of 360.4 MW operating. The development of small hydropower plants has been a success story in Armenia since the 1990s.² In 2018, an additional 33 small hydropower plants were under construction with a total projected capacity of 63.2 MW and 222 million kWh electricity annual supply.

11. In 2019, the generation of electricity from small hydropower plants was about 961.2 million kWh, corresponding to 13.1% of the total generated electricity in Armenia. According to the Armenian Energy Agency, there is still opportunity for new capacities as well as important new challenges for repowering stations, raising productivity and development units in accordance with international technical and environmental standards for the hydropower capacity in the country.³

D. ADB Sector Experience and Assistance Program

12. ADB has been active in Armenia’s energy sector since 2006. In April 2013, ADB approved a non-sovereign loan of \$25 million to rehabilitate Sevan–Hrazdan Cascade. In July 2014, ADB approved a special drawing rights (\$37 million equivalent) sovereign loan to rehabilitate substations, and expand the supervisory control and data acquisition and energy management system.⁴ In November 2016, ADB approved a sovereign loan of \$90 million for the improvement of infrastructure operation and sustainability through reforms in the power sector. In June 2017, ADB approved a non-sovereign loan of \$80 million to Electric Networks of Armenia for

² According to the Decision of the Government of Armenia (N 1300-U from 8 September 2011), plants with less than 30 MW of installed capacity are considered small hydropower plants.

³ Armenian Energy Agency. Hydropower. https://energyagency.am/en/page_pdf/hidroenergetika.

⁴ Special drawing rights refer to an international reserve asset created by the International Monetary Fund in 1969 that operates as a supplement to the existing reserves of member countries.

rehabilitation of the distribution network.⁵ In March 2018, ADB also approved a non-sovereign loan of \$68.4 million for construction and operation of a combined cycle thermal power plant.⁶

13. The country partnership strategy for Armenia, 2019–2023 continues to support the energy sector to foster diversified growth and inclusiveness with both sovereign and non-sovereign financing in priority infrastructure investments.⁷ The strategy calls for further attention to Armenia’s renewable energy sector development, with the aim of using the country’s potential for solar and wind projects through private sector investments. Energy efficiency improvements also remain a key priority through public and private sector investments in generation, transmission, and distribution assets.

⁵ 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.

⁶ 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.

⁷ ADB. 2019. *Country Partnership Strategy: Armenia, 2019–2023—Fostering Inclusive, Diversified, and Transformative Growth*. Manila.

ENVIRONMENTAL AND SOCIAL IMPACT

A. Environment, Social, Health, and Safety Performance

1. In compliance with the Safeguard Policy Statement (2009) of the Asian Development Bank (ADB), the project was classified category B for environment, category C for involuntary resettlement, and category C for indigenous peoples. Effective measures to avoid, minimize, mitigate, and compensate for the adverse impacts were incorporated in the safeguard reports and plans. The institutional capacity and commitment of the International Energy Corporation (IEC) to manage the project's social and environmental impacts were deemed adequate. The audit report of existing facilities was disclosed on ADB's website in 2013.¹ The potential impacts were not expected to be significant and a project environmental and social action plan (ESAP) was prepared to follow-up specific studies and environmental management plans. The project ESAP has been satisfactorily implemented and there are only two actions that are yet to be initiated (paras. 8–20).

2. In 2013, the IEC prepared and adopted an environmental and social policy with procedures, programs, and plans to improve its environmental and social management system (ESMS). The policy included (i) an environmental and social management plan for the Sevan–Hrazdan Cascade Hydropower System Rehabilitation Project and the Yerevan 1 dredging works, (ii) an environmental and social monitoring plan (ESMP), (iii) pollution prevention plans, (iv) an oil management plan, (v) a waste management plan, (vi) an employee grievance procedure, (vii) a stakeholder engagement plan and grievance mechanism, and (viii) health and safety procedures for workers. The ESMP for the dredging works was implemented accordingly.

