Terminal Evaluation of the UNEP/GEF Project "African Rift Geothermal Development Facility (ARGeo)" GEF ID number 2119 (2010 - 2021)

FINAL REPORT

Evaluation Office of the
United Nations Environment Programme

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Front cover: Visit to KenGen, Geothermal Power Plants at Hell´s Gate National Park 2019 https://theargeo.org/media.html# (27.12.2021) ©UNEP/ J. Runar Magnusson

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Project Title: Terminal Evaluation of the UNEP/GEF Project “African Geothermal Development Facility (ARGeo)

Project Number: GEF 2119
Date: 11/2022

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This Terminal Evaluation was prepared by Andreas H. Jahn (Principal Evaluator) and J. Runar Magnusson (Evaluation Specialist), as independent consultants.

The evaluators would like to express their gratitude to all persons met and who contributed to this evaluation, as listed in ANNEX I.

The evaluation team would like to thank the project team and in particular Dr Meseret Teklemariam Zemedkun (Project Manager) and Mr. Geordie Colville (Portfolio Manager) for their contribution and collaboration throughout the evaluation process. Sincere appreciation is also expressed to those who took time to provide comments to the draft report. The evaluators would also like to thank all officials and experts from the participating countries as named in ANNEX I.

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Special acknowledgements to Susanne Bech (Evaluation Officer), and ARGeo team members in UNEP's Africa Office for their support in providing relevant data, contacts, historic information and guidance through the evaluation process.

The Evaluation Team hopes that the findings, conclusions and recommendations will contribute to the formulation of any "next phase" and to the continuous improvement of similar projects in other countries and regions.

Andreas H. Jahn / J. Runar Magnusson Berlin / Reykjavik, November 2022

BRIEF CONSULTANT BIOGRAPHY

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ABOUT THE EVALUATION

Joint evaluation: No

Report language: English

Evaluation type: Terminal Evaluation

Brief description: This report is a Terminal Evaluation of a UNEP/GEF project implemented between 2010 and 2021 with the title "African Rift Geothermal Development Facility (ARGeo)". The ARGeo project aimed to accelerate geothermal energy investments by both public and private sectors. Therefore, the project objective was to facilitate in geothermal power production in the African Rift Valley. It addressed barriers related to financial institutional and information obstacles hindering the implementation of geothermal energy production. Especially, project intended to address the need for exploration studies in the entire African Rift region to confirm GtE resources and support GtE development. The evaluation assessed project performance (in terms of relevance, effectiveness, and efficiency), and determined outcomes and impacts (actual and potential) stemming from the project, including review on their sustainability. The evaluation had two primary purposes: (i) to provide evidence of results to meet accountability requirements, and (ii) to promote learning, feedback, and knowledge sharing through results and lessons learned among UNEP, and the relevant agencies of the project participating countries.

Key words: climate change, direct use, electrical generation, exploration drilling, feasibility study, geothermal conference, geothermal energy, geothermal training, geothermal system, geothermal utilization, surface exploration study, Geothermal Risk Mitigation Facility (GRMF), East African Rift countries.[1]

Primary data collection period: Collection of primary data started by mid November 2021 and was completed by end of February 2022.

Field mission dates: Due to COVID-19 pandemic situation field missions to the project countries were not possible. Therefore, all information gathered were done via desk research and via internet-based meetings.

[1] This data is used to aid the internet search of this report on the Evaluation Office of UNEP Website.

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AFD	Agence Française de Développement, French Development Agency
AfDB	African Development Bank
AGA	African Geothermal Association
AGCE	African Geothermal Centre of Excellence
AGID	African Geothermal Inventory Database
ARGeo	African Rift Geothermal Development Facility
ATAT	ARGeo Technical Advisory Team
AUC	African Union Commission
AWAG	African Women Advancing Geothermal
BGR	Bundesanstalt für Geowissenschaften und Rohstoffe, Hannover
CREAM	Clear, Relevant, Economic, Adequate, Monitorable
DEG	Deutsche Investitions- und Entwicklungsgesellschaft mbH, Cologne
DFID-EAGER	Department for International Development East Africa Geothermal Energy Facility (UK)
DTIE	Division of Technology, Industry, and Economics
EARS	East African Rift System
EAT	East African Time
EIA	Environmental Impact Assessment
EU-AITF	European Union – Africa Infrastructure Trust Fund
EUR	Euro
EVAR	Terminal Evaluation of the UNEP/GEF Project "African Rift Geothermal Development Facility (ARGeo)"
FHI-EG	Fraunhofer-Einrichtung für Energieinfrastrukturen und Geothermie, Bochum
FIT	Feed in tariff
GDC	Geothermal Development Company
GEF	Global Environment Facility
GRD	Geothermal Resource Department
GRMF	Geothermal Risk Mitigation Facility
GtE	Geothermal Energy
IAEA	International Atomic Energy Agency
ICB	International Competitive Bidding
ICEIDA	Icelandic International Development Agency
IGA	International Geothermal Association
IPCU-AGCE	Interim Project Coordination Unit of the African Geothermal Centre of Excellence
IPP	Independent Power Producer
IR	Inception Report
ISOR	Iceland GeoSurvey
JICA	Japan International Cooperation Agency
KENGEN	Kenya Electricity Generating Company
KfW	Kreditanstalt für Wiederaufbau
M&E	Monitoring and Evaluation
MFA	Ministry of Foreign Affairs, Iceland
MoU	Memorandum of Understanding
MTE	Mid-term Evaluation
MTR	Mid-term Review
MTS	Medium-Term Strategy (UNEP)
MWe	Mega Watt Electric

NGO	Non-Governmental Organisation
NPMU	National Project Management Unit
PA	Project Assistant
PCA	Project Cooperation Agreement
PDQ	Project Design Quality
PIR	Project Implementation Review
PM	Project Manager
PMU	Project Management Unit
PoW	Programme of Work (UNEP)
PPA	Power purchase agreement
PPP	Public Private Partnership
PRC	Project Review Committee (internal UNEP committee)
ProDoc	Project Document (UNEP)
PSC	Project Steering Committee
R&D	Research & Development
RBM	Results-Based Management
RfP	Request for Proposal
RMF	Risk Mitigation Fund
ROA	Regional Office for Africa (UNEP)
SDG	Sustainable Development Goal
SMART	Specific, Measurable, Achievable, Realistic, Time-Bound
SREP	Scale Up Renewable Energy Program
STAP	Scientific and Technical Advisory Panel
TA	Technical Assistance
TAT	Technical Advisory Team
TGDC	Tanzania Geothermal Development Company
TGW	Temperature Gradient Well
ToC	Theory of Change
ToR	Terms of Reference
TRM	Technical Review Meeting
UNEP	United Nations Environment Programme
UNU-GTP	United Nations University Geothermal Training Program
UNV	United Nations Volunteer
USAID	United States Agency for International Development

PROJECT IDENTIFICATION TABLE

Table 1. Project Identification Table

GEF Project ID:	2119		
Implementing Agency:	UNEP	***Executing Agency:***	UNEP ROA (Africa Office)
Relevant SDG(s) and indicator(s):	**SDG 7:** 7.1 By 2030, ensure universal access to affordable, reliable and modern energy services; 7.2 By 2030, increase substantially the share of renewable energy in the global energy mix. 7.a By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology. **SDG 9:** 9.4 By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities. 13.2 Integrate climate change measures into national policies, strategies and planning. Indicator(s): 7.1.1 Proportion of population with access to electricity. 7.1.2 Proportion of population with primary reliance on clean fuels and technology. 7.a.1 International financial flows to developing countries in support of clean energy research and development and renewable energy production, including in hybrid systems. 9.4.1 CO2 emission per unit of value added. 13.2.1 Number of countries that have communicated the establishment or operationalization of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production (including a national adaptation plan, nationally determined contribution, national communication, biennial update report or other).		
GEF Core Indicator	GEF-3		
Sub-programme:	SP1: Climate Change	Expected Accomplishment(s):	EA (b): Countries increasingly adopt and/or implement low greenhouse gas emission development strategies and invest in clean technologies
UNEP approval date:	12 April 2010	***Programme of Work Output(s):***	2010-2011 2012-2013 2014-2015 2016-2017 2018–2019 Indicator (s): Increase in climate finance invested by countries or institutions for clean energy, energy efficiency and/or amount of decarbonized assets. Unit of measure: Number of countries that have adopted or are implementing plans,

GEF Project ID:	2119		
Implementing Agency:	UNEP	***Executing Agency:***	UNEP ROA (Africa Office)
			strategies or policies on energy efficiency, renewable energy
GEF approval date:	24 September 2009	***Project type:***	Full-Size Project
GEF Operational Programme #:	Operational Program #6: Promoting the Adoption of Renewable Energy by Removing Barriers and Reducing Implementation Costs	***Focal Area(s):***	Climate Change
		GEF Strategic Priority:	CC-2 Increased Access to local sources of financing for Renewable energy and energy efficiency CC-3: Power sector policy frameworks supply of Renewable Energy and Energy Efficiency
Expected start date:	12 April 2010	***Actual start date:***	May 2010
Planned completion date:	31 December 2021	***Actual operational completion date:***	31 December 2021
Planned project budget at approval:	USD 80,390,704	***Actual total expenditures reported as of 28 April 2021:***	USD 25,507,654
GEF grant allocation:	USD 4,750,000	***GEF grant expenditures reported as of 28 April 2021:***	USD 4,607,465
Project Preparation Grant – GEF financing:	USD 880,000	***Project Preparation Grant – co-financing:***	USD 499,052
Expected Full-Size Project co-financing:	USD 74,261,652	***Secured Medium-Size Project/Full-Size Project co-financing:***	USD 79,820,000

GEF Project ID:	2119			
Implementing Agency:	UNEP	***Executing Agency:***	UNEP ROA (Africa Office)	
Date of first disbursement:	1 December 2010	***Planned date of financial closure:***	31 January 2021	
No. of formal project revisions:	7	***Date of last approved project revision:***	22 March 2019	
No. of Steering Committee meetings:	11	***Date of last/next Steering Committee meeting:***	Last: 11 November 2020	Next: N/A
Mid-term Review/ Evaluation (planned date):	December 2016	***Mid-term Review/ Evaluation (actual date):***	May 2017	
Terminal Evaluation (planned date):	November 2021	***Terminal Evaluation (actual date):***	June 2022	
Coverage – Country(ies):	Eritrea, Ethiopia, Kenya, Rwanda, Tanzania, Uganda	***Coverage – Region(s):***	Africa	
Dates of previous project phases:	First activities on GtE in EARS started in 2003	***Status of future project phases:***	N/A	

Source: ARGeo Final Report (April 2021), 24 pages, dated 8 December 2021; Evaluation Office of UNEP: Draft Terms of References, Terminal Evaluation of the UNEP/GEF project "African Rift Geothermal Development Facility (ARGeo)" (GEF ID/2119), Nairobi July 2021, page 1f

EXECUTIVE SUMMARY

Project background

1. The scope of this evaluation is the ARGeo project over the period of implementation from April 2010 to December 2021. Activities have continued in the project up to end of December 2020.Total budget of the project was USD79.89 million. This budget included co-financing from the African Union Commission (AUC) Geothermal Risk Mitigation Facility (GRMF) where countries could access funds but only if they fulfilled the financial and technical requirements of GRMF. ARGeo's budget was the GEF funded USD 4.75 million grant where it produced project pipelines to make countries legitimate to access the AUC KfW GRMF.
2. In East Africa, the East African Rift (EAR) system is a potential area for geothermal energy use. Activities to increase the use of geothermal energy started in 2003, a part of that was establishing ARGeo.
3. In total, six participating countries were part of the ARGeo project and benefitted from both its Component 1 and 2. Additional seven countries were added to the ARGeo project as per request of countries, where they benefited only from capacity development and regional networking under Component 1. The project was executed and co-ordinated by the Regional Office for Africa (ROA), United Nations Environment Programme.
4. Donor organisations (in kind and in cash) for the ARGeo project were the Global Environment Facility (GEF), Bundesanstalt für Geowissenschaften und Rohstoffe (BGR), International Atomic Energy Agency (IAEA), Icelandic International Development Agency (ICEIDA), Ministry of Foreign Affairs, Iceland (MFA), African Union Commission (AU–) - Kreditanstalt für Wiederaufbau (KfW) and Geothermal Risk Mitigation Facility (GRMF). The six countries participating in the ARGeo project with funding from GEF also contributed to the financing of the project.
5. UNEP was both the Implementing Agency and Executing Agency. In addition to project management by the project team in UNEP/ROA, and oversight by the portfolio manager in the Economy Division, there were three experts working exclusively for the ARGeo project from April 2010 to December 2021.
6. The project refers to UNEP's Climate Change Sub-programme (SP1) and SDG 7 (for example "ensure universal access to affordable, reliable and modern energy services", "increase substantially the share of renewable energy in the global energy mix") and SDG 9 (for example, "upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies").
7. The ARGeo project had two components: Component 1 was on information exchange in conferences, training, capacity building in order to increase technical and managerial knowledge on GtE use in East Africa. Component 2 focussed on "Technical Assistance" for exploration studies for the EAR countries in order to find viable geothermal resources for electricity production.

Evaluation purpose and scope

8. This terminal evaluation of the ARGeo project was managed by the Evaluation Office of UNEP and undertaken by two independent Evaluation Consultants from November 2021 to May 2022 to: i) meet accountability requirements; ii) promote operational improvement and share knowledge for scaling-up the project's results; and iii) generate lessons and recommendations to inform future project design and execution.

9. The key audiences for the terminal evaluation's findings include Donors, UNEP and representatives of national institutions in East Africa.

10. The Evaluators used a participatory approach whereby key stakeholders were kept informed and consulted throughout the process. Primarily qualitative methods of desk review of documents and interviews were used to collect and triangulate data and put together findings on the project's performance and achievement of its expected outcomes. A reconstructed Theory of Change was used as an analytical framework for the assessment of outcome.

11. The evaluators reviewed 320 project documents[2] and carried out 54 interviews with 48 experts, participants and stakeholders in the region.

Key findings

12. Without any exception, all interviewed persons agreed on the importance and need for the ARGeo project, that without the support and coordination by UNEP-ROA the topic of "geothermal energy" would not have the success as it shows in 2022. In particular, capacity building, technology transfer, exchange of ideas and experience between the stakeholders were mentioned as great strengths of the project. This included the conferences, workshops, training seminars and international expert exchange. On the other hand, within the project period of 12 years only investments in Kenya (861 MW_{el}) and in Ethiopia (7.3 MW_{el}) were completed, which is quite low compared to the expectations in the beginning of the project. Key findings for each of the evaluation criteria are provided in the following.

13. **Strategic relevance:** ARGeo project was fully compatible to strategic priorities of UNEP, GEF and other donor organisations. Dissemination of information on geothermal energy in the East African rift system, as well as awareness raising, training of experts and building partnerships worked very well.

14. **Quality of project design:** ARGeo project was designed to support six countries in mitigating the risks associated with surface exploration and catalyse investment for electricity production with the assumption of having high temperature geothermal resources all the project target countries. However, exploration studies and the regional technical evaluation of the geothermal resource in the western regional branch of the east African System (e.g. Uganda, Rwanda, Tanzania) have shown that the geology and geodynamic evolution of the Western part of the rift system allows only existence of low and medium temperature geothermal systems. Further, the project design included knowledge transfer in terms of

[2] Please note: The Evaluation Report counts about 111 references, but a number of references include several reports, usually with an annual update.

capacity building, field training, technical short courses, and building partnership at congresses.

