



Report and Recommendation of the President to the Board of Directors

Project Number: 46941
March 2013

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

This is an abbreviated version of the document approved by ADB's Board of Directors that excludes information that is subject to exceptions to disclosure set forth in ADB's Public Communication Policy 2011.

Asian Development Bank

CURRENCY EQUIVALENTS

(as of 28 February 2013)

Currency unit	–	dram (AMD)
AMD1.00	=	\$0.0024
\$1.00	=	AMD409.5100

ABBREVIATIONS

ADB	–	Asian Development Bank
EBRD	–	European Bank for Reconstruction and Development
GWh	–	gigawatt-hour
IEC	–	International Energy Corporation
MW	–	megawatt
PSRC	–	Public Services Regulatory Committee

NOTES

- (i) The fiscal year (FY) of International Energy Corporation ends on 31 December.
- (ii) In this report, “\$” refers to US dollars.

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CONTENTS

Page

PROJECT AT A GLANCE

I. THE PROPOSAL	1
II. THE PROJECT	1
A. Project Identification and Description	1
B. Development Impact, Outcome, and Outputs	3
C. Alignment with ADB Strategy and Operations	4
D. Implementation Arrangements	4
III. THE PROPOSED ADB ASSISTANCE	5
A. The Assistance	5
B. Value Added by ADB Assistance	5
IV. POLICY COMPLIANCE	6
A. Safeguards and Social Dimensions	6
B. Anticorruption and Anti-Money-Laundering Policies	7
C. Investment Limitations	7
D. Assurances	7
V. RECOMMENDATION	7
APPENDIXES	
1. Design and Monitoring Framework	9

PROJECT AT A GLANCE

1. Project Name: Sevan–Hrazdan Cascade Hydropower System Rehabilitation Project			
2. Project Number: 46941			
3. Country: Armenia		4. Department/Division: Private Sector Operations Department Infrastructure Finance Division 1	
5. Sector Classification:			
Sectors	Primary	Subsectors	
Energy	✓	Large hydropower	
		Energy efficiency and conservation	
6. Thematic Classification:			
Themes	Primary	Subthemes	
Economic Growth		Promoting macro-economic stability Promoting economic efficiency and enabling business environment	
Private Sector Development	✓	Private sector investment	
6a. Climate Change Impact:		6b. Gender Mainstreaming:	
Adaptation		Gender equity theme	
Mitigation	✓	Effective gender mainstreaming	
Not applicable		Some gender elements	
		No gender elements	✓
7. Targeting Classification:		8. Location Impact:	
General Intervention	Targeted Intervention		
	Geographic dimensions of inclusive growth	Millennium development goals	Income poverty at household level
✓			
Rural			low
Urban			high
National			high
Regional			low
9. Nonsovereign Operation Risk Rating: NSO8			
10. Safeguard Categorization:			
	Environment	B	
	Involuntary resettlement	C	
	Indigenous peoples	C	
11. ADB Financing:			
	Sovereign/Nonsovereign	Modality	Source
	Nonsovereign	Loan	OCR
			Amount Up to \$25 million
12. Cofinancing:			
	Financier	Category	Amount
	EBRD	Loan	Up to \$25 million
13. Counterpart Financing: Not Applicable			
14. Aid Effectiveness: Not Applicable			

I. THE PROPOSAL

1. I submit for your approval the following report and recommendation on a proposed loan of up to \$25 million to International Energy Corporation (IEC) for the Sevan–Hrazdan Cascade Hydropower System Rehabilitation Project in Armenia.¹

II. THE PROJECT

A. Project Identification and Description

1. Project Identification

2. Armenia imports around 60% of its primary energy requirements, mainly natural gas, and suffers from obsolete power generation infrastructure. The hydropower plants in the country do not meet international technical, economic, or environmental performance standards. Despite its favorable topography and hydrology, Armenia suffers from underinvestment in hydropower generation capacity. To overcome these problems, the government launched an initiative to promote private sector investment in the country's energy infrastructure, including hydropower. In 2005, the government's Energy Sector Development Strategy targeted an increase of the country's renewable energy generation including hydropower generation from 3,600 gigawatt-hours (GWh) to 5,100 GWh by 2025.

