

**PROJECT INFORMATION DOCUMENT (PID)
APPRAISAL STAGE**

Report No.: **75857**

Project Name	Preparation of the Scaling up Renewable Energy Program Investment Plan Project
Region	Europe and Central Asia
Country	Armenia
Sector	Energy and Mining
Lending Instrument	Technical Assistance
Project ID	P133831
Parent Project ID	N/A
Borrower(s)	Renewable Resources and Energy Efficiency Fund
Implementing Agency	Renewable Resources and Energy Efficiency Fund
Environmental Screening Category	{ }A { X }B { }C { }FI
Date PID Prepared	March 1, 2013
Estimated Date of Appraisal Completion	March 11, 2013
Estimated Date of Board Approval	March 20, 2013
Decision	Project authorized to proceed to negotiations upon agreement on any pending conditions and/or assessments.

I. Country Context

Armenia has sustained economic reforms leading to significant improvements on its income levels over the past decade and a half. Real gross domestic product (GDP) growth averaged 12% per year during 2000–08 driven by substantially foreign exchange inflows, mostly in the form of remittances. These inflows boosted domestic investment, primarily in the construction sector. Growth in per capita incomes together with improved social safety nets contributed to a decline in poverty. However, the recent economic crisis reversed some of these achievements when Armenia experienced a sharp downturn with output contracting by 14% in 2009. Poverty increased, with 35.8% of the population living below the poverty line in 2010 compared to 27.6% in 2008. The Government’s strong counter-cyclical fiscal policy focused mainly on increased spending on infrastructure, social protection, and emergency financing for enterprises. While the fiscal expansion helped protect the poor and maintain jobs, the pace of recovery remained slow with only 2.1% growth in 2010, picking up to 4.6% in 2011 and 6.2% in 2012, but expected to moderate at approximately 4% in 2013.¹

II. Sectoral and Institutional Context

The power sector has achieved significant results through reforms and restructuring. The sector has strong payment discipline with collections for electricity at 100% of sales. There are no

¹ “Republic of Armenia: Fourth Reviews Under the Extended Fund Facility and Extended Credit Facility”, IMF Country Report No. 12/153

explicit or implicit subsidies to the energy sector and the sector entities are among the largest tax payers in the country. There is a competent regulatory agency for the sector. Despite these achievements, the energy sector faces a number of challenges.

The key challenges in the energy sector include: (a) emerging power supply gap; (b) threatened energy security; and (c) increasingly unaffordable energy tariffs.

Emerging power supply gap: Armenia currently has sufficient capacity to meet its demand. However, depending on electricity demand growth scenarios, generation capacity shortage to meet the peak electricity demand is estimated to emerge after the planned shut-down of the nuclear power plant (currently estimated in 2021), and the phasing out of inefficient and old (>40 years) thermal power plants.

Threatened energy security: Heavy reliance on imported fuels as well as old and under-maintained transmission and distribution assets put Armenia at risk of supply interruptions, price fluctuations, and possible outages. The average age of the transmission lines is around 45 years and the transmission company did not make any substantial investments in rehabilitation of the lines. Moreover, fuel for more than 90 percent of the country’s energy needs is imported.

Unaffordable energy tariffs: Rising fuel prices and the need for new, more expensive generating units make the energy tariffs less affordable for the poor. In 2010, the poor Armenian households spent roughly 9% of their household budgets on electricity and gas. The affordability issue will exacerbate if fuel prices continue to rise and the required significant investments are made.

The Energy Sector Strategy (2006), the National Program on Renewable Energy and Energy Efficiency (2007) and the Sustainable Development Program (2009) recognize these challenges, including the need to expand the use of renewable energy as a means of improving the country’s energy security and ensuring sustainable energy supply.

In 2011, the share of renewable energy in the electricity mix was 40%, however, this included two large hydropower cascades, which account for almost 33% and 130 SHPPs, a wind plant and a biomass plant (all having less than 10 MW of installed capacity) accounting for remaining 7%. The Government is keen to further increase use of renewable energy given significant estimated renewable energy potential (see Table 1 below).

Table 1. Estimated Renewable Energy Technical Potential in Armenia

Technology Type	Capacity
PV	>1000 MW
Wind	300-500 MW
Geothermal	50 MW ²
Small Hydro	250-300 MW
Solar Thermal	>1000 MW
Heat Pumps	>1000 MW
Biofuel	100 thousand tons/year

Source: Renewable Energy Roadmap for Armenia, Renewable Resources and Energy Efficiency Fund, May 2011

² This is the estimated potential of only two geothermal sites for which significant field investigation works were done – Karkar and Jermakhyur (Southern Armenia). The field investigation works for Karkar site were supported by GEF financed recently closed US\$1.8 million grant from GeoFund 2.

However, to date renewable energy generation in Armenia (excluding larger hydro cascades) was almost entirely confined to small hydropower. Development of SHPPs picked up pace due to donor, including World Bank's, support with long-term financing for such projects, assistance in removal of legal and regulatory barriers and establishment of attractive feed-in tariffs and electricity off-take requirements. However, despite the existence of feed-in tariffs and enabling regulation, there has been very limited development of other renewable energy sources such as wind, solar, biomass and geothermal. The use of renewable energy for heating and hot water is also very limited.