15. **Nature of external context:** ARGeo was not affected by conflicts[3], disasters, or political upheaval during the implementation except for the conflicts in Eritrea, where exploration drilling stopped due to unrest. Overall, however, the nature of the external context was considered favourable. COVID-19 epidemic situation was at the end of project, the influence of COVID-19 on the project results was neglectable.
16. **Effectiveness** (availability outputs, achievement of project outcomes, impact): In general, the ARGeo project met planned outputs, outcomes and intended impacts.
17. **Financial management:** Financial management of the ARGeo project (USD4.75 million) was appropriate. Financial data on the additional co-financing funds were quite often inconsistent due to the huge number of organizations contributing to the project including co-financing and in-kind-contributions. It must be reported that neither exploration studies, nor exploration drillings were procured; this reflects on the assessment that while contracting processes were followed there appear to be no detailed Terms of References prepared, which could allow an evaluation of the respective works completed. The lack of some tendering documentation in the procurement process was revealed at interviews with donors and consultants.
18. **Efficiency:** For Component 1, a huge number of documents have been produced, which the Evaluation Team finds to be of good quality. For Component 2 costs for surface exploration studies and exploration drillings were quite high compared to international standards. The ARGeo project has supported the countries in carrying out surface exploration studies that lead to development of conceptual models that allowed for selection of target sites for drilling.
19. **Monitoring and reporting:** In detail and well documented project. Donor commitments on reporting were fulfilled.
20. **Sustainability** (socio-political, financial, institutional): The probability of project outcomes being maintained and further developed after the closure of the ARGeo project is poor without additional support and funding. Component 1 needs additional support to continue. The ARGeo Project, however, is continuing under the realm of UNEP and it is in operation after project closure of the GEF funded project in December 2021. At present (August 2022), the ninth African Rift Geothermal Conference is being organized in Djibouti under the auspices of the UNEP ARGeo project. It has developed from being project based to matured institutional support by establishing the African Geothermal Association (AGA), African Women Advancing Geothermal (AWAG), etc. The continued capacity development process through Interim Project Coordination Unit of the African Geothermal Centre of Excellence (IPCU-AGCE) is another testimony. This clearly indicates the sustainability of the project. Component 2 can use international funds, for example, GRMF and similar funds.

[3] At time of war in Eritrea, the exploration drilling had to be stopped due to unrest in the country.

21. **Factors affecting performance and cross-cutting issues:** The performance of the ARGeo project is adequate and was more or less the only entity providing trans-national support for GtE Africa with information exchange over country borders. Preparation of the project, quality of project management and supervision and stakeholder participation were ensured. Responsiveness to human rights and gender equity, environmental and social safeguards were adequate. Communication and public awareness were completed at very high level.

Summary response to key strategic questions

22. Within the ARGeo project all investigations into newly geothermal fields to be developed started with scientific research, scientific methods and knowledge, on the specific geothermal situation at the site. Pending on scientific results of geothermal explorations, drillings and exploration would continue to develop the geothermal fields using engineering disciplines for electricity generation and low-temperature use (direct use). (Strategic question 1). A conceptual model for the resource and thermal process is finalised along with a feasibility study to create project pipelines for exploration drillings. With a successful outcome of the exploration drilling and feasibility study this supports the financial envelope and secures financing for the project.

23. The ARGeo project fully supported the strategies of UNEP and GEF with the establishment of a regional networking of East African institutions on promoting and implementing geothermal energy along the East African Rift System (EARS). The effectiveness of the established partnership mechanism has been mirrored in the ongoing surface exploration studies in East African countries. (Strategic question 2). On the other hand, the ARGeo project appears to have had little and very limited visibility within UNEP. While the ARGeo Project has created some influence in other UNEP projects; the project currently being implemented in Nakuru, Kenya, on "Hybridized Geothermal and Solar energy" to drive climate smart agriculture and deliver on transformation of climate action and the "Technical Guidebook on Utilization of Low to Medium Geothermal Systems" to change the livelihood of communities and contribute to job creation and income generation as examples, it seems to be a missed opportunity for ARGeo to influence other UNEP projects or UNEP strategies on climate change and energy policy in the East African region.

24. Private public partnerships were established at Steering Committee meetings and at ARGeo congress level where geothermal utilisation knowledge was transferred to local context. The transfer of technology from international level to local context is considered sustainable for the on-going surface exploration activities. The risk associated with developing geothermal energy (GtE) projects is high, and exploration drilling is costly and for this reason the participation of the private sector is limited. Therefore, the establishment of the Geothermal Risk Mitigation Facility (GRMF) functioning as a bridge for GtE development with funds for exploration grants for supporting drilling activity and reducing financial risk to attract private participation (Strategic question 3), here we refer to Chapter 5. D. Effectiveness, paragraph 157, where explanations on experience with introduction of geothermal energy from other countries are given.

Main conclusions

25. Based on the findings of the Terminal Evaluation, the project has demonstrated performance at very high level for Component 1 with a budget of USD4.75 million[4] (conferences, training, etc.) but for the implementation of surface exploration studies (Component 2), cost at USD75.14 million) only 4 out of 5 planned studies, including few slim hole drillings have been completed. Please note that the budget of USD4.75 million covered Component 1 and contributed to Component 2 and included surface exploration studies. Co-financing leveraged under Component 2 were managed by the AUC-KFW Geothermal Risk Mitigation Facility.

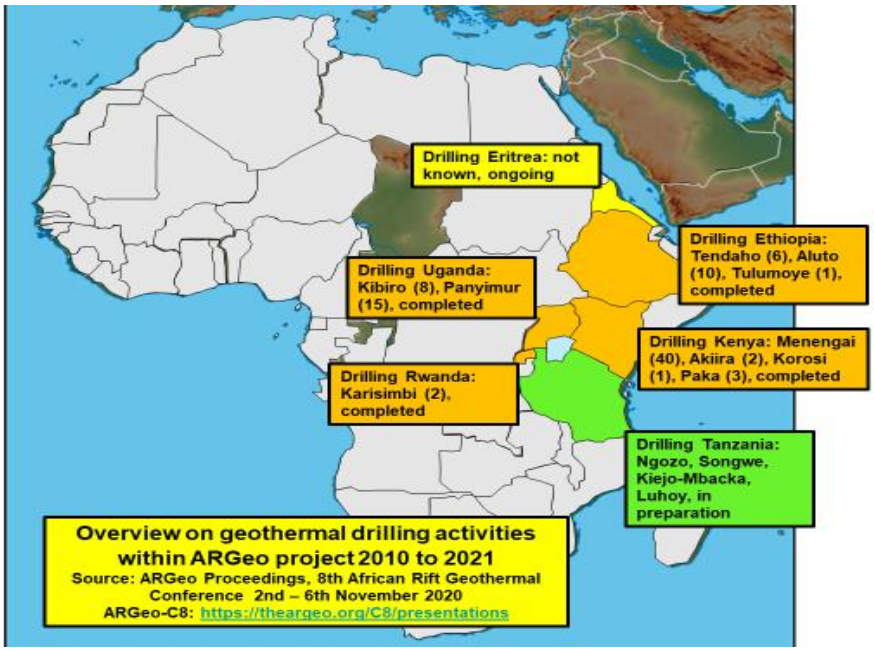

Figure 1. Overview on geothermal drilling activities within ARGeo project 2010 to 2021

Note: The data in this figure is based on "ARGeo Proceedings, 8th African Rift Geothermal Conference 2nd – 6th November 2020 in: ARGeo-C8" https://theargeo.org/C8/presentations, download on 16.02.2022

26. The project has demonstrated strong performance in the areas of information exchange in conferences, training, capacity building and increase technical knowledge. The project design included participation of international scientists to lead the surface studies in cooperation with local scientists for establishing international networking and transfer of technology. For the surface exploration studies for the EAR countries no ToRs and no requests for proposals (RfPs) were produced and, contracts were awarded and signed on an individual basis. Exploration drillings in Kenya, Tanzania and Ethiopia are promising for further development but the drilling in Karisimbi, Rwanda funded by the government did

[4] For details on budgeting and financing see ANNEX II.

not give any indication of high temperature geothermal resources that would be needed for electrical production.

27. Table 2 shows summarized evaluation ratings against all evaluation criteria.

Table 2. Summarized Rating Table

A. Strategic Relevance	**Satisfactory (4.58)**
B. Quality of Project Design	**Moderately Satisfactory (4.00)**
C. Nature of External Context	**Favourable (2.00)**
D. Effectiveness	**Satisfactory (4.33)**
E. Financial Management	**Satisfactory (4.67)**
F. Efficiency	**Satisfactory (5.00)**
G. Monitoring and Reporting	**Satisfactory (5.00)**
H. Sustainability	**Likely (5.00)**
I. Factors Affecting Performance	**Highly Satisfactory (5.67)**
Overall Project Performance Rating	**Satisfactory (4.65)**

Lessons learned

28. Lesson 1: Exchange of know-how and experience on GtE in East Africa, i.e., continuation of conferences (ARGeo Conferences every two years), workshops and including improvement and update of database and AGID website on GtE in East Africa are in high demand and urgently needed.

29. Lesson 2: Continuation of capacity building, training and other similar activities are critical to the respective countries of the EAR system in order to improve their competencies and management capabilities. For most of the countries involved (except for Kenya) the ARGeo trainings by UNEP and ARGeo are the main means of accessing international expertise to transferred knowledge to the local context and thereby strengthening national expertise. In addition to the formal training offered at training events and conferences, professionals and technicians need on-going opportunities and to work in other geothermal field development areas applying world-class standards for their activity, for example, to reduce drilling time or ensure rig safety compliance. The hosting of the IPCU-AGCE in the UNEP Africa office demonstrates institutional commitment to continued capacity development. Further, a business plan for establishing an African owned and African led “Africa Geothermal Center of Excellence” had been developed. The African Energy Ministerial declaration in Lomé, Togo, on setting up the Geothermal Center of Excellence coordinated by AUC is also another testimony.

30. Lesson 3: Support to the establishment of a detailed inventory assessment on GtE in East Africa is needed. This could be done by using all local existing know-how and international expertise to gather all exploration studies, drilling results and active use of GtE projects in East Africa in order to avoid overlapping and duplication of work. UNEP through the legacy of the ARGeo project is currently the only institution, which could organize a process from handling a detailed inventory

assessments to supporting and put together an Evaluation Committee to select the best geothermal systems for further development.

31. Lesson 4: A selective GtE development approach with involvement of selected countries could increase the efficient use of funds and expertise of experts in "Lighthouse-Projects" and generate valuable knowledge that could help countries in East Africa that are still considering how to develop GtE in their country.

32. Lesson 5: There is a need to increase the number of geothermal projects to qualify to apply for the GRMF funds and mitigating the risk of drilling in the early stages of investment in GtE development. The GRMF funds have attracted more private investors to participate in GtE projects in East Africa. Refer to paragraph 24 on private investments and on paragraph 157 on PPAs and power prices.

Recommendations

33. Recommendation 1: Depending on availability of additional UNEP funds or other financing sources, ensure a sound GtE survey inventory of with information on projects in all countries in order to single out best places for use of GtE. This applies for both electricity production and direct-use based on research information gathered on GtE projects in the last decade. This could include improving and updating the existing database on current GtE activities in EAR countries to avoid overlapping and duplication of GtE exploration work. Financial support from the Government of Italy currently supports the implementation of a project on low-medium temperature GtE use with advanced technology and geothermal driving other catalytic sectors such as agriculture (food and water security).

34. Recommendation 2: UNEP should contact national stakeholders and other financing organisations to ensure that UNEP through the ARGeo project take on the role as a facilitator as an information hub for financing of GtE projects and for donor organisations to implement GtE projects in East Africa. The UNEP ARGeo project is already considered as a regional hub that organizes regular conferences (ARGeo-C9; Djibouti, November 2022) and is a host to the IPCU-AGCE. ARGeo is also involved in developing the "Africa Geothermal Resources Atlas".

35. Recommendation 3: Ensure that future activities by UNEP projects supporting investments in the use of GtE in East Africa are transparent and in line with the UNEP rules and regulations and that of donors and stakeholders. Especially, exploration studies and drillings that are financed by UNEP should have a clear system of ToRs and Request for Proposals in line with international norms and standards for tendering processes. This is especially true for the exploration drillings and the exploration studies done in East Africa in connection with the ARGeo project. Projects with sizable budgets (those budgets and thereof UNEP/ implementing agency fees allow) should acquire or develop expertise in tendering and procurement to support and manage these processes. Although it should be noted, that requiring and supporting effective ToRs and RfPs of large projects is important, for small projects like employing experts to present lectures, support RfP preparation or review reports, the high overhead of a full RfP process could discourage participation by suitable experts.

36. Recommendation 4: Depending on availability of additional UNEP funds or other financing sources, ensure a continuation of urgently needed exchange of experience within EAR countries on GtE use through conferences and workshops and by sharing lessons learned on successful and unsuccessful implementation of exploration studies and exploration drillings. For example, by taking on a lead role in organizing the ARGeo C9 Conference to be held in Djibouti in November 2022 and organizing side events for the World Geothermal Congress planned to be held in Beijing, China, in 2023. Supporting more opportunities for hands-on training with world-class mentors and supporting exchanges of staff on geothermal energy between developers is of priority.

I. INTRODUCTION

37. The purpose of this Terminal Evaluation of the United Nations Environment Programme / Global Environment Facility (UNEP/GEF) project, GEF ID 2119 "African Rift Geothermal Development Facility[5]", hereafter referred to as the ARGeo project, was two-fold: to provide evidence to what extent the results of this project meet the UNEP's accountability criteria and to give operational improvements and lessons learned to UNEP and to the main stakeholders of the project. The Terminal Evaluation is expected to help the GEF and UNEP to identify key lessons on design, planning, management arrangements and project implementation that will provide a useful basis for improved project design, partnerships and delivery. In addition, the evaluation addressed three strategic questions given in the Terms of Reference (ToR) for the evaluation:

- To what extent did the applied science-policy model work at regional and national level?
- How did the project contribute to GEF and UNEP strategies on geothermal initiatives and discussions on emerging issues of priority?
- To what extent were the public-private partnership mechanisms adapted to the local context and do they remain effective and sustainable?

38. The scope of this evaluation was the ARGeo project over the period of implementation from May 2010 to December 2021. Originally, the ARGeo project was planned to be completed in 2016 and following this a continuation was agreed with all stakeholders up to end of December 2021. Most of the knowledge building, drilling and exploration activities were conducted throughout the project and the later part of the project from 2019 to 2021, having acquired exploration results from selected sites, provided a better understanding of countries' GtE potential and of the project's outcomes and likely impacts.

39. Budget for the project was as follows: Total planned budget at approval for the ARGeo project was USD79.89 million. The final actual budget spending was USD 79.82 million. Financing was ensured through a GEF grant USD4.75 million and through co-financing of USD75.14 million from donors and participating countries.

40. A mid-term evaluation (MTE) was completed in 2016, where an independent evaluator assessed the performance of the ARGeo project covering the period 2010 to 2015. Findings were given in this MTE and following this, there was a shift in implementation approach of the ARGeo project, to give more attention to low-and medium temperature use of GtE.

41. The ARGeo project aimed to accelerate geothermal energy investments by both public and private sectors. Therefore, the project objective was to facilitate in geothermal power production in the African Rift Valley. It addressed barriers related to financial institutional and information obstacles hindering the implementation of geothermal energy production. Especially, project intended to address the need for exploration studies in the entire African Rift region to confirm GtE resources and support GtE development.

[5] Originally initiated in 2003. The ARGeo project to be evaluated covers the period 2010 to 2021.

42. The justification for the project was that East Africa had mainly developed hydro electricity production and only limited use of GtE energy resources and limited renewable resources for electrical production. The technical GtE potential of about 20,000 MW_{el} would seem huge[6], but countries were not in a position, lacking expertise and initial funds for exploration to activate such potential. Without the ARGeo project the potential could not be activated, therefore the support by UNEP and others was a prerequisite for countries to consider in earnest the use of GtE.

43. The project was funded by GEF with the UNEP Economy Division and UNEP Regional Office for Africa as executing and implementing agency. The project was financially supported by other organisations, namely Icelandic International Development Agency (ICEIDA), Ministry of Foreign Affairs (MFA), Bundesanstalt für Geowissenschaften und Rohstoffe, Hannover (BGR), Geothermal Risk Mitigation Facility (AUC-KfW-GRMF) and International Atomic Energy Agency (IEAE).