3. IEC approached the Asian Development Bank (ADB) in 2011 to raise debt financing for its modernization and reconstruction program for 2012–2017. IEC owns and operates the Sevan–Hrazdan Cascade Hydropower System, which supplies about 10% of the country's electricity. The system has a significant role in supporting the balance of the electric grid, and also provides more affordable energy than thermal power plants. Given ADB's recent financing of private infrastructure in the country² and the fact that the private banking market is still hesitant to provide long-term financing, IEC approached ADB and the European Bank for Reconstruction and Development (EBRD) with an assumption that the project would be financed by the two banks on a 50:50 basis. [Confidential information deleted] From initial discussions with IEC, RusHydro, and the EBRD, the project team believed that the project possesses sound fundamentals, that ADB's participation will bring significant developmental benefits and demonstration impact, and that it will also send an important signal to the market, helping build confidence for private sector participation in Armenia's renewable energy development. It was also noted that the project could become ADB's first loan to Armenia's power sector and would also be the first nonsovereign cofinancing by ADB and the EBRD in the power sector.

2. Project Design

4. The project involves the rehabilitation and modernization of four hydropower plants, the diversion channels for three plants, and associated electrical equipment replacement at the substations. The planned rehabilitation will be completed in 2017. The project aims to restore the capacity of the hydropower plants by 44.7 megawatts (MW), improve their reliability and safety, and reduce IEC's operational and maintenance expenses. The project will also reduce water leakage from the diversion channels and could increase power generated by the system. After repair of the diversion channels, it is estimated that water leakage will decrease by

¹ The design and monitoring framework is in Appendix 1.

² ADB. 2010. *Report and Recommendation of the President to the Board of Directors: Proposed Loan for Zvartnots Airport Expansion Project (Phase 2) in Armenia*. Manila.

50 million–85 million cubic meters annually, which will bring additional generation of 18–30 GWh of electricity. The rehabilitation and modernization plan is outlined in Table 1.

Table 1: Key Features of International Energy Corporation’s Rehabilitation and Modernization Plan

Item
Hydro and electromechanical components
1 Argel: Replacement of the excitation system of four generators (4 x 56 MW)
2 Kanaker: Replacement of hydro units 3 and 4 (2 x 12.5 MW)
3 Sevan: Replacement of the stators of the two generators (2 x 17.1 MW)
4 Yerevan 1: Replacement of two hydro generator units (2 x 22 MW), overhaul of the electromechanical equipment
Civil works
5 Yerevan 1 reservoir: Dredging of the reservoir and reconstruction of the weir
6 Refurbishment of the diversion channels (Argel, Arzni, and Hrazdan)

Source: International Energy Corporation.

3. The Borrower and/or Sponsor

5. IEC (the borrower) was incorporated in the Republic of Armenia in May 2003 and owns and operates the Sevan–Hrazdan Cascade Hydropower System. The initial owner of IEC was INTER RAO, a Russian state-owned company. IEC took ownership of the system in July 2003 and obtained a license for generation of electric power in September 2003. In 2010, HydroInvest (a subsidiary of RusHydro) acquired INTER RAO’s ownership in IEC, [Confidential information deleted] and currently RusHydro (through HydroInvest) holds the majority of the shares (90%) and controls IEC. [Confidential information deleted.]

6. The system consists of seven run-of-the-river hydropower stations located along a waterway of connected rivers (Hrazdan and Marmarik), canals, and reservoirs, principally fed by the Marmarik River. The system was originally built between 1930 and 1965. Five stations are operational year-round and the remaining two stations work only during the irrigation season, when additional water from Lake Sevan is released into the system. The system’s year-round available capacity is 458.7 MW and operational capacity is 390 MW, the latter accounting for 16% of estimated total current operational capacity in Armenia. A summary of information about the system’s seven hydropower plants is in Table 2.