3. The Yerevan 1 reservoir dredging required an environmental and social impact assessment (ESIA), which was prepared in 2013 and disclosed on ADB's and the IEC's websites. All works were carried out within the existing facilities, channels, hydraulic structures, and property boundaries. The main environmental impacts and risks from the operations and planned rehabilitation were related to the dredging activities for Yerevan 1 reconstruction; management of oils and lubricants for turbines, transformers, and support infrastructure; management of lead and acid batteries; material and waste management; and management of occupational and community health, safety, and security.

4. The company indicated that no material environmental, health, and safety issues have occurred or have been raised by third parties or government, and there have been no incidents or fatalities during construction or operation. The company has submitted an annual environmental and social monitoring report in compliance with the safeguard requirements and the ESAP.

5. No additional land has been acquired under the project and the IEC has confirmed that it was not involved in any resettlement activity. All rehabilitation works were undertaken within the existing footprint and no expansion of facilities occurred. There are no pending claims or grievances with regard to the project facilities and the lands they stand on. The project did not trigger ADB's safeguard policy requirements on indigenous peoples as no such sociocultural groups were found within the project area.

¹ DG Consulting Ltd. 2012. *Environmental and Social Compliance Audit Report: Sevan–Hrazdan Cascade Hydropower System Rehabilitation Project*. Manila.

6. The IEC complies with labor standards regulated by national laws, including core labor standards. Labor contracts are posted in a government database accessible to relevant authorities who can impose penalties when violations are uncovered. As part of the ESAP, the IEC was required to maintain records on employment diversity, including data on job responsibility and gender. All records have been made available at the IEC's human resource department.

7. The IEC implemented a stakeholder engagement plan (SEP), which describes the process for engaging stakeholders, including information disclosure and consultation with potentially affected people and other stakeholders. The SEP also provided guidance in the establishment of the grievance redress mechanisms (GRMs) for both internal and external stakeholders (paras. 26–27). No complaints from the workers or the community were recorded

B. Environmental Impact

1. Introduction

8. The project is classified category B for environment pursuant to ADB's Safeguards Policy Statement. The European Bank for Reconstruction and Development (EBRD), which is co-financing the project, classified the project as B under its Environmental and Social Policy (2008).² This is an evaluation of the project's implementation and environmental compliance performance against ADB's safeguard requirements.

2. Review Findings

9. **Compliance.** IEC engaged DG Consulting in 2012 to support the environmental and social due diligence, which included a review and audit of the IEC's current management and operations against ADB's relevant environmental and social policies and requirements, Armenian and European Union legal requirements, and the EBRD's performance requirements.

10. The proposed rehabilitation of the Sevan–Hrazdan Cascade Hydropower System was not required to undergo an environmental impact assessment (EIA) process under Armenian environmental regulations, and an environmental audit was conducted in 2012 in accordance with ADB and EBRD ("the lenders") requirements.³ The potential impacts were not expected to be significant and a project ESAP was prepared to follow-up specific studies and environmental management plans. All works were planned within the existing hydropower plant facilities, canal channels or hydraulic structures, and property boundaries. All facilities were operational prior to 1995 and are therefore exempt from the EIA law (1995), except for the Yerevan plant reconstruction where reservoir dredging was required to restore the plant capacity. An EIA was prepared in 2013 for the dredging works in accordance with the lenders' requirements and Armenian environmental regulations. The company confirmed that it is operating in full compliance with the regulatory requirements, including the requirements of the Armenian Public Services Regulatory Commission, the Ministry of Nature Protection, and the Ministry of Territorial Administration. The company obtained all related permits or licenses prior to construction and operation.

² EBRD. 2008. *Environmental and Social Policy*. London. https://www.ebrd.com/downloads/about/policies/environmental_policy/2008-05-14_Environmental_and_Social_Policy-Publication.pdf

³ The audit report was disclosed on ADB's website in 2013. <https://www.adb.org/projects/documents/sevan-hrazdan-cascade-hydropower-system-rehabilitation-project-escar>.