44. The project was in line with the UNEP Climate Change Sub-programme (SP 1) of UNEP's Medium-term strategies[7] and Programme of Work[8] and contributed to SDG 7 and GEF 3 indicators. It was executed and managed by the Project Management Unit (PMU) located in the UNEP Regional Office of Africa and supervised by a GEF-UNEP Portfolio Manager in the Economy Division.

45. The Terminal Evaluation started on 15 November 2021 and completed by end of June 2022. This allowed time between the work to be done by the Evaluation Team (desk reviews, interviews pending on availability of experts) and the review on the draft report by the Evaluation Office, project management, and other stakeholders. The Terminal Evaluation was based on given Terms of Refences[9] for both evaluators and the general and specific evaluation guidelines of UNEP.

46. The immediate and priority users of the Evaluation are GEF and UNEP management (including Economy Division and Africa Office Directors), the sub-programme coordinator of Climate Change and UNEP units and staff involved in renewable energy as well as other organisations co-financing the ARGeo project. Interest in the Terminal Evaluation is likely to be shown by other stakeholders and partners, including the project countries, donors and others working in the area of geothermal energy, research centres and academia, and other stakeholders involved in GtE use in EAR countries.

47. Although geothermal energy is an economically viable energy option in East Africa, there is a need for detailed exploration and drilling. There is a high cost and risk associated with exploration and production drilling, that needs donor support along with favourable institutional and regulatory framework, these barriers have to some extent prevented the exploitation of this indigenous and environmentally friendly energy source in the region. In order to overcome these barriers, and to replicate the success of geothermal development in Kenya and throughout the region, an African

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[6] Abegaz, K. B: Mid-term Review of the UN Environment GEF Funded Project "African Rift Geothermal Development Facility (ARGeo) Project to Accelerate the Development and Utilization of Geothermal Resources in the Rift Valley as a Pathway to Low Carbon Development in the Region", GEF project ID 2119, Addis Ababa May 2017, page v.

[7] MTS 2014-2017, MTS 2018-2021

[8] POW 2012-2013, POW 2014-2015, POW 2016-2017, POW 2018-2019

[9] United Nations: Terms of reference, job opening number: 21 – United Nations Environment Programme, 162899 - Consultant, job title: Principal Evaluator for Terminal Evaluation of the UNEP/GEF project "African Rift Geothermal Development Facility" (GEF ID 2119).

Rift Geothermal Facility (ARGeo) was established[10]. One of the main goals of the ARGeo surface exploration studies was to fast-track electrical generation in the region and initiate a programme for a sound quality project outcome that would enter a pipeline for geothermal projects and be eligible for GRMF grant funding evaluation for exploration drilling.

48. The ARGeo project was funded by the Global Environment Facility (GEF) and was implemented in six participating countries - Ethiopia, Eritrea, Djibouti, Kenya, Tanzania and Uganda[11]. The initial project design was to support geothermal utilisation by planning surface exploration to identify geothermal systems in the EAR countries. The intention of the project was to provide technical assistance to ARGeo member countries through capacity and skill development in geothermal science and technology, policy advice and identification of geothermal resources that contributes to both power generation and direct use application. This in turn would contribute to reduction of greenhouse gas emissions by replacing power generated from diesel.

[10] The project under evaluation started in April 2010, but it refers to African Rift Geothermal Development Facility initiated in 2003.

[11] In total, six participating countries were part of the ARGeo project and benefitted from GEF funding for its Components 1 and 2. Additional seven countries were added to the ARGeo project as per request of countries, where they benefited only from capacity development and regional networking under component 1.

II. EVALUATION METHODS

49. This Terminal Evaluation was carried out in line with the guidelines given by UNEP and Terms of References (ANNEX V)[12]. Due to COVID-19, evaluation methods were limited to desk review of the documents provided by the PMU and to interviews with main experts and shareholders in the project. The review of documents included four surface exploration feasibility studies, the geothermal database, and conference proceedings. Interviews were conducted virtually by Teams or similar communication tools. The Evaluation Team had an in-person work meeting in Iceland for interviews and to work together on drafting of the evaluation report in mid-February 2022 (6-13 February 2022).

50. The Terminal Evaluation used a participatory approach, where it is understood that participation and involvement of beneficiary groups develop and strengthen the capabilities in development initiatives[13]. The Evaluation Team consulted with project team members, partners and beneficiaries during the inception, data collection and review process of the evaluation and especially during the main evaluation phase with interviews in January 2022 to March 2022. Project stakeholders were also invited to review drafts of the evaluation report.

51. Theory of Change (ToC) was essential for the Terminal Evaluation. Based on the ToC, initially prepared for the Mid-term Evaluation, the definition of outputs, outcomes and intended impacts were made. Planned results from implementing the ARGeo project has been compared to the actual results (outputs, outcomes and intended impacts).

52. Ethics, human rights and gender issues were considered in the evaluation process, in particular the data collection process such as selection of interviewees. Out of 47 experts interviewed 10 persons were women and 24 persons were from East Africa (see ANNEX I: People consulted during the Evaluation).

Evaluation framework

53. The Evaluation Team developed an evaluation framework with detailed evaluation questions with respect to the evaluation criteria and sources. The Evaluation Team has considered all the evidence gathered during the evaluation in relation to this matrix in order to generate evaluation criteria performance ratings.

54. The Terminal Evaluation was carried out in line with the UNEP Evaluation Policy, the UNEP Programme Manual and the Guidelines for GEF Agencies. In conducting this Terminal Evaluation, the Evaluation Team assessed nine commonly applied evaluation criteria which included: (1) Strategic Relevance, (2) Quality of Project Design, (3) Nature of External Context, (4) Effectiveness (incl. availability of outputs; achievement of outcomes and likelihood of impact), (5) Financial Management, (6) Efficiency, (7) Monitoring and Reporting, (8) Sustainability and (9) Factors Affecting Project Performance and Cross-Cutting Issues.

55. The evaluation criteria were rated on a six-point scale as follows: Highly Satisfactory (HS); Satisfactory (S); Moderately Satisfactory (MS); Moderately Unsatisfactory

[12] Evaluation Office of UNEP: Evaluation Methodology, Nairobi 08.11.2021.
[13] Dinbabo, MF., 2003. Development theories, participatory approaches and community development. Unpublished paper. Bellville: Institute for Social Development, University of the Western Cape, p 9.

(MU); Unsatisfactory (U); Highly Unsatisfactory (HU). Sustainability and Likelihood of Impact are rated from Highly Likely (HL) down to Highly Unlikely (HU) and Nature of External Context was rated from Highly Favourable (HF) to Highly Unfavourable (HU). The ratings against each criterion were 'weighted' to derive the Overall Project Performance Rating (ANNEX VI: Weighting Table for Evaluation Criteria). The greatest weight was placed on the achievement of outcomes, followed by dimensions of sustainability. In addition to the nine evaluation criteria outlined above, the Terminal Evaluation Team addressed three strategic questions.

56. The evaluation process from initiation and main evaluation phase of data collection & analysis to preparation of the evaluation report is show in Figure 2.

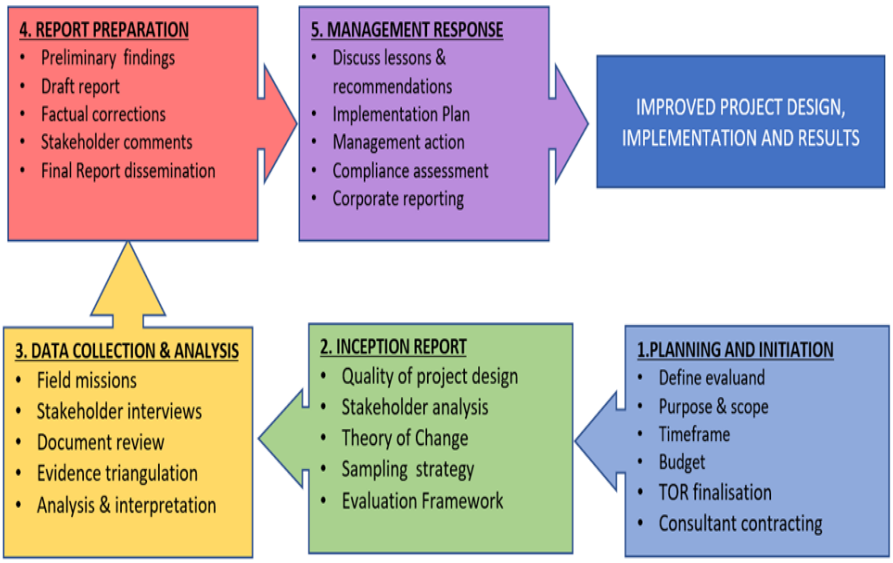


Figure 2. Overview of the evaluation process

57. In a final step of the evaluation process, the evaluation report and implementation plan for its recommendations, which will be addressed in a management response.

Evaluation of data sources

58. A great deal of information was gathered from 320 written sources and documents,[14] which are listed in ANNEX: III Key Documents Consulted and References. There were no baseline data for a project's results indicators and the project design did not allow for a control group, so it was not possible for the Evaluation Team to prove the attribution of evidenced results to the project's efforts.

59. The Evaluation Team's main focus was the ARGeo project launched in 2010 and to review the development and progress of the project until December 2021. Interviews were implemented with 47 individuals that had been involved in the ARGeo project, i.e., experts/ consultants, stakeholders, institutions, government, donors and UNEP. Those interviewed were from implementing agencies (18%), from other donor organisations (12%), from experts' side (28%) and from other stakeholders (42%),

[14] Please note, that several documents listed in the references (ANNEX III) included different documents, for example, conference proceedings and a large number of individual documents.

hereof from the later especially country representatives and Members of Steering Committee (38%).

60. The Evaluation Team identified 83 key stakeholders and the levels of influence and interest that each stakeholder group has had during the course of the project. This meant, that the Evaluation Team understood "stakeholders broadly as all those who are affected by, or who could affect (positively or negatively) the project's results". The stakeholders engaged in the ARGeo project were identified covering the entire system of institutions and persons affected by the ARGeo project.

Limitations to the evaluation

61. This evaluation was limited to the information and material made available to the Evaluation Team. The Evaluation Team had enough material for its review with a few exceptions: The Evaluation Team did not receive the initial ToR for the tenders of the five surface exploration projects for review. And, due to COVID-19 epidemic situation, travel restrictions to the different sites in East Africa did not allow for onsite inspections of GtE project site, especially those places, where drillings are in progress or have completed. To overcome these limitations, the evaluation Team made sure to include aspects related to the sites in the interviews with stakeholders.

62. Within the country analyses, mainly Ministries, scientific experts and persons from the private sector (utilities, developers of GtE) were interviewed. It was difficult to get in contact with representatives of local communities at the exploration sites due to traveling restrictions and possible difficulties in video communication.

63. It is common practice in international projects for ToRs to be always carried out as part of procurement process for higher cost assignments such as exploration studies and exploration drillings, that is as long as public sector funds are involved. The Evaluation Team has seen only a limited number of ToRs for the exploration studies and exploration drillings that have been performed according to the ARGeo project information. Without issuing a ToR for the ARGeo project requested assignments, it is not possible for the Evaluation Team to compare the results in relation to the scope of work and timeline. The ToRs are usually prepared by independent senior consultants and revised by the financing organisation. The ToR gives the basis for comments and assessment of expected results compared with cost and quality of work before selecting scientists and organizations.

64. Under normal circumstances, i.e., there would be ToRs and Requests for Proposal (RfP), and a technical evaluation report would compare the outcome consistency of the existing surface exploration reports to the Canadian geothermal code for public reporting on exploration results, geothermal resources and geothermal reserves in order to get a common measure of quality. In our case, where we do not have any ToRs and RfPs, this procedure would not be appropriate.

Photo: KenGen Geothermal Power Plant in Kenya (Source: Runar Magnusson, 2016)

Data collection tools

65. The Evaluation Team used mixed methods to collect necessary data for the evaluation that would allow for triangulation of findings as described in Chapter 2.B. Evaluation of Data Sources. This included desk review of documents and records, interviews with all stakeholders and project participants (see ANNEX I: People Consulted during the Evaluation).

III. THE PROJECT

A. Context

66. The East African Rift (EAR) has great geothermal heat potential that is possible to be utilised for both electrical production and direct use. In order to overcome the financial, investment and technical risks and barriers, and to replicate the success of geothermal development in Kenya and Ethiopia, throughout the region, an African Rift Geothermal Facility (ARGeo) was established. ARGeo project is funded by the Global Environment Facility (GEF) and was initiated by six countries – Ethiopia, Eritrea, Djibouti, Kenya, Uganda, and Tanzania – and implemented by the United Nations Environment Programme (UNEP) and the World Bank. The EAR extends from the Red Sea – Afar triple junction through Ethiopian highlands, Kenya, Tanzania and Malawi to Mozambique in the south. Figure 3 shows the East African Rift system and how the western branch passes through Uganda, Democratic Republic of Congo (DRC) and Rwanda while the south-western branch runs through Luangwa and Kariba rifts in Zambia into Botswana.

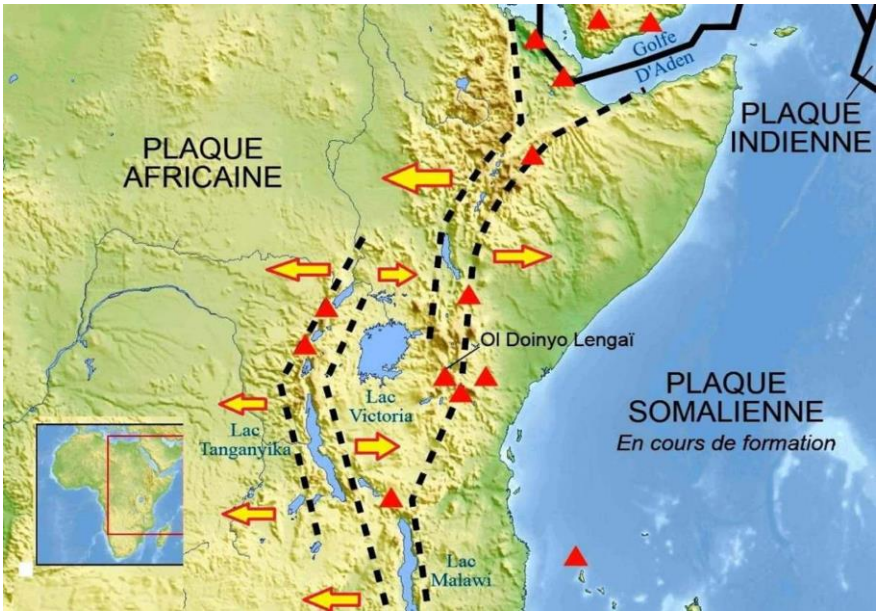


Figure 3. East African Rift system

67. The rift represents geological features that ranges from low to high temperature geothermal systems whereas the northern part of the continent has lower temperature resources[15]. The main high temperature and high enthalpy[16] geothermal fields, which are more suitable for development of electrical power plants, are located in Kenya and Ethiopia.

68. Geothermal fields with lower temperatures are suitable for direct use. In later years it has been recognised that direct use of geothermal energy can contribute positively to enhance economy with increased employment and development of activities that

[15] *Peter A. Omeda, Presented at Short Course IV on Exploration for Geothermal Resource, 2009.*
[16] Enthalpy is the sum of the internal energy. and pressure times volume.

increase food security by utilizing geothermal for agriculture, aquaculture and food industry.

69. Despite the great geothermal potential and need for the substantial growth for electrical generation capacity throughout the EAR region, development activities have been slow to materialize[17]. The geothermal development in Kenya is an exception in terms of power plant development compared to other EAR countries, reaching over 861 MW_{el} and Ethiopia 7.3 MW_{el} while development in the other EAR countries have not succeeded in geothermal electrical generation.

70. Scientific work up to date have confirmed that geothermal energy is one of the key sources suited for electrical production in the EAR countries. The development of geothermal power generation is reliable and has a high uptime on a yearly basis. Compared to hydro power generation which requires large area of land to reach the same uptime as geothermal power generation can achieve. The use of geothermal power generation will increase base load electrical production to the grid and have positive influence on the environment by reducing GHG.