Table 2: Summary of Sevan–Hrazdan Cascade Hydropower System

Power Plant	Year of Commissioning	No. of Units	Original Installed Capacity (MW)	Available Capacity (MW)	Unavailable Capacity (MW)
Argel	1953	4	224.0	168.0	56.0
Arzni	1956	3	70.6	70.6	0.0
Hrazdan	1959	2	81.6	81.6	0.0
Kanaker	1936	6	100.0	87.5	12.5
Sevan	1949	2	34.2	24.0	10.2
Yerevan 1	1962	2	44.0	22.0	22.0
Yerevan 3	1960	1	5.0	5.0	0.0
Total		20	559.4	458.7	100.7

Source: International Energy Corporation.

7. IEC’s financial position has been affected by its aging assets and insufficient investment. IEC’s assets have been heavily depreciated without capital expenditures, and its balance sheet is small. The tariff has been determined based on the asset size, and the revenue has not been

sufficiently strong. This created a vicious circle between low asset value and low revenue. However, the project (with ADB financing under RusHydro's guarantee) aims to break the vicious circle. With investment to upgrade the assets, the size of the balance sheet will grow, and the revenues will improve with the revised tariff, which incorporates the cost of investment. [Confidential information deleted.]

8. The sponsor, RusHydro, was incorporated in 2004 in the Russian Federation as part of the state program for power sector reform and creating a competitive industry. RusHydro is 60.4% state owned and its remaining shares are publicly traded on the Moscow and London stock exchanges. RusHydro is the Russian Federation's largest hydropower generation company and the leader in renewable energy using water currents, sea tides, wind, and geothermal energy. The company owns 61 power generation facilities with total installed capacity of 35,200 MW. RusHydro is currently rated BB+ by Standard & Poor's and Fitch, and Ba1 by Moody's, reflecting (i) its strong business fundamentals as the Russian Federation's largest low-cost hydropower generator, which is well positioned to benefit from the country's wholesale power market liberalization and should be able to absorb the market fluctuation risk; and (ii) the high likelihood that it would receive extraordinary government support in a crisis.

Table 3: RusHydro Key Financials (Consolidated)
(RUB million)

Item	2009	2010	2011
Profit and Loss			
Sales and services	338,460	526,581	362,599
Net profit	32,112	10,399	29,493
Balance Sheet			
Current assets	98,657	109,534	125,124
Total assets	506,866	744,993	811,783
Equity	405,800	539,568	525,659

Note: RUB30.62 = \$1 as of 27 February 2013.

Source: RusHydro.

B. Development Impact, Outcome, and Outputs

1. Impact

9. The development impact includes a successful rehabilitation of aging renewable-energy production assets. Successful implementation of the project will increase the supply of renewable energy through facilitating more rehabilitation and new investment in the sector, and will help foster confidence among potential investors and lenders and promote further private sector investment in Armenia's power sector.

2. Outcome

10. Armenia's power consumers will receive up to 600 GWh per year of more reliable low-cost, carbon-efficient energy from the Sevan–Hrazdan Cascade Hydropower System. The project's operational safety, reliability, and efficiency will increase. In addition, the successful implementation of the project will contribute to the improvement of environmental performance of the system.

3. Outputs

11. Successful implementation of the project will result in the rehabilitation and modernization of the system. The available capacity of hydropower plants in Armenia will be restored by 44.7 MW on completion of the project.

C. Alignment with ADB Strategy and Operations

1. Consistency with Strategy 2020 and Country Strategy

12. The project is consistent with ADB's Strategy 2020 in relation to environmentally sustainable growth, as one of the three strategic agenda items. Strategy 2020 emphasizes investment in infrastructure with further emphasis on promoting private sector participation. In addition, Strategy 2020 highlights ADB's operational emphasis on expanding the use of clean energy sources, reducing greenhouse gas emissions.³

13. The country partnership strategy for Armenia is under preparation and expected to be finalized in 2013. The new strategy is expected to emphasize development of the power sector and the private sector as key priority areas. The project is expected to be consistent with the forthcoming strategy.