11. The company indicated that no material environmental, health, and safety issues have occurred or have been raised by third parties or government, and there have been no incidents or fatalities during construction or operation. The company has submitted an annual environmental and social monitoring report in compliance with the safeguard requirements and the ESAP. All ESAP actions have been completed except for the following:

- (i) Completion of a study of river flow and biodiversity to support development of a plan to implement feasible measures to restore the river ecosystem. The IEC has access to studies performed by the Scientific Center of Zoology and Hydroecology (National Academy of Sciences of Armenia) and WWF Armenia. These studies provide the most complete information on the river flow and biodiversity conditions of the river basin. The IEC is exploring cooperation options with different organizations to perform additional studies with the aim of optimizing water uses in the basin, including water available for energy generation.
- (ii) Development of a long-term plan for the river ecosystem based on the river flow and biodiversity study. This action has not yet started. The IEC is planning to identify the priority areas on the river system and develop a plan to restore biodiversity. The plan could be developed in cooperation with the Scientific Center of Zoology and Hydroecology (National Academy of Sciences of Armenia) or a qualified consultant. The company is also exploring a cooperation opportunity with the Environmental Project Implementation Unit of the Ministry of Nature Protection of Armenia to implement a deforestation prevention project in the Hrazdan River basin.

12. **Environmental management and monitoring during construction.** In 2013, the IEC prepared and adopted an environmental and social policy with procedures, programs, and plans to improve its ESMS. The policy included, among other plans and procedures: (i) an environmental and social management plan for the Sevan–Hrazdan Cascade Hydropower System Rehabilitation Project and the Yerevan 1 dredging works, (ii) an environmental and social monitoring plan, (iii) pollution prevention plans, (iv) an oil management plan, (v) a waste management plan, (vi) an employee grievance procedure, (vii) a stakeholder engagement plan and grievance mechanism, and (viii) health and safety procedures for workers. The IEC also strengthened its existing emergency response plan in 2013 as reported to the lenders. The IEC set up a corporate unit in 2013 responsible for environmental and social issues and appointed an environment, social, health, and safety manager responsible for ensuring project compliance with ADB's and EBRD's environmental and social policies and European legislation requirements.

13. IEC performed the dredging of the Yerevan 1 Hydropower Plant's reservoir in 2013 in compliance with the environmental and social management plan (ESMP). The ESMP was part of the contracts with contractors. The IEC indicated that there were no exceedances shown in environmental monitoring results during construction. IEC provided monitoring results for Yerevan 1 Hydropower Plant's reservoir dredging program in 2013. The project identified water quality monitoring points upstream and downstream of the dredging area to monitor surface water quality before and during the dredging works. Baseline data indicated that the maximum permissible levels of nitrate, ammonium, sulfate ions, biochemical oxygen demand, aluminum, vanadium, chromium, manganese, copper, and selenium in the Hrazdan River were exceeded. Dredging activities in the reservoir resulted in a temporary increase in suspended particles in the river. Monitored carbon dioxide, nitrogen oxides, and dust levels were found to be less than maximum permissible concentrations during construction. The nearest house is about 110 meters away from the dredging site. Noise measurements complied with applicable standards and no noise impacts have been recorded. The ESIA predicted minimal odor impacts on residents and no odor impacts have been recorded.

14. The ESIA indicated that the works will not affect any critical habitat. The works were planned for August–November 2013 to minimize impacts on the fish breeding season (from early spring to July for most species). Measures to minimize turbidity impacts on fish were also implemented. The water flow during the dredging activities was not interrupted and there were no aquaculture facilities downstream of the reservoir in the territory of Hrazdan Gorge.

15. The sediments were analyzed for potential contamination and levels did not exceed the values set out in the Armenian regulations. Sediments were removed with digging machines and stored in a designated area. The IEC agreed with the Municipality of Yerevan that dredged material would be directly transported to an area adjacent to a new road construction site, located about 4.5 kilometers from the dredging site.

16. During construction, the company provided protective equipment and occupational health and safety training to workers, including fire security training, toolbox talks, work instructions, and quarterly training on health and safety instructions and drills.

