PROJECT INFORMATION DOCUMENT (PID)
APPRAISAL STAGE

Report No.: PIDA20062

Project Name	Geothermal Exploratory Drilling Project (P152039)
Region	EUROPE AND CENTRAL ASIA
Country	Armenia
Sector(s)	Other Renewable Energy (100%)
Theme(s)	Infrastructure services for private sector development (90%), Climate change (10%)
Lending Instrument	Investment Project Financing
Project ID	P152039
Borrower(s)	MINISTRY OF FINANCE AND ECONOMY
Implementing Agency	Renewable Resources and Energy Efficiency Fund
Environmental Category	B-Partial Assessment
Date PID Prepared/Updated	14-Apr-2015
Date PID Approved/Disclosed	14-Apr-2015
Estimated Date of Appraisal Completion	06-Apr-2015
Estimated Date of First Grant Approval	29-May-2015
Appraisal Review Decision (from Decision Note)	

I. Project Context

Country Context

Economic growth slowed to 3.5 percent in 2013 and 2.7 percent year-on-year in the first half of 2014. The slowdown is the result of a number of factors such as slackening foreign direct investment (FDI), dependence on a limited number of commodity exports, and a difficult external economic environment. Consumer lending and remittances continued to support private consumption, but under-execution of government spending suppressed aggregate demand. On the supply side, the mining and energy sectors performed particularly badly, offsetting positive developments in manufacturing. The expectation of accession to the Eurasian Economic Union (EEU) has not yet had much impact on Armenia's trade profile. In fact, exports to the EEU declined. Among the developing Commonwealth of Independent States (CIS), trading partner slowdowns, geopolitical tensions, declining metal and mineral prices, and domestic capacity constraints have been slowing growth this year. The incidence of poverty is recovering slowly from the 2009 economic crisis, in line with growth dynamics. The composition of the consumption basket for both poor and non-poor groups of Armenians to some extent offset poverty pressures related to price increases. Employment is not a sufficient safeguard against poverty; the poverty rate among the employed grew from 22.2 in 2008 to 26.1 percent in 2012. Up to 2009, the shared

prosperity, or growth in average consumption of the bottom 40 percent, experienced high annual growth of 4.3 percent. Then there was a large contraction of 7.5 percent during the crisis and a subsequent recovery to growth of 3.4 percent between 2010 and 2012.

Sectoral and institutional Context

During the first phase of reforms in 1990s and early 2000s the power sector achieved some remarkable results. The collection of electricity bills reached 100 percent of sales. The regulatory framework was stable and overall conducive to private investments. The explicit and implicit subsidies were eliminated. A competent and independent regulatory agency for the sector was established.

However, currently the power sector faces a number of major challenges that need to be addressed as part of the second phase of reforms. The key challenges currently faced by the power sector are: (a) emerging power supply gap; (b) threatened power supply reliability; (c) increasingly unaffordable electricity tariffs; and (d) deteriorating governance.

Supply Adequacy: The power system will need around 500 MW of new gas-fired generation capacity as soon as possible to: (a) stop buying power from old (>45 years) and inefficient (30% conversion efficiency) gas-fired Hrazdan Thermal Power Plant (TPP), which has the highest generation tariff in the system; and (b) preclude emergence of supply capacity gap by 2020.

To ensure sufficient long-term supply the Government will also need to develop a number of renewable energy projects, which are estimated to be part of the least-cost supply plan (e.g. Shnogh HPP, Loriberd HPP, and Karkar geothermal if the exploratory drilling confirms availability of adequate temperature resource).

The supply gap can be reduced through improvements in tariff structure to promote more efficient energy consumption. Specifically, the existing electricity tariff structure does not reflect the large difference between the costs of supply during winter and summer months (AMD 28/kWh vs. AMD 8/kWh), which creates perverse incentives for consumers and promotes economically inefficient electricity consumption.

Supply Reliability: The average interruption frequency per line for 110 and 220 kV lines on the balance sheet of High Voltage Electric Networks (HVEN) is 2.5 times higher than for comparator well-performing utilities.

Affordability: In 2013-2014, the average electricity tariff for residential customers increased by 40% and the gas tariff increased by 19%. Those increases were estimated to have increased poverty by 3%. Moreover, bottom 20% of population (in terms of income) cannot afford adequate amount of energy for basic needs. The situation is expected to deteriorate further as much needed investments in the sector are made.

Financial viability of state-owned power companies: The financial standing of state-owned power companies deteriorated since 2001 due to: (a) Inconsistent application of cost-recovery tariff methodology. This has resulted in under-spending on maintenance, significant increase of liabilities for the privately-owned distribution company and all state-owned companies (HVEN, Yerevan

TPP, and ANPP), and reduced investments in improvement of power supply reliability and reduction of losses; (b) Large short-term borrowing by the state-owned companies for non-core business activities (financing of salaries of a large dysfunctional synthetic rubber plant); and (c) Deterioration in transparency and public disclosure of information as evidenced by a recent privatization transaction, and tariff review decisions.

Transparency: The transparency of the sector has deteriorated since 2011. Specifically, the deterioration of transparency was manifested through reduced public disclosure of information related to energy sector issues and challenges.

