

Terminal Evaluation Review form, GEF Evaluation Office, APR 2013

1. Project Data

Summary project data			
GEF project ID		3878	
GEF Agency project ID		P114409	
GEF Replenishment Phase		GEF-3	
Lead GEF Agency		World Bank	
Project name		GeoFund 2: ARMENIA GEOTHERMAL PROJECT	
Country/Countries		Armenia	
Region		ECA	
Focal area		Climate Change	
Operational Program or Strategic Priorities/Objectives		OP6- Promoting the adoption of renewable energy by removing barriers and reducing implementation costs	
Executing agencies involved		Renewable Resources and Energy Efficiency Fund (R2E2) Fund	
NGOs/CBOs involvement		Lead executing agency	
Private sector involvement		Consultations	
CEO Endorsement (FSP) /Approval date (MSP)		24-Feb-2009	
Effectiveness date / project start		30-Apr-2009	
Expected date of project completion (at start)		30-Apr-2011	
Actual date of project completion		30-Sep-2012	
Project Financing			
		At Endorsement (US \$M)	At Completion (US \$M)
PPG	GEF funding		
	Co-financing		
GEF Project Grant		1.50	1.24
Co-financing	IA/EA own		
	Government	0.30	0.26
	Other*		
Total GEF funding		1.50	1.24
Total Co-financing		0.30	0.26
Total project funding (GEF grant(s) + co-financing)		1.80	1.50
Terminal evaluation/review information			
TE completion date		4-Mar-2013	
TE submission date		12/1/2013	
Author of TE		Arsen Petrosyan	
TER completion date		20-Feb-2014	
TER prepared by		Pallavi Nuka	
TER peer review by (if GEF EO review)		Joshua Schneck	

*Includes contributions mobilized for the project from other multilateral agencies, bilateral development, cooperation agencies, NGOs, the private sector, and beneficiaries.

2. Summary of Project Ratings

Criteria	Final PIR	IA Terminal Evaluation	IA Evaluation Office Review	GEF EO Review
Project Outcomes	S	S	S	S
Sustainability of Outcomes	UA	L	ML	UA
M&E Design	UA	UA	Substantial	S
M&E Implementation	UA	UA	Substantial	S
Quality of Implementation	S	S	S	S
Quality of Execution	UA	S	S	S
Quality of the Terminal Evaluation Report	NA		S	S

3. Project Objectives

3.1 Global Environmental Objectives of the project:

As described in the project document, the global environmental objective of the project is to remove the barriers to the development of geothermal energy in Armenia. Development of geothermal resources will enable the reduction of the reliance on imported fuels, increase the country's energy security and contribute to reduction of green house gases and other pollutants. Additionally, geothermal is the most reliable form of environmentally friendly power.

3.2 Development Objectives of the project:

The project development objective (PDO) was to assess the feasibility of exploratory drilling of the geothermal site with the estimated highest geothermal potential. The project had one component: Technical Assistance. The technical investigation was in done in two phases. Preliminary identification of potential sites was done through Phase I-MT sounding. Phase II 3D-MT survey would be then be conducted at the 2 most promising sites.

1. Technical Investigation

- Phase I included (i) geological field works (scouting) and (ii) 2D magneto-telluric (MT) sounding of the two selected potential geothermal fields; (iii) interpretation of the results of the MT sounding; and (iv) supervision of the implementation of the scope of geological field works and MT sounding study.
- Phase II involved a three dimensional (3D) seismic survey, accompanied by the gravimetric and soil gas surveys; (iii) supervision of the implementation of the scope of 3D seismic study; and (iv) assessment of the economic and financial viability of the geothermal site with the highest estimated technical potential.

2. Project Implementation/Management

3.3 Were there any **changes** in the Global Environmental Objectives, Development Objectives, or other activities during implementation?

The original project components were not revised, but there were some changes in proposed activities.

Based on the results of the Phase I site investigation works, the project was restructured and the GEF grant amount was revised down to \$USD 1.24 Million. The proposed 3D seismic study of the Karkar site was replaced with a 3D MT sounding, which would provide more reliable data given the geology of the Karkar site.

4. GEF EO assessment of Outcomes and Sustainability

Please refer to the GEF Terminal Evaluation Review Guidelines for detail on the criteria for ratings.