71. Most of the stakeholders had been involved in the process of planning in the previous phase of the ARGeo project from its early start in 2003 up to 2010.

72. It is clear for nearly all GtE developments in most countries, that exploration cost is much lower than the cost for project drilling. Therefore, a thorough investigation in surface exploration is needed for increasing drilling success. For details we refer to Figure 4.

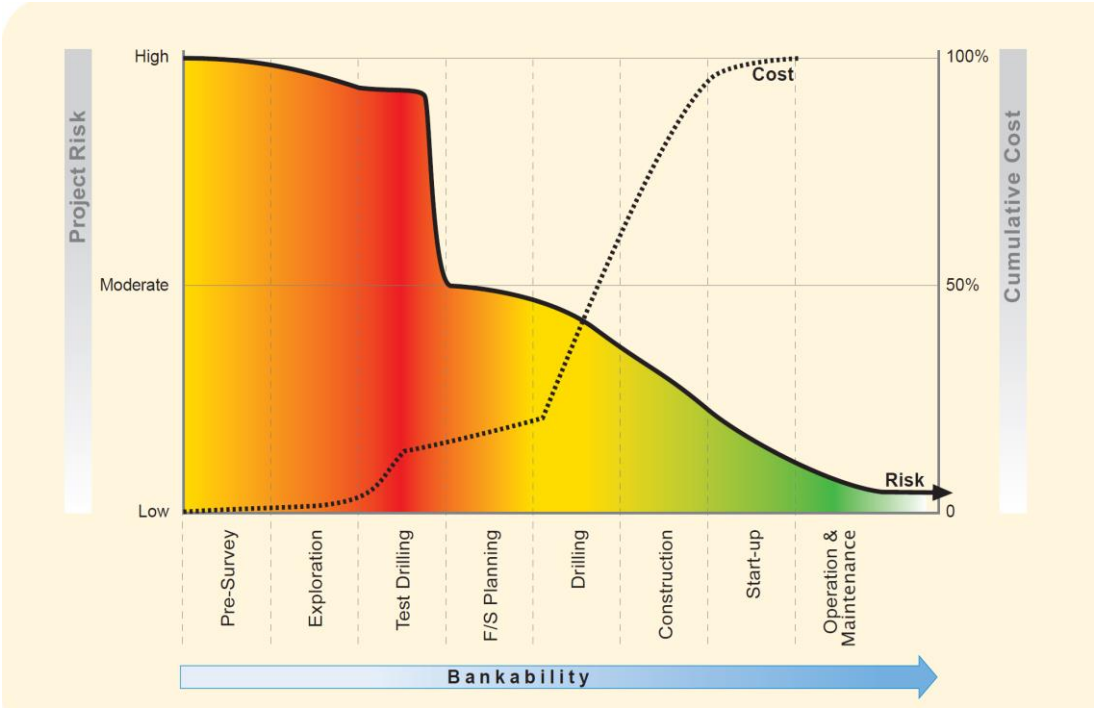


Figure 4. Phases of geothermal development - (risk & cost)[18]

73. EAR countries have been facing number of barriers, that are related to incomplete and inadequate geoscientific information and analyses, insufficient capabilities in

[17] *Gordon Bloomquist, The AUC/KfW Geothermal Risk Mitigation Facility (GRMF), 2012*
[18] *ESMAP, Technical Report 002/12 Gehringer and Lokshal, 2012, (World Bank)*

terms of human resources for characterizing of geothermal systems and insufficient funds and investment for geothermal energy development.

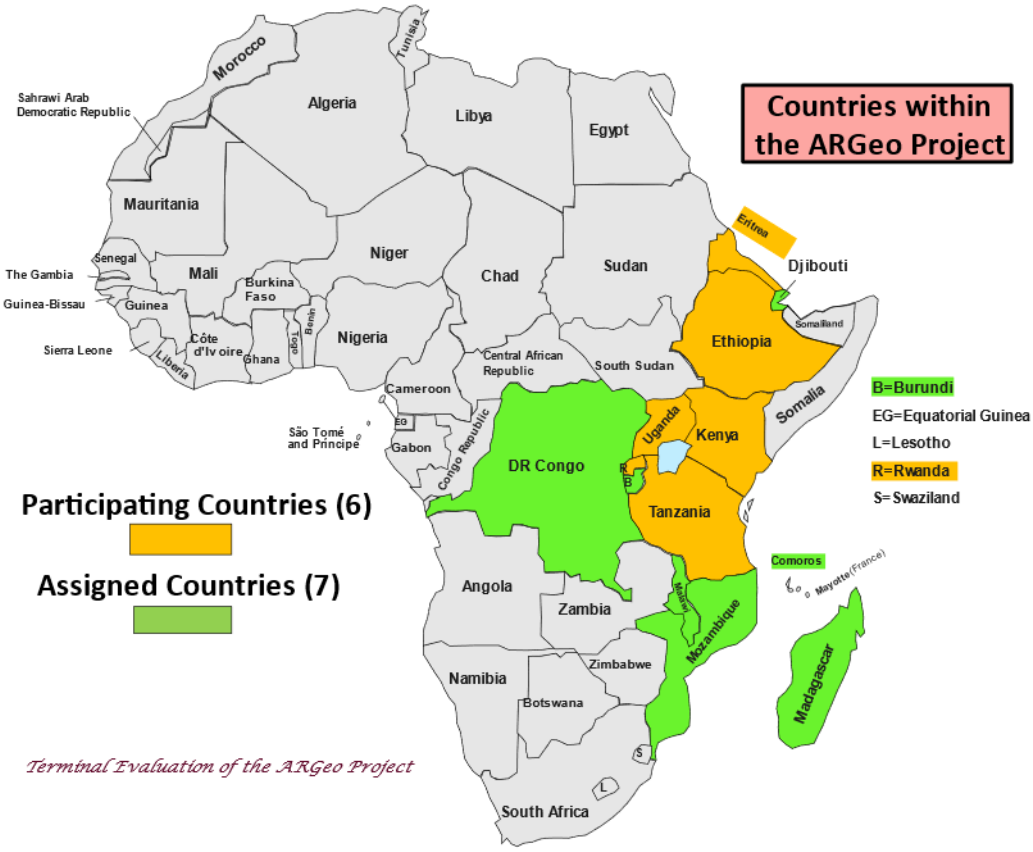


Figure 5. Countries in the ARGeo project: six participating countries and seven assigned countries

B. Results framework

74. The project's development objective was "to accelerate the development and utilization of geothermal resources in the Rift Valley as a pathway to low carbon development in the region through technical assistance that includes capacity and skill development, regional networking, policy advice and identification of geothermal resources in the ARGeo member countries. The programme's global objective was to facilitate reduction of the growth rate of greenhouse gas (GHG) emissions in the region through geothermal energy development to produce electricity". The project aimed to increase electrical power production by GtE and increase use of GtE in industry and agriculture. Its focus was to provide data and information that would contribute to the development of fields for GtE use in Eastern Africa. In more detail, the objective of the project was to fast-track utilization of geothermal for electrical generation as high priority in East African countries to displace the use of diesel-based products, diversify energy resources and lead to the reduction of greenhouse gas emission.

75. The project supported the EAR countries to increase scientific knowledge through training, short courses and capacity building. ARGeo included plans for organizing ARGeo congresses to facilitate a combination of regional networking, capacity

building, information systems, training and technical assistance. The main goal for the surface exploration studies was to minimize the risk associated with exploration drilling into the geothermal resources which would include expensive deep production well drilling.

76. The project had four outcomes and two components: Component 1 corresponding with outcome 1 focused on regional level cooperation and Component 2 corresponding with outcomes 2, 3 and 4 focused on providing technical support at the national level.

77. Planned project outputs for Component 1 on Regional Cooperation were:
    - Regional Network of geothermal agencies established in the region in support of the project and as an instrument to promote the optimal use of geothermal resources in the region.
    - Regional forums, ARGeo biennial conferences, are created for the exchange and sharing of experience, research conclusions, and technical advances, and outreach to international and regional geothermal events is increased in the EAR countries.
    - Regional programme for awareness raising and the promotion of policies and regulatory frameworks needed for increasing geothermal development and private sector investment.
    - Regional training and technical capacity building programme responding to the needs and expectations of the countries and making optimal use of human resources and on-going exploration campaigns in the region to build up a local technical capacity.
    - Regional information system is set up with the aim to strengthen national information database which is already created and is used.

78. Planned project outputs for Component 2 on Technical Support were:
    - Joint Geophysical Image (JGI) and reports in the EAR countries are made available in the EAR countries and other pool of equipment are used for the exploration studies in the region.
    - Technical assistance and finance should be provided for the confirmation and priority of prospects identified, through surface exploration for the GRMF pipeline.
    - ARGeo Technical Advisory Team (ATAT) is established and is operational evaluating projects during the timeline of the ARGeo project.

79. The expected Project outcomes were:
    - Outcome 1: Enhanced institutional capacity, enhanced knowledge and awareness of the potential and what requirements are needed for geothermal development in the Rift Valley at the regional and national levels for optimal use of geothermal resources in the region (human, institutional, equipment).
    - Outcome 2: Priority prospects are confirmed through surface exploration studies to a conceptual model stage that location of exploration drilling can commence. Good quality applications based on pre-feasibility and exploration studies are submitted to the GtE Risk Mitigation Fund (GRMF).
    - Outcome 3: Legal and regulatory framework are conducive of geothermal development and governments have the capacity to

efficiently negotiate with the private sectors involvement in the GtE development.

- Outcome 4: Private sector investments are catalysed through the building of reliable, robust and sustainable public-private sector relationships through PPA, permitting, transmission grid and infrastructure.

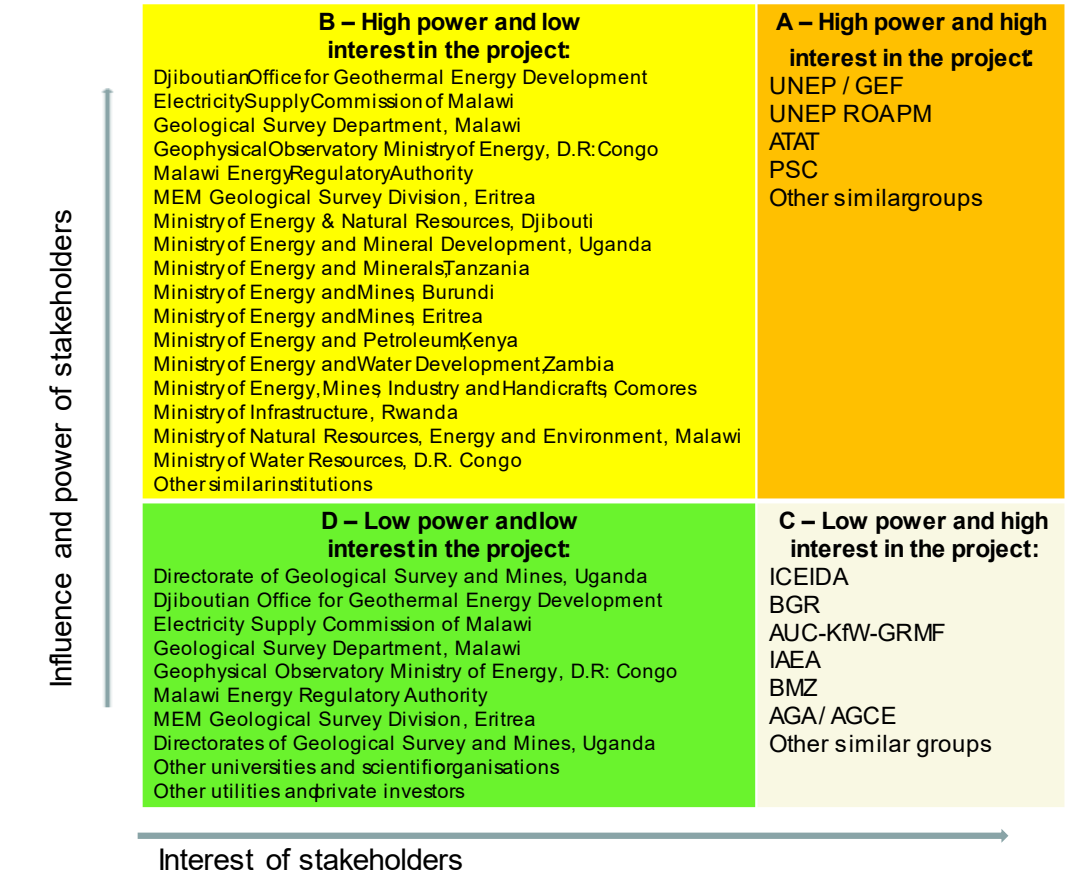
C. Stakeholders

80. The Evaluation Team identified during the inception period 83 stakeholders and the levels of influence and interest for each stakeholder group has had during the course of the project. Key stakeholder groups of the project included: Implementing partners, government officials, scientific experts and utilities and industry. Besides beneficiaries in Figure 6, other groups have benefitted from the ARGeo project such as industries, households, businesses and trade people, that would use geothermal energy. Members of the Advisory Technical Team (ATAT) and the ARGeo Steering Committee, UNEP and GEF were key stakeholders with high power and interest and considered to be the main influencing partners in this project. They were the "motor" of getting GtE to East Africa.

81. Ministries responsible for energy production in the respective country had relative high power on implementing GtE, but their level of interest in GtE projects were limited in some countries. This group of stakeholders also included some research institutes and similar organisations, that had a more "scientific interest" in GtE, but would have limited funds available to finance investments in GtE.

82. International financing institutions, which were in a position to finance GtE investments in the East Africa region, had low power of influence on direct implementation of geothermal equipment and high interest in promoting renewable energy sources, but in the end, these institutions would negotiate activities with the respective national governments (for details we refer to Figure 6).

83. Other partners in the project supporting the GtE activities would have low power and low interest. Usually, they would have no detailed interest in getting GtE implemented (for details we refer to Figure 6).



Type A: High power / high interest over the project = Key player
Type B: High power / low interest over the project =Meet their needs
Type C: Low power / high interest over the project = Show consideration
Type D: Low power /low interest over the project = Least important

Figure 6. Stakeholder analysis according to "level of interest" and to "level of power and influence"

84. During the course of the ARGeo project being evaluated, governmental stakeholders were fully represented, but beneficiaries including industry were participating at a low level. During the "Data Collection Period" In January 2022 and March 2022 the Evaluation Team communicated with all stakeholders and identified to what extent the different types of stakeholders had been involved in the project.

85. Co-financing organisations like ICEIDA, BGR, AUC-KfW, GRMF and IAEA have been interviewed. The interest of these institutions had been in relation to the terminal evaluation to ensure that the given funds had been spend effectively and wisely compared to the given objective.

Photo: Kibiro geothermal field in Uganda, inspection of surface GtE (Source: Runar Magnusson, 2016)

86. The national stakeholders came from 13 countries. Participating countries (6): Eritrea, Ethiopia, Kenya, Rwanda, Tanzania and Uganda and assigned countries (7): Burundi, Comoros, Democratic Republic of Congo (DRC), Djibouti, Madagascar, Malawi and Mozambique. Within the country analyses, mainly Ministries, scientific experts and persons from the private sector (utilities, developers of GtE) were interviewed.

87. In the project design and during the course of implementation, there was only very limited attention to gender and under-represented and marginalised groups and to those living with disabilities. Human rights and gender concerns were considered as integrated in the existing stakeholder groups. The Evaluation Team ensured that gender concerns were considered during interviews.

D. Project implementation structure and partners

88. The implementation structure of the project was as shown in Figure 7. The figure clearly describes the management lines of GEF, UNEP/ROA, UNEP/DTIE (now Economy Division), and the advisory and reporting roles the ARGeo Technical Advisory Team (ATAT) and the ARGeo Steering Committee. The Project Management Unit in the UNEP-ROA was the main focal point in the ARGeo project liaising with the National Project Management Units. Support and advice were given to the PMU by the (ATAT) on technical matters and by Steering Committee (SC) on strategic matters. The PMU was overseen by the portfolio manager located in the Economy Division and the PMU reported to GEF via the Economy Division.