2. Consistency with Sector Strategy and Relevant ADB Operations

14. The project is fully consistent with the ADB Energy Policy (2009), which makes support for renewable energy generation a key priority. The policy further stresses the importance of harnessing energy efficiency, which is essential to improve energy security and reduce emissions of greenhouse gases.⁴

[Confidential information deleted.]

D. Implementation Arrangements

15. Table 4 summarizes the implementation arrangements.

Table 4: Summary of Implementation Arrangements

Aspects	Arrangements
Regulatory framework	The project will operate under the general regulatory framework applicable to hydropower companies in Armenia. The tariff is set by the PSRC.
Management	IEC has three directors on its board, all nominated by RusHydro. Key management roles are held by (i) A. Grigoryan, general director (previously deputy general director of ENA); (ii) A. Mkhitarian, director of economics and finance (concurrently advisor to the deputy chairman of RusHydro); and (iii) H. Sargsyan, chief engineer (over 20 years of hydropower experience).
Implementation period	2012–2017
Rehabilitation works	IEC will procure goods and services for the proposed rehabilitation through international competitive bidding. Engineering, procurement, and construction contracts will be used to the extent possible.
Revenue structure	IEC has a power purchase agreement with ENA, the sole electricity distributor in

³ ADB. 2008. *Strategy 2020: The Long-Term Strategic Framework of the Asian Development Bank, 2008–2020*. Manila.

⁴ ADB. 2009. *Energy Policy*. Manila.

Aspects	Arrangements
	Armenia, and it is effective until January 2015. The tariff payable by ENA under the agreement will be in accordance with the approval by PSRC. The approved tariff reflects the amount of capital expenditures to implement the project, the return from capital expenditures, and the company's O&M expenses.
Major cost structure	There is no fuel cost for the project, and the key cost items include administrative costs and O&M costs.
Operation and maintenance	O&M will be handled primarily by IEC staff, and assistance will be provided by RusHydro and contractors.
Performance monitoring	Key performance indicators, including output and outcome indicators, will be reported by IEC to the Asian Development Bank and the European Bank for Reconstruction and Development.

ENA = Electric Networks of Armenia, IEC = International Energy Corporation, O&M = operation and maintenance, PSRC = Public Services Regulatory Committee.

Sources: Asian Development Bank and International Energy Corporation.

[Confidential information deleted.]

III. THE PROPOSED ADB ASSISTANCE

A. The Assistance

16. The proposed loan of up to \$25 million to IEC will be provided from ADB's ordinary capital resources. [Confidential information deleted.]

B. Value Added by ADB Assistance

17. The proposed transaction merits ADB's assistance for the following reasons:

- (i) The project will restore part of the currently unavailable old power generation capacity, and make it available for generating additional electricity.
- (ii) The project will enhance operational efficiency, reliability, and safety of the system and help avoid major outage and associated impacts on the populace.
- (iii) The project will contribute to more efficient use of water resources by reducing water leakage from the system. Water savings are expected to lead to higher electricity generation. In addition, the government is currently making efforts to increase the water level of Lake Sevan, which was reduced significantly during the Soviet era. Reducing water leakage will also support this effort of environment conservation.
- (iv) ADB will provide long-term financing, which is required for successful implementation of the project but not easily available in the market. The nature of the project (e.g., long construction period, high upfront capital expenditure, competitive tariffs assuming a long asset life) is appropriately financed by long-tenor debt to better match with the cash-flow profile.
- (v) ADB facilitated introduction of foreign currency escalation in the project tariff. ADB had rounds of discussion with the PSRC, the regulator, to ensure that the new tariff will include key parameters to achieve a cost recovery level and support the system's sustainability. The project will need to be financed by US dollar-denominated long-term debt, as the local banking market does not have capacity to provide long-term debt in local currency. In view of this, the PSRC approved a new tariff reflecting the project cost and foreign currency escalation.
- (vi) ADB will contribute to strengthening IEC's policies on environment, health, and safety. IEC will implement the new environmental and social management plan, which was

prepared with assistance from ADB. ADB will monitor implementation of the plan and will continue providing recommendation to ensure building up IEC's capacity to implement the plan appropriately.