Relevance can receive either a Satisfactory or Unsatisfactory rating. For Effectiveness and Cost efficiency, a six point rating scale is used (Highly Satisfactory to Highly Unsatisfactory), or Unable to Assess. Sustainability ratings are assessed on a four-point scale: Likely=no or negligible risk; Moderately Likely=low risk; Moderately Unlikely=substantial risks; Unlikely=high risk. In assessing a Sustainability rating please note if, and to what degree, sustainability of project outcomes is threatened by financial, sociopolitical, institutional/governance, or environmental factors.

Please justify ratings in the space below each box.

4.1 Relevance	Rating: Satisfactory
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Development of indigenous renewable energy resources is a priority for Armenia as a means to diversify energy supply and ensure greater energy security. As import prices of fossil fuels Armenia needs to invest in new generation capacity and rehabilitation of existing capacity in order to continue to meet consumer needs. This is highlighted in the national Energy Law, the Law on Renewable Energy and Energy Efficiency, and the national Energy Sector Strategy

The project objective is consistent with the current development priorities as reflected in the World Bank Country Partnership Strategy (CPS) with Armenia for FY 2009-2012. One of the key objectives of the current CPS is to strengthen the foundations for competitiveness through investments in new power generation capacity, including renewable energy. The proposed project is also consistent with the current Country Assistance Strategy for Armenia as it will enable Armenia to improve environmental sustainability through reduction of green-house gas (GHG) emissions. The project is also in line with the Poverty Reduction Strategy Paper (PRSP), which prioritizes strengthening of the country's energy security by facilitating the development of indigenous renewable energy resources.

The project is consistent with the strategies of GEF's Climate Change focal area and GEF OP6-Promoting the adoption of renewable energy by removing barriers and reducing implementation costs. This project lowers barriers to exploitation of geothermal energy in Armenia. The project is also consistent with the Program Objectives of the GeoFund to systematically promote the use of geothermal energy in the ECA region by removing barriers to the development of renewable energy in the areas of: (i) knowledge and information; (ii) institutional, policy, legal and regulatory systems, and (iii) financial systems. The project provides technical assistance to Armenia in identifying potential geothermal drilling sites.

4.2 Effectiveness	Rating: Satisfactory
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Based on the information presented in the terminal evaluation report, the project successfully achieved expected outputs and outcomes. The project results enabled the Gov. of Armenia to make an informed decision to proceed with exploratory drilling at the Karkar geothermal site.

Phase 1: Project activities were carried out through contracted geological consulting firms. Geological fieldwork at the Karkar and Gridzor sites was conducted to identify the location and length of profiles for an MT sounding study. The data from the MT sounding study was used to develop 1D and 2D inversion models mapping rock resistivity at both sites. To limit bias, the interpretation of the models was done by a different independent contractor. The conclusion was that the Karkar site had greater potential and that future work should be restricted to the Karkar site. The TE report does not find any issues with this result from Phase 1 investigations.

Phase 2: A 3D MT sounding was then carried out at Karkar, instead of the planned 3D seismic survey, supplemented by the gravity and CO2 gas surveys. Data from the 3D MT sounding survey was used to develop conceptual geothermal models of the Karkar site with indications of the possible reservoir sizes and temperatures. Again an independent contractor provided interpretation of the models, to confirm the likely locations of geothermal aquifers and proposed exploratory drilling sites. However another pre-drilling survey will be required to determine exact locations. The project also contracted studies on the economic and financial viability of three types of potential geothermal plants at the Karkar site given the geological data.

4.3 Efficiency	Rating: Satisfactory
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The project closed almost 18-months later than expected with all planned activities implemented and clear results supporting follow-on investments. The TE report notes savings of approximately \$US 0.257 million due to the replacement of the 3D seismic study with the 3D MT study. However, according to the World Bank datasheet, total disbursement to the project by Sep. 2013 was \$US 1.31 million, which is consistent with the original commitment amount. It's not clear from the TE report or the final PIR if the project was able to realize savings, and if so, where the savings went.

According to the TE report, the project management was efficiently managed. The technical studies were carried out by contracted geological engineering firms. The TE report notes that "project funds yielded good value for money spent and the costs of exploration works were comparable to the average costs of similar field investigation works for geothermal projects." According to the TE report, the only source of delay was due to the decision to do a 3D MT sounding study rather than a 3D seismic study.

4.4 Sustainability	Rating: Unable to Assess
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The TE report briefly assesses the risks to development outcomes. Because of the lack of information regarding financial risks, the TER is unable to assess a rating for sustainability.