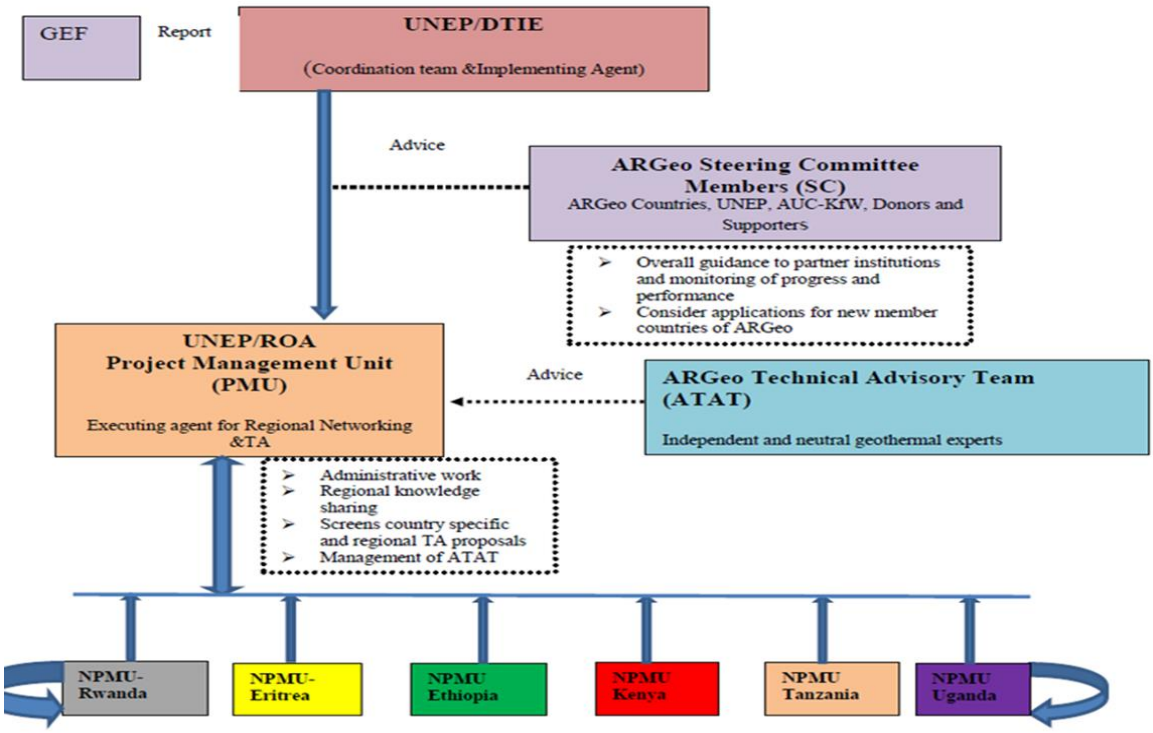


Figure 7. Organisational overview on the ARGeo project

89. The Advisory Technical Team (ATAT) was established with the aim to enhance the quality of the proposals from the ARGeo countries for surface exploration studies received by the ATAT team for evaluation. The overall objective for the ATAT team was to select the most viable geothermal prospects and prepare ToR for each of the surface explorations. After tendering, the ATAT team reviews proposals, selected high level international scientific teams with relation to the exploration methods to solve problems identified for each prospect in the ARGeo Countries. The ATAT team objective was to evaluate individual studies, provide recommendations and guidelines for each of the presented conceptual model. The quality of the surface exploration reports was evaluated by an independent ATAT team with comments and recommendations on data quality and how the results could be interpreted for targeting exploration- and deep production drilling.

90. The structure that was setup by UNEP/ARGeo to fast-track geothermal development in EARS countries was highly dependent on the technical definitions and requirements of the TOR for the planed surface exploration studies and also the final outcome of the ATAT evaluation reports.

Responses to mid-term report recommendations

91. Most recommendations given in the MTE report[19] were addressed by the ARGeo Team, especially by the PMU and the SC. The MTE report had been published in May 2017 and covered the period 2010 to 2015. In the recommendations[20] the main concern of the MTE evaluator related to the African Rift Geothermal Inventory

[19] Abegaz, K. B: Mid-term Review of the UN Environment GEF Funded Project "African Rift Geothermal Development Facility (ARGeo) Project to Accelerate the Development and Utilization of Geothermal Resources in the Rift Valley as a Pathway to Low Carbon Development in the Region", GEF project ID 2119, Addis Ababa May 2017.

[20] Abegaz, page 39f.

Database (AGID), African Geothermal Centre of Excellence (AGCE) and on African Geothermal Association (AGA). All these aspects have been strengthened in the period following May 2017. Recommendations with reference to Independent Power Producer/ Public Private Partnership (IPP/PPP) and for additional countries to participate in the ARGeo project did not progress until the end of 2021.

E. Changes in design during implementation

92. The ARGeo project document was revised seven times, mainly due to the fact, that time extensions with reallocation of funds to the subsequent year were necessary, but not for substantial changes in the results framework of the project[21]. Additional new financing of ARGeo was needed, which required a change in the project design.

93. The main changes of the project design were related to the time when the World Bank withdrew its involvement as an implementing agency of the second part of the original ARGeo project, i.e., the Risk Mitigation Facility. The design of the project revised to be the UNEP GEF funded ARGeo project with two components: Component 1: "Regional Networking, Capacity Development, Policy Advice" and Component 2: "Technical Assistance for Surface Exploration Studies". The UNEP/GEF project had a total budget of USD 4.75 million. The revision included an operational linkage with AUC-KfW GRMF by creating project pipelines after completion of the surface exploration studies in order to access the Risk Mitigation Facility Fund of AUC-KfW after technical and financial evaluation of the project pipelines.

F. Project financing

94. The total budget at approval was USD79.89 million of which GEF project grant was USD4.75 million and total co-financing with international partners and countries was USD75.14 million.

[21] The "Project Documents" had been revised throughout the project. The Evaluation Team has analysed the changes in the various "Project Documents" and classified all changes as minor compared to the original "Project Document" in 2010. Finally, all "Project Documents" made available during the 7 revisions have had very limited changes the original "Project Document", mostly there were clarifications of details in the project planning.

Table 3. Project Budget and Co-financing UNEP 2010-2021

Project budget and co-financing	Planned in M USD	Actual in M USD
GEF	4,75	4,83
UNEP ROA	0,25	0,25
BGR	1,60	0,15
ICEIDA	0,25	0,92
IAEA	0,31	0,00
ETHIOPIA	1,65	0,76
ERITREA	0,25	0,01
KENYA	2,50	2,83
TANZANIA	0,45	4,65
RWANDA	1,00	0,14
UGANDA	1,00	0,28
AUC-KfW (GRMF)	65,00	65,00
OTHERS	0,00	0,00
Project preparation by UNEP GEF financing	0,88	0,00
Leveraged co-finance US Power Africa	0,00	0,00
Leveraged co-finance Italian Agency for Development	0,00	0,00
TOTAL	79,89	79,82

95. Annual expenditures of the GEF project grant and details of the ARGeo planned and actual budget can be seen in ANNEX II: Project Budget and Expenditures, 2010-2021.

96. Expenditures amounted to USD 79.82 million. Project expenditures by component are shown in Table 4. It included costs for surface exploration studies at sites (component 2), which had been covered through co-financing of international partners and countries.

Table 4. Planned and actual cost by component

Component	Planned in M USD	Actual in M USD
COMPONENT 1: Regional Networking, Information Systems, capacity Building, Policy Advice and awareness creation	4.76	4.83
COMPONENT 2: Technical Assistance for surface Exploration studies (Institutional and technical capacity building)	75.14	74.99
Total	79.89	79.82

Source: Project Document ARGeo.

IV. THEORY OF CHANGE AT EVALUATION

97. A Theory of Change (ToC) is a key component for evaluation. It illustrates how the intervention intended to achieve the desired results.

98. "A Theory of Change is a method used for planning a project, describing the participation that will be needed by different actors and for evaluating the project's performance. It articulates long lasting intended impact and then maps backward to identify the preconditions necessary to achieve this impact(s). It is a comprehensive description and illustration of how and why a desired change is expected to happen in a context. A Theory of Change also allows for unintended positive and/or negative effects to be depicted."[22]

99. The project ARGeo started in 2010 and since then no Theory of Change has been established by UNEP or the Project Management. Only during the mid-term evaluation (MTE) was a concept of a ToC developed. The Evaluation Team has reviewed the ToC from MTE. As a result, the reconstructed ToC presented as a one-page diagram (see Figure 8) follows the MTE ToC.

Project outputs, project outcomes and project impacts

100. Project outputs for Component 1 on Regional Cooperation were:
    - Regional Network of geothermal agencies established in the region in support of the project and as an instrument to promote the optimal use of resources in the region.
    - Regional forums, ARGeo biennial conferences, are created for the exchange and sharing of experience, research, and technical advances, and outreach to international and regional geothermal events is increased.
    - Regional programme for awareness raising and the promotion of policies and regulatory frameworks needed for geothermal development and private sector investment.
    - Regional training and technical capacity building programme responding to the needs and expectations of the countries and making optimal use of human resources and on-going exploration campaigns in the region to build an effective technical capacity.
    - Regional information system set up and strengthened national information base is created and used.

101. Project outputs for Component 2 on Technical Support were:
    - Joint Geophysical Image (JGI) and other equipment in the equipment pool are used for exploration in the region.
    - Technical assistance and finance provided for the confirmation of priority prospects identified for the GRMF pipeline, through surface exploration.
    - ARGeo Technical Advisory Team (ATAT) is established and is operational throughout the timeline of the project.

102. Project outcomes were:

[22] Evaluation Office of UNEP: Glossary of results definitions, Version 6, Nairobi April 2021.

- Outcome 1: Enhanced institutional capacity, enhanced knowledge and awareness of the potential and requirements for geothermal development in the Rift Valley at the regional and national levels, optimal use of resources in the region (human, institutional and equipment).
- Outcome 2: Priority prospects are confirmed through surface exploration to a stage that exploration drilling can commence, and good quality applications based on pre-feasibility studies are submitted to the GtE Risk Mitigation Fund (GRMF).
- Outcome 3: Legal and regulatory framework are conducive of geothermal development and governments have the capacity to efficiently negotiate with the private sector.
- Outcome 4: Private sector investments are catalysed through the building of reliable, robust and sustainable public-private sector relationships.

103. Intended impacts for the ARGeo project were as follows:
    - Impact 1: Increased access to electricity from GtE.
    - Impact 2: Reduced CO_2 emissions and air pollution
    - Impact 3: Increased incomes, better jobs and poverty reduced.
    - Impact 4: Reduced deforestation and use of fossil fuels.

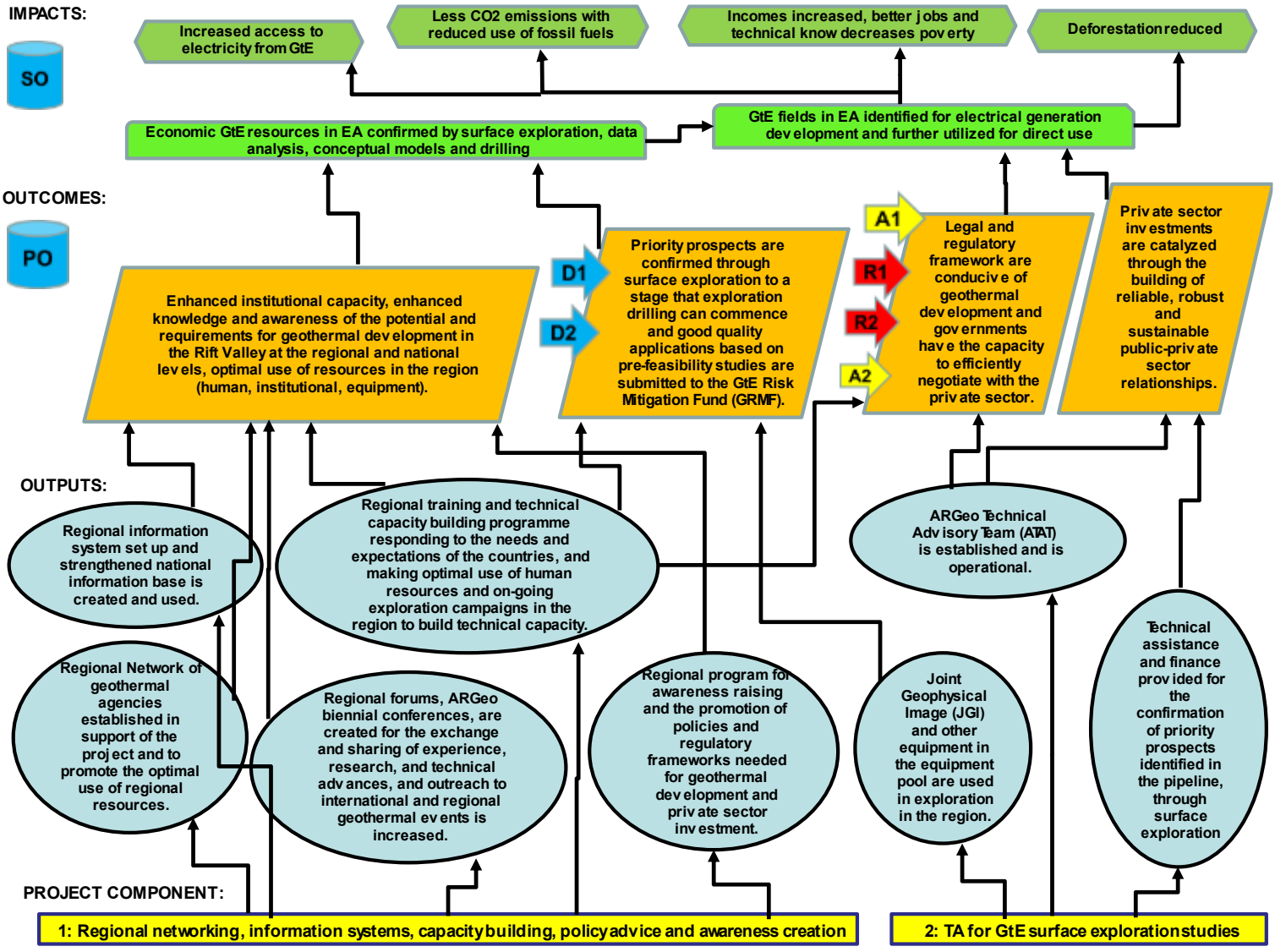
Theory of Change

104. The project strategic objective was to increase electrical power production by GtE and increase use of GtE in industry and agriculture. The project was to develop geothermal fields for harnessing GtE in East Africa. This meant fast-tracking utilization of geothermal for electrical generation as high priority in EAR countries as a means to displace the use of diesel-based products, diversify energy resources and lead to the reduction of greenhouse gas emission.

105. The ToC diagram in Figure 8 gives an overview on all main outputs, outcomes and impacts and their interrelation and causal pathways according to the five components. Main drivers, assumptions and risks are identified and included to the ToC.

106. **Main hypothesis:** If the six target countries actively engage and build on previous achievements, while the governments and ministries of energy and natural resources of the target countries actively support development of geothermal energy, and if capacity and exploration in their respectively selected sites, and if the general political will and financial resources are present in all project countries, then the project will be successful in achieving its objective, namely to accelerate the development and utilization of geothermal resources in East Africa and lead to reduced growth rate of GHG emissions in the region through geothermal energy development to produce electricity.

107. The reconstruction of the ToC did not require any reformulation of results statements except for adding assumption that “Women and vulnerable groups are part of ARGeo and beneficiaries of GtE”.



Please note, that in the "impacts" section, the dark green marked impacts can be described as intermediate impacts and the light green marked impacts are direct impacts.