Thus, the Government requested Scaling Up Renewable Energy Program in Low Income Countries (SREP) to support development of other non-SHPP viable renewable energy technologies and projects for several of which detailed technical assessments, pre-feasibility or feasibility studies are available. The Government's participation in the SREP could allow Armenia to access donor funds to facilitate the greater exploitation of renewable energy resources.

III. Project Development Objectives

The project development objective is to support the Armenian government to prepare renewable energy investment plan for consideration by the SREP for funding.

IV. Project Description

Component 1: Preparation of the investment plan: This component will support the following key activities:

- (i) Comprehensive assessment of various renewable energy technologies applicable in Armenia. This will include: (a) assessment of the levelized economic costs (LECs) of various renewable energy technologies; (b) simulation of combinations of assessed renewable energy based electricity generation options with other fossil-fuel based generation options considered by the Government for meeting the electricity demand; (c) assessment of the viability of renewable based heating technologies included in the analysis and estimate of the relative economic attractiveness of renewable based alternatives to electricity, gas-based, coal-based or firewood based heating.
- (ii) Identification of specific renewable energy projects. This will include identification of specific renewable energy projects (excluding SHPPs) based on the above analysis, existing assessments of renewable energy resources and potential, including data/information from resource mapping and completed pre-feasibility and feasibility studies. The renewable energy projects may include, but not limited to wind, solar (photovoltaic, concentrated solar plants, solar heaters), geothermal, biomass. This task will also include: (a) trade-off analysis of promising renewable energy projects considering advantages and disadvantages and prioritization of the projects based on at least four criteria agreed with the Government. Besides the purely economic considerations, evaluation of technologies should also consider other costs and benefits including, but not limited to energy security; reduction of GHG emissions; and environmental and social costs, including potential impacts related to connection of the specific renewable energy projects to high voltage grid; (b) development

of business models and financing schemes for identified priority projects; (c) assessment of the impact of combinations of renewable energy options and other generation investments on end-user tariffs; and (d) assessment of generic environmental and social opportunities and risks of various renewable energy generation technologies considered for Armenia, and environmental and social screening of the available documents analyzed for the identification of specific renewable energy projects. Depending on the scope and nature of the reviewed material, this will include: (1) identification of possible gaps in the coverage of the expected positive and negative environmental and social impacts of the proposed projects, pointing out whether the existing information and data gaps will preclude proper analysis/prioritization of a project and will need to be filled in before it is recommended for the inclusion in the investment plan; and (2) environmental and social assessment of available pre-feasibility and feasibility studies.

- (iii) Support to the MENR and R2E2 Fund for stakeholder consultations regarding the priority list of renewable energy technologies. This primarily includes support for engaging stakeholders and conducting public consultations to discuss preparation activities, potential interventions to be funded by SREP and the draft Investment Plan.
- (iv) Drafting of the SREP Investment Plan for renewable energy, based on the findings of the above analysis and the consultations with key stakeholders. This subcomponent will include: (a) drafting of the Investment Plan following the structure recommended by SREP (enclosed to the concept note package), based on prioritized list of renewable energy investments identified above. The Investment Plan will present the requirements for financing under SREP and present other available financing options; (b) preparation of concept briefs of priority investment projects for SREP funding, as per templates provided by SREP; and (c) identification of the issues that need to be addressed in order to successfully allow the implementation of the proposed Investment Plan.

Component 2: Project implementation: This component will finance the incremental operating costs of the R2E2 Fund related to implementation of the project activities and the project audit.

V. Financing

Source:	(\$m.)
Borrower/Recipient	0.06
IBRD	-
IDA	-
Others (SREP)	0.3
Total:	0.36

VI. Implementation

The R2E2 Fund will implement the project. It has adequate capacity and significant experience in implementing Bank financed projects. 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.

The R2E2 Fund has significant experience in procurement and financial management policies, rules and procedures of the Bank. The R2E2 Fund has implemented several World Bank financed projects since 2005, including the Urban Heating Project, Renewable Energy Project, GeoFund 2: Armenia Geothermal Project and is currently implementing the GEF Energy Efficiency Project.

VII. Safeguard Policies (including public consultation)

Safeguard Policies Triggered by the Project	Yes	No
Piloting the Use of Borrower Systems to Address Environmental and Social Issues in Bank-Supported Projects (OP/BP 4.00)		X
Environmental Assessment (OP/BP 4.01)	X	
Natural Habitats (OP/BP 4.04)		X
Pest Management (OP 4.09)		X
Physical Cultural Resources (OP/BP 4.11)		X
Involuntary Resettlement (OP/BP 4.12)		X
Indigenous Peoples (OP/BP 4.10)		X
Forests (OP/BP 4.36)		X
Safety of Dams (OP/BP 4.37)		X
Projects in Disputed Areas (OP/BP 7.60)*		X
Projects on International Waterways (OP/BP 7.50)		X

VIII. Contact point at World Bank and Borrower

World Bank

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* By supporting the proposed project, the Bank does not intend to prejudice the final determination of the parties' claims on the disputed areas.

Implementing Agencies

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IX. For more information contact:

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