Financial (UA): There is no information in the TE report on follow-on funding to sustain project outcomes. The project document stipulated only that follow-on financing for drilling one or two exploratory well would be considered conditional upon results of this project. The TE report does not mention government financing of exploratory drilling.

Socio-political (L): There is strong government commitment to geothermal development. According to the TE report, the government is "very unlikely to change its decision to pursue exploratory drilling" given the findings of the technical studies. The project has also reduced the obstacles to private sector support for geothermal since the prospecting results provide strong evidence for large geothermal potential.

Institutional (L): Project design did not include capacity building or institutional strengthening. There was some enhancement of local scientific and technical expertise as a local geological research institution was subcontracted for aspects of the fieldwork. The TE report notes that the "project did not support any investments or policy, regulatory, legal or other changes, which may revert due to some unanticipated or anticipated influence or impacts."

Environmental (L): No risks noted in the TE report. The prospective geothermal fields are located in pristine natural areas, thus, as a precautionary measure (despite the C classification) the ProDoc stipulated that a simple environmental management plan (EMP) was to be produced by the government. Under a decision to drill, a comprehensive environmental assessment was supposed to be prepared. This is only a risk in the case that the results of the environmental assessment trigger some safeguards that hinder drilling.

5. Processes and factors affecting attainment of project outcomes

5.1 Co-financing. To what extent was the reported co-financing essential to the achievement of GEF objectives? If there was a difference in the level of expected co-financing and actual co-financing, then what were the reasons for it? Did the extent of materialization of co-financing affect project's outcomes and/or sustainability? If so, in what ways and through what causal linkages?

At appraisal, the Gov. of Armenia was expected to contribute US\$ 0.30 million cofinancing, unspecified cash or in-kind. This was later revised to US\$ 0.26 million. According to the TE report US\$ 0.26 materialized but there is no indication of when or in what form.

5.2 Project extensions and/or delays. If there were delays in project implementation and completion, then what were the reasons for it? Did the delay affect the project's outcomes and/or sustainability? If so, in what ways and through what causal linkages?

According to the TE report, the only source of delay was due to the decision to do a 3D MT sounding study rather than a 3D seismic study. This required time for restructuring, re-doing the bidding on the contract, and waiting for favorable weather conditions.

5.3 Country ownership. Assess the extent to which country ownership has affected project outcomes and sustainability? Describe the ways in which it affected outcomes and sustainability, highlighting the causal links:

According to the TE report, the project was strongly country-driven, and the Ministry of Environmental and Natural Resources (MENR) was committed to the project throughout project preparation and implementation. The TE report does not provide much detail on ownership, but does not that MENR supervised the executing agency, and "provided the needed support to facilitate implementation and resolve various project related issues."

6. Assessment of project's Monitoring and Evaluation system

Ratings are assessed on a six point scale: Highly Satisfactory=no shortcomings in this M&E component; Satisfactory=minor shortcomings in this M&E component; Moderately Satisfactory=moderate shortcomings in this M&E component; Moderately Unsatisfactory=significant shortcomings in this M&E component; Unsatisfactory=major shortcomings in this M&E component; Highly Unsatisfactory=there were no project M&E systems.

Please justify ratings in the space below each box.

6.1 M&E Design at entry	Rating: Satisfactory
<p>The M&E design at entry was brief, only indicating that the "R2E2 Fund will have the overall responsibility for project implementation and for monitoring of project outcomes." The Fund itself was under direct supervision of the MENR. There was no separate budget indicating for project M&E; these costs were integrated into the overall project management budget.</p> <p>The project results framework included outcome and intermediate outcome indicators. The indicators are output oriented (subsurface maps produced, analysis conducted), but clearly defined, and directly relevant to the PDO. The project itself, as a technical assistance exercise, was output oriented. The results framework contains no baseline data, because the indicators were defined as output indicators, and the baseline values are essentially null.</p>	
6.2 M&E Implementation	Rating: Satisfactory

The TE report does not provide a detailed assessment of the implementation of project M&E, but does rate this parameter as satisfactory. Monitoring of project implementation was carried out in accordance with Bank guidelines. According to the TE report, the data for the project outcome and the results indicators “was acquired from the reports submitted by the consultants implementing geological field scouting, MT, 3D MT and pre-feasibility stage economic/financial appraisal of the conceptual geothermal power plant.” The TER notes the “fiduciary and safeguards aspects of the project were adequately supervised. The financial management implementation support missions and procurement ex-post reviews were conducted as scheduled.” A terminal evaluation of the project was also conducted.