Figure 8. Reconstructed Theory of Change diagram for the ARGeo project

Causal pathways

108. Causal pathways start from Project Component 1 on Regional Cooperation and lead to improved know-how on GtE use in EA. Other pathways start from Project Component 2 on Technical Support at national level leading to investments and implementation of GtE use for electricity production in East Africa. All the pathways lead finally to the four impacts[23] as shown in the reconstructed ToC diagram for the ARGeo project in Figure 8.

109. **Assumptions:** Causal pathways can only work, if the underlying assumptions and drivers are valid: Two assumptions refer to the government, that co-financing funds for drilling and exploration are made available in all countries[24,] and that the respective legislation on GtE is implemented[25].· If these assumptions are not valid, any causal pathway to the intended impacts are not functioning. Parallel to the assumptions, risks in implementing the project can occur, Project Management and Steering Committee would have to pay attention throughout the project to possible risks of not attaining sufficient co-financing[26] and of not implementing respective legislation[27]. Another assumption was that women and vulnerable groups are part of ARGeo project and are beneficiaries of GtE.

110. **Drivers:** The two main drivers of the ARGeo project are a prerequisite for the success of the project. The key policy/contextual impulses that underline the rationale presented in the ARGeo project logic include the recognition of the need for electricity for industry and agriculture and the growing contribution of the latter through conventional electricity production to GHG emissions, with agencies and utilities lobbying for explorations and drillings in GtE in East Africa and governments actively supporting GtE field development in the countries.[28] The main institutional actors are ministries of energy, environment and natural resources, geothermal expert community, UNEP, GEF, donors, and prospective investors.[29]

111. **Pathways:** The Project aimed to contribute to GHG reductions by accelerating the development and exploration of geothermal energy, with the development of a regional network, regional and information systems, training and capacity building, sharing of experience, awareness raising and outreach, promotion of regulatory frameworks, technical assistance, access to expert advisory and so enhance the institutional capacity, knowledge and awareness, selected site prospects, and capacity to negotiate efficiently with the private sector as well as catalyse private sector investments through public-private sector relationships.

[23] Increased access to electricity from GtE; less CO2 emissions with reduced use of fossil fuels; incomes increased, better jobs and technical know decreased poverty; deforestation reduced

[24] Government does not commit on funds for co-financing drilling for GtE in EA (A1)

[25] Government implements legislation and regulation on GtE in EA (A2)

[26] Government does not commit on funds for co-financing drilling for GtE in EA (R1)

[27] Government does not implement necessary GtE policies and legislations (R2)

[28] Agencies and utilities lobby for exploration and drillings on GtE in EA (D1)

[29] Government actively supports GtE field development in EA (D2)

V. EVALUATION FINDINGS

A. Strategic relevance

Alignment to UNEP's MTS, POW and strategic priorities

Rating: Satisfactory

112. The project was highly relevant in the context of UNEP's Medium-Term Strategy – strategic focus on Climate Change. Expected Accomplishment 2 Low Emission Growth.[30]

113. It was consistent with the POW Sub-programme 1: Climate Change, Expected Accomplishment (b) Countries increasingly adopt and/ or implement low greenhouse gas emission development strategies and invest in clean technologies.

114. In addition, in terms of its relevance to global development priorities, the project was consistent with Sustainable Development Goal SDG 7 on affordable and clean energy, and SDG 9 on industry, innovation and infrastructure, most notably Target 7.1 on universal access to modern energy, 7.2 to increase global percentage of renewable energy, and 7.a to promote access to research, technology and investments in clean energy, and target 9.4 to upgrade all industries and infrastructures for sustainability.

Alignment to GEF/ donor strategic priorities

Rating: Satisfactory

115. The Project was consistent with the GEF 3 in Table 1 "Operational Strategy for its Climate Change Focal Area", and supported the objectives set out in Operational Program #6: "Promoting the Adoption of Renewable Energy by Removing Barriers and Reducing Implementation Costs". ARGeo also contributed to the aims of ICEIDA31, AUC-KfW32 and BGR33, which are organisations operating in the geothermal energy sector in East Africa. The Evaluation Team does not see any conflicts between the ARGeo project and the aims of ICEIDA, AUC-KfW and BGR. ARGeo was always defined as a facilitator for additional activities in production drillings, which are aimed to be supported by AUC-KfW and private or national financing.

[30] The ARGeo project covered UNEP's Medium-Term Strategy 2010-2013, 2014-2017, 2018-2021, and POW 2010-2011, 2012-2013, 2014-2015, 2026-2017, 2018-2019 and 2020-2021.
[31] With reference to ICEIDA we refer to https://www.government.is/topics/foreign-affairs/international-development-cooperation/
[32] With reference to AUC-KfW and for GRMF we refer to https://www.kfw-entwicklungsbank.de/PDF/Entwicklungsfinanzierung/ L%C3%A4nder-und-Programme/Subsahara-Afrika/Projekt-AU-Energieversorgung-DE-2014.pdf and to https://www.kfw-entwicklungsbank.de/PDF/Entwicklungsfinanzierung/L%C3%A4nder-und-Programme/Subsahara-Afrika/Projekt-Ostafrika-Energie-2014-DE.pdf
[33] With reference to BGR we refer to https://www.bgr.bund.de/EN/Home/homepage_node_en.html;jsessionid=1F607311DC44461B8D432F99BF462AD5.2_cid321

Relevance to global, regional, sub-regional and national priorities

Rating: Moderately Satisfactory

116. The EAR countries have significant geothermal energy potential, but the geothermal systems are different, but all countries have in their energy plans and energy strategies geothermal energy as one of the main energy resources as it could be seen in the references[34].

117. Exploration studies in later years of the project timeline show that Rwanda, Uganda and Tanzania geothermal systems are considered low to medium temperature while Kenya and Ethiopia are medium to high temperature geothermal systems. Deep drilling in Rwanda was unsuccessful in terms of finding a viable geothermal resource and confirmed on the contrary a low temperature resource.

118. It is of high importance that financial support reaches the EAR countries who have selected the development of geothermal energy as high priority. The participating EAR countries have a demand for donors supporting geothermal development to reduce cost by diversifying electrical production with geothermal resource.

Photo: Geothermal Power Plant of KenGen in Kenya (Source: Runar Magnusson, 2016)

Complementarity with existing interventions and coherence

[34] **Eritrea**: Habtetsion, S. / Tsighe, Z.: The Energy Sector in Eritrea - Institutional and Policy Options for Improving Rural Energy Services, 2022. **Ethiopia**: Khan, B. / Singh, P.: The Current and Future States of Ethiopia's Energy Sector and Potential for Green Energy: A Comprehensive Study. International Journal of Engineering Research in Africa, 33, 115–139, 2017. **Kenya**: Republic of Kenya / Ministry of Energy: National Energy Policy, 2018. **Uganda**: Adeyemi, K. / Asere, A.: A Review of the Energy Situation in Uganda, in: International Journal of Scientific and Research Publications, Volume 4, Issue 1, 2014. **Rwanda**: Republic of Rwanda / Ministry of infrastructure: Rwanda Energy Policy, 2015. **Tanzania**: Government of Tanzania / Ministry of Energy and Minerals: National Energy Policy, Dar es Salaam, 2015.

Rating: Satisfactory

119. As there were nearly no activities in the field of GtE use in Eastern Africa, complementarity with other interventions was not a main topic. This can be seen from project documents and project reports and interviews made during first quarter of 2022, except for co-operation with GRMF.

120. Experts interviewed in the course of the Terminal Evaluation reported that fast track implementation of GtE in other countries were mainly driven by government support and completion of PPAs. KenGen is the main player in geothermal development aiming to deliver affordable clean energy by creating value for shareholders while expanding energy sources and revenue streams. In general, the Evaluation Team did not find any conflicts with existing interventions, as anyhow, there is a very limited number of activities in the field of GtE in East Africa during the ARGeo project's first steps of exploration.

Rating for strategic relevance:	**Satisfactory**

B. Quality of project design

121. Generally, the project design showed both strengths and weaknesses.

122. A key strength of the ARGeo project design was the acknowledgement that high level international experts were needed to undertake the lead in gathering of field data, quality control of data and interpret data for establishing solid conceptual model for the geothermal fields. The project design contributed therefore to technology transfer, exclusive training and networking by establishing a cooperation between the regional and international scientists.

123. The employment of local experts to cooperate with the international experts for establishing quality documentation for the geothermal resources provided an opportunity to strengthen the country knowledge on how to address the surface exploration studies using geothermal technology methods for establishing conceptual models from the data gathering and recognizing each GtE potential and exercise exploration well targeting in cooperation with the international experts.

124. The fast-growing geothermal power plant development in Kenya, over 861 MW_{el} and thermal 253.5 MW_{th}, supports expert knowledge and increased number of experts within GDC and KenGen. KenGen geothermal development areas are along the Rift Valley, the company has power plants and wellheads running as baseload energy sources in Olkaria and Eburru. It is of high importance for African countries to get GDC and KenGen experts involved in GtE development to increase geothermal awareness, technical knowledge to support GtE development to increase energy security and job opportunities.

125. The cooperation setup of local and international experts in association with ARGeo, AGCE, AUC, and UNEP were essential for monitoring the project progress. The strength of the project setup was also the decision of setting up the ATAT, SC and TRM teams for project evaluation of the outcome quality of each surface exploration study.

126. The results of the surface exploration reports were evaluated in the ARGeo Technical Review Meetings (TRM) with a pool of international scientists and participation from all EARS member countries along with representation from funds and stakeholders. The pool of experts in TRM reviewed the reports in a two to three days workshops and supplied comments and recommendations that were important to incorporate in the final feasibility study before the project document application was sent for approval to GRMF for drilling funds.

127. The outcome of the validation workshop meeting in 2015 and the western branch technical workshop in 2016 reflected a good technical practice by monitoring and reviewing the project performance and conclusions. It was a strength for the project to focus on the initial exploration stages of geothermal development, i.e., quality control on geology, geophysics, geochemistry and creation of solid conceptual models of resource and well targeting for increasing drilling success.

128. The development of the site-projects has been satisfactory for Ethiopia and Kenya where surface exploration has confirmed viable geothermal resource and projects have moved forward as recommendations for GRMF funding to proceed with exploration drilling.

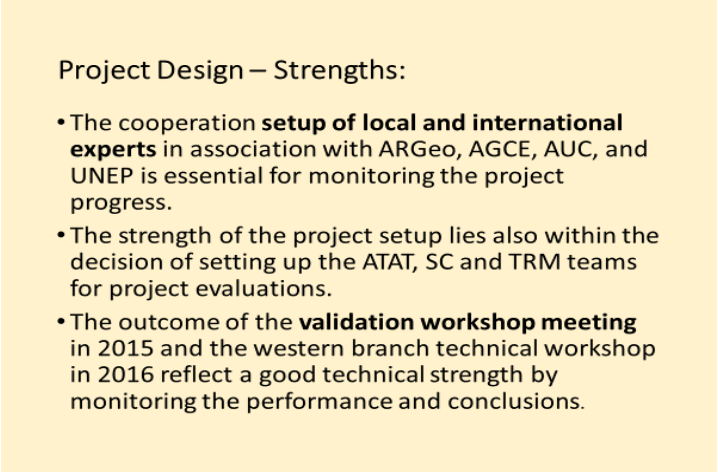


Figure 9. Summary of strengths of the project design

129. The project had some weaknesses in the project design which affected the implementation and achievement of outcomes of the project.

130. The projects in Ethiopia and Kenya took many years to reach the current stage but Eritrea has been further delayed according to the original timeline of the project. The current situation in Tanzania and Uganda shows a slow process in geothermal development considering the fact that they have been planning shallow Temperature Gradient Wells (TGW) in 2018-2020 and considering slim well drilling 10 years after start-up of the project here is referred to Tanzania country update at 8th ARGeo Conference in 2020).

131. The Evaluation Team considers the continuing and extended timeframe was a weakness for the project. The first technical review meeting (TRM) was held in June 2014 where the status of the Silali, Tendaho and Rwanda were under consideration and discussion. It was stated at the TRM presentations that Silali project surface exploration and well targeting of four exploration wells were completed and financing was secured. The Western Branch Technical Workshop proceedings in Kigali,

Rwanda, in 2016 was organized as part of ARGeo and requested by EARS countries of western branch. The need for the workshop arose from observation that despite enhanced exploration activities no successful geothermal project had been undertaken. It was disappointing that ARGeo goal for fast tracking GtE development of electrical generation has not been successful except for continuous development of power plants at Kenya (KenGen) and a small binary unit in Ethiopia. It is a weakness of the project design and project management that six years after start-up of the surface exploration project no successful geothermal project had been undertaken in the Western Branch, even as there are limited opportunities for high temperature geothermal energy use in the area. Limited resources of ARGeo could have been re-direct support to the Eastern Branch.

132. The ARGeo project emphasis was to increase technical assistance in terms of surface exploration, capacity building with international cooperation, training and transferring technology in each country with the goal to increase knowledge and geothermal awareness. Different countries in the EARS are likely to have different conventional geothermal resource capacity, especially between the West and East Branch. Therefore, groups of experts from different countries with equal expertise are likely to make very different predictions. Much of the slower progress in the West Branch may have been due to a transition from the Karisimbi-mode to a more realistic approach to resource prediction. It is considered a weakness that the result of technical level and expertise[35] was so different within the EARS countries considering the fact that Kenya has currently developed over 861 MW_{el} and Ethiopia has 7.3 MW_{el} while there are no geothermal projects developed in Eritrea, Rwanda, Tanzania or Uganda in the past 10 years.

133. At the ARGeo 8th geothermal conference held in 2020, the country update for Kenya states that KenGen have installed 865 MW_{el} electrical generation from geothermal resources and surface exploration have been conducted for seven potential areas and exploration drilling have been executed for three geothermal areas. The update showed a clear difference in development between the EAR countries, which did not appear to be in line with the main goal of the ARGeo project: "When implemented, the UNEP ARGeo project in partnership with the GRMF will have developed pilot geothermal power production plants in the ARGeo member countries with a total power rating of about 500 MW_{el}"[36]. It was a common optimistic expectation of the ARGeo members in 2012 and is unrealistic now in 2022. By the end of ARGeo project in December 2020 there were electrical generation based on geothermal energy installed in only two of the project countries (Ethiopia and Kenya)[37].

134. The time lapsed from the start of the project in May 2010 and with the initial completion date March 2015 with a revised completion date June 2016[38], which was extended to December 2021, is somehow a weak point within the entire ARGeo project. The surface exploration reports for Silali and Tendaho were reviewed at the TRM in 2014 by high level geothermal experts. The experts made few

[35] In resource exploration, judgments of the level of technical quality of the assessment process and the reliability of resource predictions.

[36] ARGeo: Final Report (April 2021), 24 pages, dated 8 December 2021

[37] It should be noted that there was a common expectation prior to 2012 that Olkaria would be typical of geothermal developments in the EAR.

[38] UNEP: IMIS. GFL 2328-2721-4B12/Rev 4.

recommendations on incorporating exploration wells in Silali to the final versions of the reports. The experts recommended additional exploration geophysical studies to fill gaps and finalize the models, mainly for Tendaho, before targeting exploration drilling. The outcome of the surface exploration studies was not according to ARGeo project initial expectations of targeting development sites of 500MW_{el} at the end of June 2016.The reviews of the surface exploration studies for Ngozi in Tanzania, Kigali in Rwanda and Kibiro in Uganda that were presented at the technical workshop in Kigali 2016 indicated no high temperature resource for electrical generation. The result of the site reviews carried out for the above countries showed potential for low to mid temperature GtE systems to mainly support direct use and possible Binary systems.

135. It is the view of the Evaluation Team, based on good practice, that an exploration study including exploration drilling should be finalized, validated and confirmed within three to four years[39] after the award of contract. This should have been feasible considering the high-level experience of the selected international experts and the cooperation with experienced scientists at GDC for executing the surface exploration projects.