[Confidential information deleted.]

IV. POLICY COMPLIANCE

A. Safeguards and Social Dimensions

18. In compliance with ADB's Safeguard Policy Statement (2009), the project is classified as category B for environment, category C for involuntary resettlement, and category C for indigenous peoples. The EBRD, which is cofinancing the project, has classified the project as B under its Environmental and Social Policy (2008). The potential environmental and social impacts of the project have been recognized and effective measures to avoid, minimize, mitigate, and compensate for the adverse impacts are incorporated in the safeguard reports and plans. The institutional capacity and commitment of IEC to manage the project's social and environmental impacts are deemed adequate. Information disclosure and consultations with affected people are conducted in accordance with ADB requirements.

19. A review and audit of IEC's current management and operations was prepared against ADB's relevant environmental and social policies and principles, Armenian and European Union legal requirements, and the EBRD's performance requirements. The proposed rehabilitation program does not require undergoing the environmental assessment process according to Armenian legislations, except for Yerevan 1 reconstruction where reservoir dredging is planned. All works are planned within the existing facilities, channels, hydraulic structures, and property boundaries, and rehabilitation does not consider an increase of the original capacity of the hydropower plants. The main environmental impacts and risks from the operations and planned rehabilitation are related to reservoir management, including proposed 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. An environmental and social action plan and corrective action plan were prepared, including an action item for preparing an environmental assessment of dredging works for Yerevan 1 reconstruction before dredging starts. Other key measures in the plan are pollution prevention for oil and all materials and wastes, facilitation of agreements to solve community water connections, and strengthening of the emergency response plan. IEC will develop and implement an oil management plan to properly handle and store raw and used oil to prevent spillage, include oil spill clean-up procedures, provide for disposal and recycling of used oil and define roles and responsibilities of staff involved in raw and used oil management. IEC will also develop and implement a comprehensive waste management plan that will include a description of all waste types generated, procedures for collection, handling, labeling, storage and transportation of wastes for each type, waste prevention, reduction and reuse strategies, a record-keeping system and as well as the roles and responsibilities of staff involved in waste management. IEC will strengthen its existing emergency response plan in order to address (i) community-related emergencies, (ii) risks from flooding from natural causes and illegal construction along the natural river course and floodplains, and (iii) risks from failure of company facilities and structures. IEC will also establish a corporation-wide environmental and social management system based on ADB and ISO 14001 requirements, and adopt it at each hydropower plant. As for protecting Lake Sevan, a fish protection system is in place and

rehabilitation of the structures at water diversion point at Lake Sevan is not planned. Thus, the planned rehabilitation will not affect the lake.

20. A stakeholder engagement plan, which describes the process for engaging stakeholders, including information disclosure and consultation with affected people and other stakeholders, was also prepared. The stakeholder engagement plan also incorporates a grievance mechanism for resolving complaints about IEC's environmental performance. The planned rehabilitation works will be carried out within the existing footprint and no expansion of existing facilities is planned. Such rehabilitation will not require any additional land acquisition and there are no indigenous peoples in the project area. There are also no known outstanding social safeguards issues connected with the facilities to be rehabilitated.

21. ADB will ensure that the investment documentation includes appropriate provisions requiring IEC to comply with national labor laws and, in addition, to take specific measures (including in relation to contractors) in line with internationally recognized core labor standards for the ADB-financed portion of the project, and in compliance with ADB's Social Protection Strategy.⁵ The project is categorized as having no gender elements and does not have measures to provide benefits specific to women.

B. Anticorruption and Anti-Money-Laundering Policies

22. IEC was advised of ADB's Anticorruption Policy (1998, as amended to date) and policy relating to the Combating of Money Laundering and the Financing of Terrorism (2003). Consistent with its commitment to governance, accountability, and transparency, ADB will require IEC to institute, maintain, and comply with internal procedures and controls following international best practice standards for the purpose of preventing corruption, money-laundering activities, and the financing of terrorism, and to covenant with ADB to refrain from engaging in such activities.