17. The company also provided training on waste management and developed contamination prevention plans and a waste management plan. The company has agreements with municipal waste services and qualified companies for collection and disposal of waste and wastewater. Hazardous waste (including mercury and fluorescent lamps, accumulator acids, and used accumulators) is stored at the IEC's premises as there are no licensed companies specialized in hazardous waste treatment and disposal. The IEC created special storage areas for hazardous waste at each hydropower plant site and a new oil storage facility in Hrazdan city. Each hydropower plant has safe containers for temporary storage of mercury lamps and batteries. The storage site is locked and ventilated with non-permeable floor material. Acid is stored in adequate tanks with secondary containment. Evidence provided by the company showed that implementation of waste management measures at each hydropower plant needed improvement and the company is exploring appropriate measures.

18. **Environmental management and monitoring during operation.** Hydropower plants comply with flows stipulated by the Ministry of Nature Protection's regulations. Works did not have an impact and did not require any flow changes. The IEC maintains health and safety records (no accidents reported to date), and monitors community health and safety risks. Fire and flood emergency measures are in place. There have been no reported landslides or natural hazards in the project area. The ESMS is still implemented during operation and the IEC conducts periodic assessments. The company is considering pursuing International Organization for Standardization certification in 2021.

19. **Stakeholder engagement and grievances.** The company developed and implemented a SEP for the Yerevan 1 works, which was disclosed on ADB's and the IEC's websites. The IEC placed (i) information on planned works and the grievance mechanism in the municipalities of potentially affected communities and (ii) suggestion boxes at the company's office entrance. The IEC also has an employee grievance mechanism that was adopted in 2013 and is available at all offices. The IEC indicated that it (i) did not receive any written complaints, (ii) widely publicized the existence of the grievance mechanism across the company, and (iii) distributed forms.

3. Conclusion

20. Based on the review of safeguards monitoring reports and meetings with the company environmental and social team, it is concluded that there are no significant outstanding

environmental safeguard compliance issues or claims. The IEC's performance was satisfactory in implementing almost all of the ESAP actions and required project mitigation measures and plans. The company is exploring options for the implementation of the two unrealized actions. Additional monitoring reports will not be required because the original loan was repaid in March 2020.

C. Social Impact

1. Introduction

21. The project is classified category C for involuntary resettlement and category C for indigenous peoples pursuant to ADB's Safeguards Policy Statement (2009). This is an evaluation of the project's implementation and social compliance performance against ADB's safeguards and social requirements.

22. DG Consulting undertook an environmental and social compliance audit of the Sevan–Hrazdan Cascade Hydropower System in 2012 to review all relevant social and environmental risks and impacts and the IEC's ability to manage and address them. The audit resulted in the preparation of an ESAP to address gaps identified and included the following social requirements:

- (i) prepare and adopt a corporate policy indicating the corporation's willingness for environmentally and socially responsible operation and compliance to international best practices and recognized principles throughout operation;
- (ii) set up a unit at corporate level responsible for environmental and social issues;
- (iii) maintain records on employment diversity, including the number of employees, by job responsibility and gender (by category);
- (iv) develop an employee grievance procedure;
- (v) implement a SEP, including establishment of a grievance mechanism covering the overall operation;
- (vi) carry out consultations with the population living along the channel to be rehabilitated and other project stakeholders in accordance with the SEP and accurately record community concerns; and
- (vii) conduct consultations with government offices, the water resources management authority, and heads of local municipalities in accordance with the SEP.

2. Review Findings

23. **Corporate policy and organizational staffing.** In 2013, the IEC adopted an environmental and social policy that embraced as fundamental principles (i) respecting the rights of the local population and its workers, and gender equality; (ii) prioritizing the preservation of the life and health of society and workers; and (iii) ensuring awareness of interested parties about the possible impacts of the company's activities on its employees and the population. Responsibility for the implementation of the policy lies with the IEC's top management. To support its capacity-building efforts, the IEC appointed, in February 2013, a manager who was responsible for environmental and social issues across its operations. The manager led the preparation of the annual environmental and social monitoring report from 2013 to 2017. By 2018, the position became vacant and annual reporting became the responsibility of the financial director.