136. The Evaluation Team finds that the project design was not efficient due to limitations in the use of equipment. Interviews with stakeholders on the use of surface exploration equipment, stated, that "experts have visited Eritrea a few times for the surface exploration project. Eritrea had prior received surface exploration equipment from ARGeo and the exploration equipment was still in the boxes few years later." Programs for processing exploration data needs to be upgraded frequently and new licences renewed along with continuous training and supervision. The operation of the data processing equipment is very costly, and it is doubtful if each country should have their own exploration and large data processing equipment that needs skilled and trained manpower for high quality operation. Using equipment and expertise from staff in a "pooling" system could be a particularly challenging issue to resolve by ARGeo project management.

137. The Evaluation Team found that the implementation strategy was slow to adapt to change, which would have ensured continuous priority setting on different uses of GtE (high/medium/Low temperature use). Quite often during interviews this statement was given: "The main problem in the beginning was that geothermal expectations had been too high for other countries because it was assumed that all EAR countries would have similar potential for GtE as Olkaria in Kenya". They said, that "…after Rwanda it was confirmed that the GtE systems were different in the African Rift System." Some interviewed experts mentioned that "the early stage GtE specialists assigned to the exploration work did not understand the systems in the EAR countries in the beginning, ... we know now that the systems are sediment based and not volcanic as in Kibiro where a direct use could be very good for industry, flower farms, spas offering relaxing, therapeutic, or beauty treatments or other use." And, "the government is now looking into budgeting a GtE specialists review on how to establish a spa and other means of direct use in Kibiro." Other experts mentioned, that "there were great expectations for the geothermal potential in Rwanda and

[39] Energy Sector Management Assistance Program (ESMAP): Copyright © June 2001, Figure 2.1, Geothermal Project Development, The International Bank for Reconstruction and Development / THE WORLD BANK GROUP, Washington 2001.

Uganda and project development. Early indicators before the drilling in Rwanda where far from the truth, drilling results where disappointing and the cost of drilling was enormous." ARGeo management eventually involved international geoscientists with experience for building resource conceptual models for US Basin & Range geothermal reservoirs for the surface exploration studies.

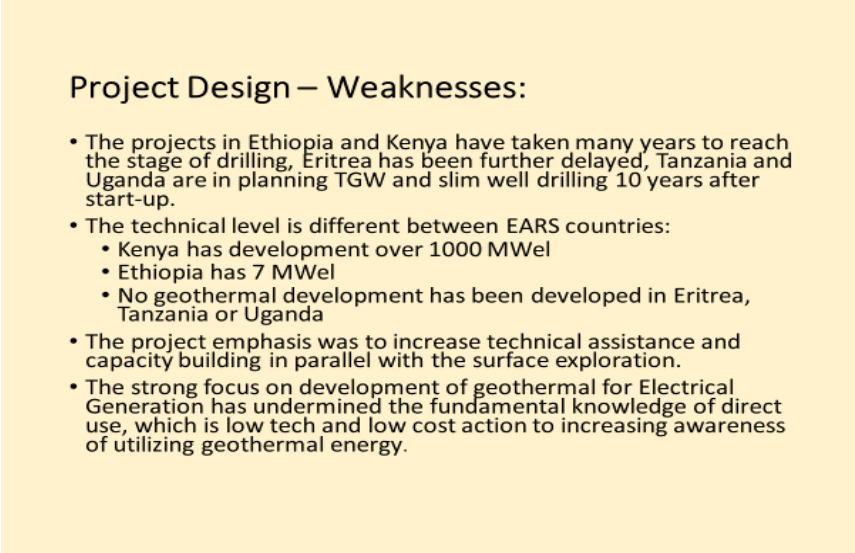


Figure 10. Summary of weaknesses in the project design

Rating for project design:	**Moderately Satisfactory**

C. Nature of the external context

138. Generally, risks, in terms of the nature of external context, were low for the six participating countries. At project design phase and during implementation there was no likelihood of conflict in any of the countries. The war in Ethiopia, however, stopped activities as the situation was deemed unsafe.

139. One risk was the natural environment. An employee tragically succumbed due to dehydration during an exploration site drilling in Eritrea but the incident is considered to be a highly unlikely and unfortunate event out of control of the project. Following the tragic event, no major changes within the project was made except for the fact that further exploration drillings were stopped in this area.

140. Same applies for COVID-19 period in 2020 and 2021, where very limited personal meetings were held and been replaced by videoconferencing. As most of the times within the project were outside this COVID-19 period (2010 up to 2020), the Evaluation Team sees nearly no negative effect on the ARGeo project (anyhow, GEF Technical completion date was December 2019). The bi-annual ARGeo C9 conference will be held in November 2022 and will update the geothermal community with latest results from the project. There is a delay in information sharing, but the effects are limited compared to the overall time of the project (2010 to 2021).

Rating for nature of the external context:	**Favourable**

D. Effectiveness

Availability of outputs

Rating: Satisfactory

141. The Evaluation Team has assessed the project's success in producing the programmed outputs and making them available to the intended beneficiaries as well as its success in achieving milestones as per the project design document (ProDoc). The ARGeo provided technical assistance for surface exploration studies to mitigate the risk associated with confirmation of the geothermal resource and catalyse investment in utilizing geothermal energy in the member countries. The conceptual model output identified the target sites for deep drilling for Bogoria-Silali, Tendaho-Dubti, Ngozi-Songwe and Kibiro.

142. The Evaluation Team sees the availability of outputs as in the project documents, where with the homepage a huge number of results, especially on the content of the bi-annual Conferences is made available and of high quality. The success of the conference is reflected by the number of experts attending of the main conferences, over 350 participants, and more than 140 presentations[40]. During interviews the stakeholders confirmed their ownership and usefulness of information provided.

143. All planned outputs under Component 1 were met in the ARGeo project, which means, that:
(a) information on GtE use were shared on regional meetings and had been disseminated among the member countries.
(b) know-how capacity on GtE has been enhanced and advertised. Regional networking has stimulated and spurred public and private geothermal interest in the region through organization of biennial regional/international geothermal Conferences.
(c) students and staff had been trained on GtE and the regional know-how base on GtE has been enhanced, trained a total of 113 geothermal scientists, engineers, planners and social scientists in the Pre-ARGeo C7 conference four parallel short courses[41].
(d) respective policy needs for GtE were identified and further developed.
ARGeo supported this process by hosting the Interim Project Coordination Unit (IPCU) of AGCE, providing technical backstopping in developing various training modules and agendas. Also, it facilitated several trainings in geothermal science and technology with various hands of experience and tailor-made trainings were held in geothermal value chain development.

144. As a result, more than 400 home grown experts (women and youth) were empowered to tap into Africa's (expected) 20 GW geothermal energy. The project supported 30 Trainees for Trainers (ToT) in application of using Geothermal Leapfrog Software for Conceptual modeling of geothermal systems.[42]

145. Geothermal project sites where selected by the ATAT and feasibility studies planned to be completed by international and regional scientists. In the initial stages

[40] UNEP: UN Environment Programme GEF PIR Fiscal Year 2019.
[41] UNEP: UN Environment Programme GEF PIR Fiscal Year 2019.
[42] UNEP: UN Environment Programme GEF PIR Fiscal Year 2019.

of the surface exploration project there were delivered four technical reports containing the outcome of the "Geothermal Resource Assessment", that resulted in selection of viable prospects in Ethiopia, Kenya, Tanzania and Uganda. In Rwanda, exploration drilling started at the Karisimbi prospect in July 2013, first well KW01 (3,015 m) and well KW03 (1,367 m). Well testing showed no evidence of a geothermal system in the Karisimbi area and drilling was stopped (see Figure 11 for overview of geothermal drilling activities carried out).

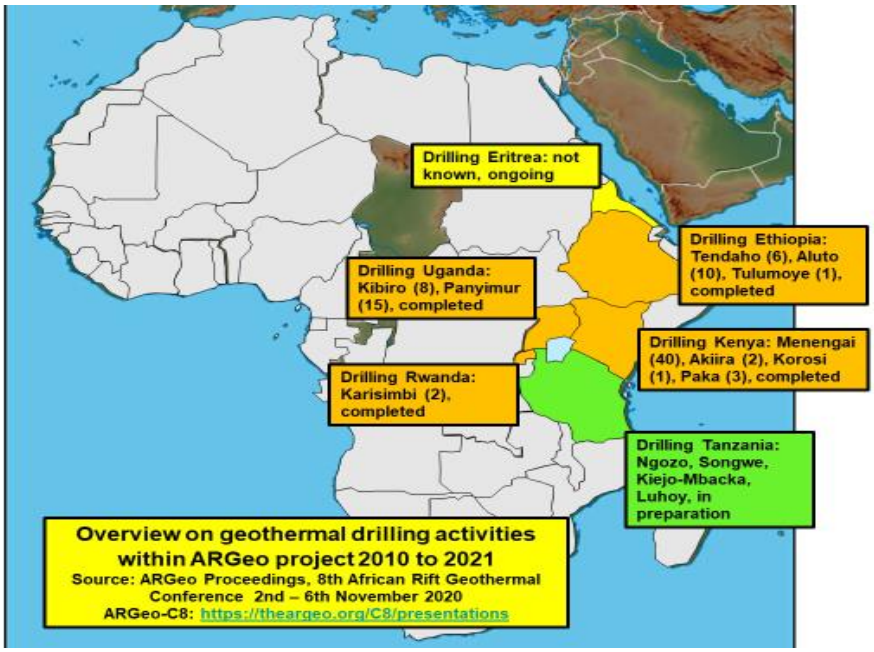


Figure 11. Overview on geothermal drilling activities within ARGeo project 2010 to 2021

Note: The data in this figure are taken from information based in "ARGeo Proceedings, 8th African Rift Geothermal Conference, 2nd – 6th November 2020 in: ARGeo-C8" https://theargeo.org/C8/presentations, download on 16.02.2022

146. The four technical reports were finalized and delivered for peer review evaluation by the ATAT international scientific team at a workshop set up by ARGeo with about 65 geothermal specialists participating and the Government institutes in Ethiopia, Kenya, Tanzania and Uganda. The report from Eritrea would be the fifth and has not yet been finished so it could not be evaluated at this stage.

147. MFA-ICEIDA and the Nordic Development Fund (NDF) started Implementation of the Geothermal Exploration Project (GEP) in January 2013. In 2018 the last remaining activities were reported to be under way, although the final evaluation noted that some activities (e. g. completion of the Eritrean surface exploration).

148. ARGeo submitted a revised Proposal for Technical Assistance by ARGeo, UNEP-ROA, for the Prefeasibility Study of the Eritrean, Alid Geothermal Prospect in May 2014, a total value of USD1.113.000, to MFA-ICEIDA, of which MFA-ICEIDA's share was USD553.500 (49.7%), for funding. The project document was unusual in that it specifies neither overall, nor specific, objectives. A PCA contract between UNEP and ISOR was signed in February 2015, total value USD450,000, for the "common aim to develop and promote economic, scientific and technical cooperation in the field of

Geothermal Energy under the framework of Sustainable Energy for all as declared by UN Secretary General in the year 2012".

149. The donor extended the period of the support from 2018 to 2019 and the Government of Eritrea agreed to restart the halted implementation of surface exploration studies in Alid geothermal prospect.[43] This has been confirmed in March 2022 that the Alid geothermal prospect has not commenced since. A new contract was signed between ISOR and UNEP 2nd December 2019 for a total sum of USD 288,051. The new contract between ISOR and UNEP includes an updated detailed implementation plan for achieving the project objectives with timeline and deliverables.

Achievement of project outcomes

Rating: Moderately Satisfactory

150. The achievement of project outcomes was assessed as performance against the project outcomes as defined in the reconstructed Theory of Change. These are outcomes that were intended to be achieved by the end of the project timeframe and within the project's resource envelope. Emphasis was placed on the achievement of project outcomes that were most important for attaining intermediate states. In general, the surface explorations have been successful for further investment in Ethiopia, Kenya and Tanzania. The Terminal Evaluation reports on evidence of attribution between UNEP's intervention and the project outcomes.

151. Achievement of project outcomes had been assessed against the four outcomes[44].

152. **Outcome 1:** "Enhanced institutional capacity, enhanced knowledge and awareness of the potential and requirements for geothermal development in the Rift Valley at the regional and national levels, optimal use of resources in the region (human, institutional, equipment)": ARGeo supported the process of creating "African Geothermal Center of Excellence" by hosting the Interim Project Coordination Unit (IPCU of AGCE, providing technical backstopping in developing various training modules and agendas, number of trainings and geothermal science and technology, in total 350 experts from Eastern African countries had been trained during ARGeo project time. This institutional and infrastructural support including capacity and skill development has significantly contributed to job creation and income generation of the youth and women in the region. The development of local critical mass of experts also confirms the sustainability of geothermal energy in the region.[45] This has been fully achieved by the ARGeo project. The Evaluation Team refers to the large amount of conference and training materials provided by ARGeo.

153. **Outcome 2:** "Priority prospects are confirmed through surface exploration documentation creating a pipeline for applications to the GRMF funds for further development of the geothermal resource. Second stage is the exploration drilling can commence after application approval of good quality pre-feasibility studies that are submitted to the GtE Risk Mitigation Fund (GRMF)": Within the ARGeo project four exploration projects with sufficient drilling targets

[43] UNEP: UN Environment Programme GEF PIR Fiscal Year 2019.
[44] See the outcomes in the results framework and reconstructed ToC.
[45] UNEP: UN Environment Programme GEF PIR Fiscal Year 2019.

were completed and the respective exploration studies have been prepared for the GRMF approval of further investment in drilling based on the enhanced conceptional models developed for Ethiopia, Kenya, Tanzania and Uganda. The TE team has reviewed the exploration studies in relation to outcome and confirms that this has been met by the ARGeo project, except for Eritrea.

154. **Outcome 3:** "Legal and regulatory framework are conducive of geothermal development and governments have the capacity to efficiently negotiate with the private sector": ARGeo project completed some support to a legal and regulatory framework for the use of GtE. The Evaluation Team has examined the respective documents and finds that this outcome is met by ARGeo.

155. **Outcome 4:** "Private sector investments are catalysed through the building of reliable, robust and sustainable public-private sector relationships": This outcome is limited to Kenya and Ethiopia, other countries[46] so far did not catalyse with the ARGeo project any private investments. Enhanced private sector participation where more than twelve private developers started investment in geothermal resource development in the region, specifically in Kenya and Ethiopia[47] This outcome has not been partially met by the ARGeo project.

156. The surface exploration projects supported development of GtE with supply of documentation for a geothermal resource and well targeting for applications to GRMF for funding for continuance in exploration drilling. The exploration drilling was expected to confirm if there were viable geothermal resources for further development. The GRMF would fund international scientists to review the documentation and results of the surface exploration and it was expected that there would be a conclusion from GRMF within 5-7 months if all documentation was good quality. It was the opinion of interviewers that the GRMF review process of surface exploration documentation was taking a long time and slowing down the progress of GtE.

157. There are models in other countries that have been successful in fast tracking development of GtE and increasing considerably private investment and construction of geothermal power plants by favourable electrical prices. For example, in 2009 Turkey had 17 MW_{el} installed electrical power generation based on GtE and in 2010 the Turkish government decided to assist the geothermal development with a legal framework, fast track 10-year PPA with 105 USD/MW_{el} based on GtE, this government support has resulted in around 1,600 MW_{el} installed electrical generation power within 10 years in Turkey driven mainly by private investors. The government of Kenya supported the geothermal development from the beginning with funds and favourable electrical prices for attracting investment and today they have developed up to 861 MW_{el}. This goes to show, that GtE project development needs to include legal framework and PPAs where ARGeo could use knowledge from Kenya as a guideline for incorporating the model to GtE development programs. It should be noted that PPAs and power prices are not exclusive factors for a successful GtE implementation, but among the main factors for attracting participation of the private sector.

[46] Except for Uganda, where in the Buranga Prospect a private company was involved.
[47] UNEP: UN Environment Programme GEF PIR Fiscal Year 2019.

158. For component 1 project outcomes have successfully been achieved, for component 2 that has not been as successful due to lack of investment in the countries outside Kenya and Ethiopia.