C. Investment Limitations

23. The proposed direct loan lies within the medium-term country, industry, group, and single project exposure limits for nonsovereign investments.

D. Assurances

24. Consistent with the Agreement Establishing the Asian Development Bank (the Charter),⁶ the Government of Armenia's no objection to the proposed assistance to IEC will be obtained. ADB will enter into suitable finance documentation, in form and substance satisfactory to ADB, following approval of the proposed assistance by the Board.

V. RECOMMENDATION

25. I am satisfied that the proposed loan would comply with the Articles of Agreement of the Asian Development Bank (ADB) and recommend that the Board approve the loan of up to \$25,000,000 to International Energy Corporation for the Sevan–Hrazdan Cascade Hydropower System Rehabilitation Project in Armenia from ADB's ordinary capital resources, with such terms and conditions as are substantially in accordance with those set forth in this report, and as may be reported to the Board.

⁵ ADB. 2003. *Social Protection*. Manila (adopted in 2001).

⁶ ADB. 1966. *Agreement Establishing the Asian Development Bank*. Manila.

12 March 2013

Haruhiko Kuroda
President

DESIGN AND MONITORING FRAMEWORK

Design Summary	Performance Targets and/or Indicators with Baselines	Data Sources and/or Reporting Mechanisms	Assumptions and Risks
<p>Impact</p> <p>Increased supply of renewable energy through rehabilitation as well as new investment</p> <p>Increased private sector participation in the power sector</p>	<p>Domestic supply of renewable energy increases from 2,500 GWh in 2011 to 3,100 GWh in 2020</p> <p>Private sector investment in Armenia's power sector from 2013 to 2020 is \$175 million or higher.</p>	<p>Government and ADB statistics</p> <p>Government and ADB statistics</p>	<p>Assumption</p> <p>The government remains committed to promote private sector hydropower projects.</p> <p>Risk</p> <p>Deterioration in macroeconomic and/or political climate in Armenia.</p>
<p>Outcome</p> <p>Increased efficiency, reliability, safety, and environmental performance of the Sevan–Hrazdan Cascade Hydropower System</p>	<p>Project dispatches an estimated annual production of 600 GWh from 2018.</p> <p>Annual contribution to government revenue increased from \$0.013 million in 2011 to \$1.1 million from 2018 onwards.</p> <p>The Company's operation and maintenance according to international good practice and safety standards from 2018.</p> <p>Electricity generation and transmission equipment meets international technical, and environmental performance standards from 2018.</p>	<p>Project reporting</p> <p>Government and ADB statistics</p>	<p>Assumptions</p> <p>Sufficient hydropower resources, reliable transmission and distribution network</p> <p>Approved tariff structure will continue or improve.</p> <p>Risk</p> <p>Lower-cost generation alternatives come on stream.</p>
<p>Output</p> <p>Rehabilitation and modernization of the Sevan–Hrazdan Cascade Hydropower System</p>	<p>Armenia's available generation capacity is restored by 44.7 MW when rehabilitation ends in 2017.</p> <p>Locally purchased goods and services amount to \$10 million by 2017.</p> <p>400 workers are employed during rehabilitation and reconstruction from 2013 to 2017.</p> <p>Appropriate environmental and social mitigation measures are implemented in accordance with the safeguard documents from 2015</p>	<p>Project reporting</p>	<p>Assumption</p> <p>The project reaches financial close, and is commissioned as planned.</p> <p>Risk</p> <p>The borrower and contractors are not able to execute the project on budget and on time.</p>

Activities with Milestones: Financial close by second quarter of 2013 Rehabilitation works start immediately after financial close Completion of the planned rehabilitation work by December 2017.	Inputs: [Confidential information deleted]
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ADB = Asian Development Bank, EBRD = European Bank for Reconstruction and Development, GWh = gigawatt-hour, IEC = International Energy Corporation, MW = megawatt.

Sources: Asian Development Bank and International Energy Corporation.