7. Assessment of project implementation and execution

Quality of Implementation includes the quality of project design, as well as the quality of supervision and assistance provided by implementing agency(s) to execution agencies throughout project implementation. Quality of Execution covers the effectiveness of the executing agency(s) in performing its roles and responsibilities. In both instances, the focus is upon factors that are largely within the control of the respective implementing and executing agency(s). A six point rating scale is used (Highly Satisfactory to Highly Unsatisfactory), or Unable to Assess. Please justify ratings in the space below each box

7.1 Quality of Project Implementation	Rating: Satisfactory
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The implementing agency for the project was the World Bank. According to the TE report, Bank oversight of the project from preparation through to terminal evaluation was good. The project design was sound, realistic, and relevant to national priorities.

Based on the information in the TE report, supervision by the bank was adequate. The Bank acted in a timely manner to restructure the project when it was decided to use 3D-MT sounding. Financial oversight also was adequate. Independent audits were conducted annually. No financial or procurement problems arose during the project, and there were no delays in processing disbursements.

According to the project document, because the two potential geothermal sites are located in “pristine natural areas” the project was supposed to prepare a simple environmental management plan “to instruct staff executing the field surveys to minimize any potential environmental impacts.” There is no information in the TE report on whether this was done.

7.2 Quality of Project Execution	Rating: Satisfactory
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The executing agency was the R2E2 Fund, housed in the Ministry of Environment and Natural Resources. The Fund hired an international geothermal specialist to supervise activities and review the consultants’ reports. Based on the information in the TE report and PIRs, project execution was well managed. Project activities, procurement of consultants, and submission of progress reports (ISRs), were all timely. The only delay was due to decision to use 3D-MT sounding, which required re-bidding of the contract.

According to the TE report, the financial and procurement processes were transparent and in line with Bank guidelines.

8. Lessons and recommendations

8.1 Briefly describe the key lessons, good practices, or approaches mentioned in the terminal evaluation report that could have application for other GEF projects.

1. The project design should allow flexibility regarding the types of field investigation works that can be financed. In some cases, results of field scouting and other basic field works might warrant a different type of follow-up field study, which was not provided for in the project. Thus, if types of field investigation works are strictly prescribed,

then a project restructuring will be required, which may delay implementation of the project due to the time required for restructuring and subsequent probability of missing the favorable weather conditions.

2. Given the technically complex nature of some geo-technical studies and non-availability of specialized firms in the local market as well as possible limited interest of internationally renowned firms, it is advisable to start procurement of such studies as early as possible. Otherwise, the consultant selection might result in very few or no bids for such consultancy services, which may require rebidding and delay project implementation.

8.2 Briefly describe the recommendations given in the terminal evaluation.

No recommendations are presented in the terminal evaluation report.

9. Quality of the Terminal Evaluation Report

A six point rating scale is used for each sub-criteria and overall rating of the terminal evaluation report (Highly Satisfactory to Highly Unsatisfactory)

Criteria	GEF EO comments	Rating
To what extent does the report contain an assessment of relevant outcomes and impacts of the project and the achievement of the objectives?	The TE report provides a comprehensive assessment of project results compared to expected outcomes and impacts.	S
To what extent is the report internally consistent, the evidence presented complete and convincing, and ratings well substantiated?	Except for the inconsistency in reporting the actual GEF grant amount, the report is internally consistent. The ratings are substantiated by the evidence presented.	S
To what extent does the report properly assess project sustainability and/or project exit strategy?	The assessment of risk to development outcomes is brief. There is no consideration of financial sustainability. But the project does suggest actions for post-project completion.	MU
To what extent are the lessons learned supported by the evidence presented and are they comprehensive?	The lessons learned are concise, but supported by the evidence. Given that the project had only component, they are comprehensive.	S
Does the report include the actual project costs (total and per activity) and actual co-financing used?	Actual costs are presented in total and by the two major activities. Actual co-financing is presented. No detail on co-financing is provided (whether in or in cash, and for which activity). The GEF grant amount presented in the report does not match the total amount in the disbursement profile.	MS
Assess the quality of the report's evaluation of project M&E systems:	The assessment of M&E is brief and concise.	S
Overall TE Rating		S

TE quality = (.3*(5+5)) + (.1*(3+5+4+5)) = 4.7 = S

10. Note any additional sources of information used in the preparation of the terminal evaluation report (excluding PIRs, TEs, and PADs).