24. **Social safeguards.** The due diligence and audit determined that the project will unlikely result in any involuntary resettlement and indigenous peoples impacts. The hydropower cascade was built during 1930–1965 under the Soviet Union when all lands were deemed owned by the state. The social compliance audit found no documentation readily available or historical data that

provided information on any involuntary land acquisition or involuntary resettlement at that time. Even interviews with the local elderly population yielded no information. Nevertheless, it was established that the project sites are mainly located in steeply sloping and rocky gorges that were hard to access. Thus, it was not likely that any physical or economic displacement occurred. Furthermore, the planned rehabilitation works under the project were confined within the existing footprint of the facilities. The IEC has confirmed that no additional land has been acquired and that it has not been involved in any resettlement activity. After the Tashir Group took over the IEC in March 2020, the IEC undertook a review of all fixed assets. It was determined that of the 25 fixed assets, one sits on land owned by the IEC while the rest are on leased land. The 24 pieces of land leased by the IEC are community-owned lands that are leased on a long-term basis (i.e., 50–99 years). The lease agreements are in accordance with Armenian laws and signed by the head of the community and the IEC director. No claims or grievances regarding compensation for lands or properties used for the project have been submitted to the IEC or the courts. There are also no indigenous peoples at the project site. The audit determined that the population in the project area is mainly Armenian and the minorities present (e.g., Russians, Yezidis, and Assyrians) are assimilated with the local population and have no collective attachment to the land.

25. **Other social dimensions.** Labor matters are handled by the IEC's Human Resources Department, which is guided by a personnel manual that covers work time and shifts, payment for overtime, dismissal terms, and other conditions. The IEC is required to comply with all labor standards prescribed by Armenian laws, including core labor standards. The labor contracts are submitted to a unified government database that is accessible to relevant authorities, who can impose penalties for violations. In compliance with the ESAP, the IEC's Human Resource Department has maintained records on employment diversity, including data on job responsibility and gender. The most recent data reveals that the IEC has a total of 378 employees, of which 3 (1%) belong to top management, 57 (15%) belong to middle management, and 318 (84%) are staff. Women represent 10% of middle management and 20% of staff. While the IEC did not report any collective redundancies and/or dismissals from 2013 to 2019, 223 employees left the company during that period. The main reasons for employee separation are the employees' resignation or retirement (52%) and contract expiration (22%).

26. **Stakeholder engagement and grievance redress mechanism.** The audit identified a gap in the IEC's stakeholder and public engagement processes, particularly a lack of GRM. The SEP was thus developed and implemented to guide the IEC in stakeholder identification, project consultation, disclosure, and GRM establishment. Procedures and responsibilities for both external and internal GRMs were outlined. External complaints may be submitted in person through the comments and complaint form (or other format) or via post, email, or fax. The IEC posted contact information on its website. The formal internal grievance mechanism was adopted in 2013 and guarantees (i) to prevent pressures on the person who filed a grievance, (ii) anonymity, if desired, and (iii) proper documentation and due process. No complaints from workers or the communities have been recorded.

27. The SEP guided the stakeholder identification and consultations for the Dredging Program of Yerevan 1 Hydropower Plant. Information on planned works and the GRM were distributed during consultations with stakeholders and posted at work sites and/or at surrounding communities and municipalities. Meetings with heads of local municipalities were organized to also give them the opportunity to raise their concerns and comment on or suggest modifications to the dredging. Engagement with members of the communities along the rivers and channels has continued discussions about issues, such as water theft and garbage disposal into the channels. The IEC admitted that community engagement has not always been positive, but continuing efforts have yielded good results, particularly in preventing damage to the channel wall.

28. **Corporate social responsibility activities.** The IEC does not formally report on its corporate social responsibility activities, but has donated to various causes, such as education, charities for children, relief for flood victims, and social progress.

3. Conclusion

29. The IEC's social performance is rated *satisfactory*. Based on the review of safeguards monitoring reports and meetings with the company's environmental and social team, it is concluded that there are no outstanding social safeguard compliance issues or claims. There are also no outstanding issues regarding compliance with labor laws, including internationally recognized core labor standards. The Tashir Group remains committed to the goal of improving the IEC's social standards and it is anticipated that Tashir will continue to identify opportunities for further improvement. However, no additional monitoring reports will be required because the loan was repaid in March 2020.