The proposed project will leverage the World Bank's current engagement in the energy sector in Armenia to help the Government to address the challenge of supply adequacy. The WBG is engaged in the energy sector through investment financing operations, policy dialogue, and analytical activities, including: Preparation of the Financial Recovery Plan; Armenia Power Sector Policy Note, US$39 million Electricity Supply Reliability Project (ESRP), US$40 million Additional Financing to Electricity Supply Reliability Project (ESRP AF); US$51 million Electricity Transmission Network Improvement Project (ETNIP); US$10.6 million Energy Efficiency Project (including GEF grant of US$1.8 million); Analytical and Advisory Support for Mitigating Energy Tariff Increase on the Poor;
US$15 million Sustainable Energy Finance Project of IFC.

Given the challenges of impending power supply adequacy and energy security, the Government prioritizes development of indigenous renewable energy resource as reflected in the several strategic documents of the Government, including the Concept of National Energy Security (November 2013). The Government targets to increase the share of small renewable energy based power generation in the supply mix from the current level of 9% to 20% by 2020.

The Government has taken steps to support the development of indigenous renewable energy resources, including establishment of feed-in tariffs for small hydropower plants (SHPPs) by the Public Services Regulatory Commission (PSRC), mandatory 15-year off-take by the distribution company of the electricity generated by the small renewable energy plants, streamlining of licensing requirements and procedures. As a result, the share of electricity generated by SHPPs increased from less than 1% in 2004 to 9% in 2013. The Government remains committed to further increase the share of the renewable energy in the generation mix by promoting development of renewable energy technologies, which have large potential for scale-up and limited impact on end-user tariffs.

The SREP Investment Plan identified geothermal power, utility-scale solar PV, and geothermal and solar heating as priority areas for support and future scale-up. With the support from SREP, The Government plans to construct 30-40 MW of utility-scale solar PV projects with subsidized capital cost from SREP. The total potential for geothermal power is currently estimated to be at least 150 MW. Of the known areas, the Karkar field has been assessed to have the highest potential, possibly around 30 MW, which is 8% of the new capacity required by the Government by 2021. Surface exploration has been completed according to international standards and exploratory drilling is now needed in order to confirm whether the field contains adequate resources that can be exploited for electricity generation.

II. Proposed Development Objectives

The proposed project development objective is to confirm whether the geothermal resource at Karkar site is suitable for power generation and, if confirmed, to involve the private sector in development of a geothermal power plant.

III. Project Description

Component Name

Phase I exploratory drilling

Comments (optional)

Sub-component A.1: This sub-component will finance the construction of an access road to the project site and drilling of slim exploratory wells.

Sub-component A.2: This sub-component will finance technical assistance for assessment of the geothermal resource potential and technical supervision, including mud logging, well logging, well testing, technical supervision and support consultant and project audit and operating costs.

Any project funds that are not used during the Phase One of the project will be made available for implementation of the Phase Two if the results from drilling of exploratory wells during Phase I justify the need for Phase II.

Component Name

Phase II exploratory drilling and transaction advisory

Comments (optional)

Sub-component B.1: This sub-component will finance the construction of water infrastructure and rig pads and drilling of production-size exploratory well(s).

Sub-component B.2: This sub-component will finance technical assistance for assessment of the geothermal resource potential and technical supervision, including mud logging, well logging, well testing, feasibility study for a geothermal power plant, technical supervision and support consultant, transaction advisory, and project audit and operating costs.

IV. Financing *(in USD Million)*

Total Project Cost:	10.68	Total Bank Financing:	0.00
Financing Gap:	0.00		

For Loans/Credits/Others	**Amount**
Borrower	2.13
Strategic Climate Fund Grant	8.55
Total	10.68

V. Implementation

The project will be implemented by the Renewable Energy and Energy Efficiency Fund (R2E2 Fund). The R2E2 Fund is a non-profit organization established by the Government in 2005 with the mandate to promote the development of renewable energy and energy efficiency markets in Armenia and to facilitate investments in these sectors. The implementation of the project as well as overall R2E2 Fund operations will be supervised by the Board of Trustees (BOT), consisting of representatives of government agencies, NGOs, and the private sector, thus, ensuring required professional expertise. The BOT is chaired by the Minister of Energy and Natural Resources.

Given the technical complexity of the project, the R2E2 Fund will set-up a project implementation structure that provides the necessary technical, coordination and project management skills that are required to execute an on-time and cost-effective drilling operation. This will include hiring a technical supervision and support consultant (a geothermal consulting company) to perform technical management of the geothermal drilling operations and provide technical advice to the R2E2 Fund throughout project implementation.

VI. Safeguard Policies (including public consultation)

Safeguard Policies Triggered by the Project	Yes	No
Environmental Assessment OP/BP 4.01	×	
Natural Habitats OP/BP 4.04		×
Forests OP/BP 4.36		×
Pest Management OP 4.09		×
Physical Cultural Resources OP/BP 4.11		×
Indigenous Peoples OP/BP 4.10		×
Involuntary Resettlement OP/BP 4.12	×	
Safety of Dams OP/BP 4.37		×
Projects on International Waterways OP/BP 7.50		×
Projects in Disputed Areas OP/BP 7.60		×

Comments (optional)

VII. Contact point

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