Photo from Suswa geothermal exploration terrain (Source: Runar Magnusson, 2016)

Likelihood of impact

Rating: Likely

159. The likelihood of the intended, positive impacts of geothermal projects becoming a reality, was assessed based on the articulation of long-lasting effects in the reconstructed ToC. The likelihood that the intervention contributed to unintended negative effects was also assessed as well as the extent to which the project played a catalytic role or has promoted scaling up or supports replication. One of the main drivers for geothermal development are successful projects that support technical transfer for new projects. It should be noted that geothermal resources are different as they are many and surface exploration is the key factor for firm assumptions for project development. The identification of the low to medium temperature geothermal systems in Western branch through scientific studies by the ARGeo project has definitely changed national geothermal policies.

160. The Evaluation Team has clearly seen an impact on Component 1 for supporting GtE use in East Africa by the ARGeo project. This has been confirmed by all persons interviewed (donors, project team, and national stakeholders) and by revision of project documents, especially the proceedings of the bi-annual conferences. The establishment of regional networking and information systems for capacity building, policy advise, GIS based database and awareness have positive impact in the region.

161. Experts interviewed stated that the “real value of the ARGeo project is the informal networks and meeting the peers”. They also stated that “ARGeo is the base of all

what (activities) we are doing here in Africa) with GtE". Other statements were: "ARGeo was especially helpful in providing training, organizing conferences and workshops in the East Africa countries and provision of equipment."

162. Stakeholders mentioned a number of proposals for future activities in the GtE in EAR countries, for example "ARGeo could be a facilitator for agencies and for identification of funds, ARGeo should organize an inventory survey for the EAR countries and develop best and viable geothermal projects and help Governments to prioritize geothermal systems for development."

163. During interviews with stakeholders on the ARGeo project, it came out, that a supply of GtE steam to developers in Menengai for electrical generation, the developers should pay GDC 2 USc/kWh, for the steam. It is highly likely that the developers will get around 7 USc/kWh for electrical generation delivered to the grid in Kenya. A long term PPA could support an economically viable project for Menengai and developers considering the fact that the drilling cost in a GtE project is at 30-40%. GDC takes the main risk by drilling all the needed wells for each GtE project confirming the resource and supporting GtE development.

164. The application results for Baringo-Silali geothermal field in Kenya have secured EUR100 million, in 2016, from GRMF for further deep geothermal drilling for power generation. The application results for Tendaho (Dupti) geothermal prospect in Ethiopia is now (2019) in preparation for drilling by securing grant from the French Development Bank. The application results for Ngozi-Keijo-Songwe geothermal prospects in Tanzania have been approved in 2018 and catalysed investments of USD100 million for the project from GRMF grant approval along with funding from the Government of Tanzania.

165. Tanzania tried to bid out prospects for development of GtE electrical generation, but the interest was very limited and there is still no indication of GtE electrical power production in the region. And, according to interviewed persons, it is not likely that KenGen will step in and play a role in GtE development in Tanzania or Uganda due to politics in the regions. KenGen has up to date developed around 861 MW_{el} and are capable of participating and supporting GtE projects with technical know-how, human and financial resources. GDC on the other hand have not developed any MWe but they have explored and drilled production wells that support at least 100 MW_{el} GDC Tendered out 3 x 35 MW_{el} projects in 2013 with developers following with contracting. "Think Geo Energy" reported that construction on the first 35 MW_{el} geothermal plant in Menengai kicked off in December 2019. GDC has capable manpower, exploration equipment, data processing programs, drilling rigs and project management.

166. During discussion not all experts were positive towards the „Lighthouse idea", one expert "was afraid that narrowing on to a special GtE type would draw the learning curve down, less learning. "You should rather focus on how to involve the industry and private funding to participate in the development." And, he would rather have a "centralised drilling company like GDC for the special work that needs to be done in the EAR countries and be mobilized for drilling with increasing knowledge with tool pushers, mud loggers and others for the different GtE systems." An expert underlined that the key role of ARGeo would be to ensure shared professional development throughout the EAR. "GDC and KenGen are likely to often play a role as hosts for many types of hands-on professional development opportunities, like a drilling

school remotely supported by outside experts." The likelihood of impacts (impact 1-4) was assessed by the Evaluation Team.

167. **Impact 1 "Increased access to electricity from GtE":** Except for Kenya and Ethiopia no investments in power production by GtE were finalized, but preparatory work for the implementation of power production was successfully completed in all participating countries. Therefore, this impact has been partially met by the ARGeo project.

168. **Impact 2 "CO_2 emissions and air pollution reduced":** With the implementation of power production sites as described in Impact 1 there are CO_2 emissions and air pollution reduced, as electricity produced by GtE has been substituting electricity production by diesel. Again, this impact has been partially met by the ARGeo project.

169. **Impact 3 "Incomes increased, better jobs and poverty reduced":** In East Africa the provision of electricity in rural areas is limited. With additional power capacity using GtE poverty in rural areas will be reduced. And with the know-how transfer since May 2010 the opportunities for additional power capacity by GtE resources is increased. Electricity for rural areas will allow additional and better jobs and can create additional income. As before, the third impact has been partially met.

170. **Impact 4 "Deforestation reduced":** As the use of GtE for electricity production is replacing diesel-fuelled power production the Terminal Evaluation team does not see any impacts on reduced deforestation. The impact has not been met by the ARGeo project.

Rating for effectiveness:	**Satisfactory**

E. Financial management

Adherence to UNEP's financial policies and procedures

Rating: Highly Satisfactory

171. The Project Management and expenditures within ARGeo were done by UNEP-ROA, which is part of UNEP financial budgeting system. This ensured, that the Project Management followed the rules of UNEP more easily than an external Project Management outside UNEP. The financial control was much easier for UNEP due to the fact that the Project Management had the same budgeting system.

172. With reference to the decision on co-operation with experts, during interviews with stakeholders it was said, that the Project Manager "…handpicked the international experts signed to the project in Kenya and extended the contracts to surface exploration for Tanzania and Uganda". In August 2022, the Evaluation Team received documents posted 07/08/2013 by the UN Office at Nairobi (UNON) for a "Temporary Vacancy Announcement for Consultant", which was posted prior to signing contracts for consultant work on the Sailili project in Kenya. The UN vacancy announcement was set up for individual consultancy applications for the geothermal surface exploration in Sailili such as geophysics (NA13-31), geology (NA 13-32), geochemistry and others. The example indicates that contracting processes were

adhered to, however, more detailed Terms of Reference was not shared with Evaluation Team. The lack of some documentation in tendering and procurement processes for insight into the selection process carried out for acquiring expertise in GtE use in East Africa, does not seem to be in line with UNEPs procurement rules.

Table 5. Financial management of GEF and Non-GEF projects

Financial management components:		**Rating**
1. Adherence to UNEP's/GEF's policies and procedures:		**HS**
Any evidence that indicates shortcomings in the project's adherence to UNEP or donor policies, procedures or rules		No
2. Completeness of project financial information		N/A
Provision of key documents to the evaluator (based on the responses to A-H below)		**S**
A.	Co-financing and Project Cost's tables at design	N/A
B.	Revisions to the budget	Yes
C.	All relevant project legal agreements (e.g. SSFA, PCA, ICA)	N/A
D.	Proof of fund transfers	N/A
E.	Proof of co-financing (cash and in-kind)	N/A
F.	A summary report on the project's expenditures during the life of the project	N/A
G.	Copies of any completed audits and management responses	N/A
H.	Any other financial information that was required for this project:	N/A
3. Communication between finance and project management staff		**HS**
Project Manager and/or Task Manager's level of awareness of the project's financial status.		HS
Fund Management Officer's knowledge of project progress/status when disbursements are done.		S
Level of addressing and resolving financial management issues among Fund Management Officer and Project Manager/Task Manager.		HS
Contact/communication between by Fund Management Officer, Project Manager/Task Manager during the preparation of financial and progress reports.		HS
Project Manager, Task Manager and Fund Management Officer responsiveness to financial requests during the evaluation process		HS
Overall rating		HS

Completeness of financial information

Rating: Unsatisfactory

173. Discussion was held by the Evaluation Team with the Administrative Services in the Economy Division of UNEP. The Financial Management Officer confirmed that all financial details had been checked by this Department and no problems were detected. The direct access for the Evaluation Team to financial tables was very limited, only four tables covering the expenditure tables for the period 2014 to 2017 had been shared with the Evaluation Team, and these tables covered exclusively

Component 1 of the ARGeo project (USD4.75 million). During the course of evaluation at a later stage some additional financial information on the period 2010-2013 and for the period 2018-2020 covering specific cost of this project was provided to the Evaluation Team.

174. The Evaluation Team found that figures for the ARGeo project differed in the various documents, especially for Component 2 on actual co-financing. Within the ARGeo project, procurement of goods and services were handled differently. Procurement of "consultancy service" and international high-level specialists was done via United Nation Office at Nairobi (UNON) through its on-line facility INSPIRA. Usually, the ToR for consultancy services were provided by the ARGeo team. Procurement of "equipment" was done via United Nations Office for Project Services (UNOPS). The support to "consultancy on surface exploration studies" were procured by UNOPS.

175. "Exploration drillings" and support to "surface exploration studies" were not procured using UN resources; they were handled via the respective financing organisations, either the countries or by GRMF, if they followed international procurement rules it cannot be verified by the Evaluation Team as this is outside the ARGeo influence and ARGeo/UNEP financing.

176. For the "exploration drillings", where GDC was responsible, it looks like based on the documentation available to the Evaluation Team that those contracts were awarded directly to GDC without procurement. GDC is a 100% state owned company. And "exploration drillings" had been contracted and paid by the respective countries with an estimated mix of financing (60% country, 40% GRMF). Therefore, this procurement is outside UNEP.

177. For other contracts on drilling the procedure of procurement and contract awarding is still not clear to the Evaluation Team. Same applies for slim-hole drillings in Uganda and temperature gradient drilling in Tanzania.

178. Within the ARGeo project documentation, those funds and budgets made available by GEF and other institutions were always mixed. The activities of Component 1 were financed by the GEF, the GEF gave funds to UNEP and UNEP spent these funds. The GEF grant was originally about USD4.75 million, with the Project Preparation Grant (PPG) the GEF budget increased to USD4.83 million and expenditures were at USD4,604,914.

179. Other funding up to the so called "ARGeo" budget (up to USD79.89 million minus USD4.75 million) were not under influence of UNEP on spending. After the World Bank Group pulled out in 2012, the funds provided by BGR, ICEIDA, IAEA, and by participating countries were not linked to UNEP. Of course, ARGeo and UNEP supported the implementation of different measures in the respective countries by providing expertise, but ARGeo and therefore UNEP were not responsible for the procurement process, ARGeo supported those projects with high-level expertise.

Communication between finance and project management staff

Rating: Highly Satisfactory

180. During interviews with staff of UNEP it was made clear, that communication of budget and control of budget spendings was comparatively easy as the financial system of the Project Management was part of the financial system of UNEP. Discussion with expert showed that the meetings of Steering Committee within the ARGeo project were done in detail on a regular basis and that financial documents had been shared with the Steering Committee.

181. Experts from UNEP received the Final Expenditure Statement in December 2021, it has been controlled by UNEP and during interview it was stated, that everything was checked, and the result was "All Good". According to the interviewed persons the "project worked very good from financial side" with "good management".

182. From discussion with stakeholder, it is clearly reported that ARGeo cooperation with the GEF was very limited. GEF provided the funds for surface exploration, but GEF would not intervene in daily processes, but would receive annual project implementation reports. The utilization of GEF grant funding ended in December 2021. From the time funding was made available by GEF, UNEP usually takes 9-10 % as administrative handling fee for its services: UNEP supported GEF with programme designs and with implementation of the ARGeo project. GEF and UNEP were in good communication and meetings were held at least quarterly according to information from interviews.

183. The duration of the project was extended several times due to delays and necessitated those unspent funds had to be rephased to the next year. In the opinion of experts questioned in the interviews during Terminal Evaluation it was mentioned, that "Rwanda was a problem that slowed down the entire ARGeo project, they drilled two wells and the results showed lower temperature then expected, exploration findings in Rwanda showed low resistivity but the system is not a typical anomaly, it is a sediment GtE system at 800-1,300 m with no water above. It is not expected that there is a hot thermal system where they drilled in Rwanda, and no thermal manifestations."

Rating for financial management:	**Satisfactory**

F. Efficiency

184. For Component 1: The Evaluation Team has analysed documents listed in Annex III: Key Documents Consulted and References. Based on this huge number of documents and the quality of documents analysed, the results delivered (expert exchange of know-how and experience on regional and international level), which must be compared to the given budget of USD4.75 million is assessed by the Evaluation Team as "Highly Satisfactory".

185. For Component 2: The ARGeo project was initiated in 2014 with the main goal of fast-tracking geothermal development, now eight years later the status of the project results are partly disappointing. The surface exploration studies were initiated in 2014 and final review was in 2017-2018 where four out of five projects application have been submitted to GRMF for drilling activities. The interviewers have commented on the GRMF procedure and comments as a "quite slow" process that was slowing down the geothermal development in the EAR countries. Interviewers state, as an example, that for the Salili project an application was sent to GRMF for

approval by the scientific committee and it has requested additional scientific documentation and Government approval to finalize the evaluation, which is time consuming. The ARGeo surface exploration studies were finalised within 3-4 years included exploration drilling, but, in general[48], could have been completed within a time frame of 2-3 years compared to international experience. The exploration drilling project timeline could be in the range of 1-2 years and was not included in the time period for the ARGeo surface exploration studies.

186. Costs for geothermal projects executing exploration drillings in other countries vary between USD3 million and USD5 million on an international level. In the geothermal countries within the ARGeo project exploration drillings and studies have been carried out at a very high cost, in Kigali Rwanda it took about USD15 million for each well and in Djibouti a similar cost has been named in interviews, which is considerably higher[49] than on international level. The ARGeo project was not involved in the surface exploration studies and exploration drillings that took place in Karismbi, Rwanda and at Assal, Djibouti. The drillings, that took place in Karismbi, Rwanda was financed by the government and implemented by other hired companies. This is also applicable to the drilling in Djibouti. However, very slow drilling progress has been dramatically improved for a long sequence of wells in the EARS.

187. Discussions were held with stakeholders and experts involved on the grounds about missing delivery of the 5th surface exploration project report for Eritrea. According to the experts, main reason in the early stages was that a prospector died of dehydration and the project was set on hold. There is, however, doubt about Government support to the project according to scientists interviewed and there is still political uncertainty and even violent fighting in the country.

188. Additional GEF funds are available for Eritrea surface exploration study that are still pending (2022) for Iceland GeoSurvey (ISOR) to commence the project as specified in UNEP contract. ICEIDA (now Ministry of Foreign Affairs, Iceland) stepped in and secured additional funds for hiring Iceland GeoSurvey (ISOR) for the finalization of the 5th project in Eritrea. ISOR was hired by UNEP to complete the surface exploration study without an open international tender process. The original UNEP contract with ISOR was to be completed in end of 2015 but for various reasons the project has been delayed again and again. A new extension agreement was entered between UNEP and ISOR, dated 5th of November 2019, to execute geoscientific studies in Alid Geothermal prospect for the total amount of USD 288,051 through ICEIDA support. The new contract between ISOR and UNEP includes an updated detailed implementation plan for achieving the project objectives, timeline and deliverables. It was indicated by MFA, in interview in March 2022, that funds for finalizing the surface exploration in Eritrea were still pending.

189. The shared view of some international scientific experts was that "ARGeo got a very good knowledge base documentation by executing the surface exploration project for the money they put into the EAR project compared to the actual cost of the Rwanda project" a project that was unsuccessful and the consequence of the

[48] For example, access to the north side of Silali is still pending after eight years.

[49] It must be understood that exploration drillings in East Africa are more costly than in countries where those drillings had been completed several times; especially the transportation cost to the sites are high in East Africa due to limited availability of adequate infrastructure are quitter higher.

Rwanda project slowed down the geothermal development in the EAR countries according to the view of many interviewers.

Rating for efficiency:	**Satisfactory**

G. Monitoring and reporting

Monitoring design and budgeting

Rating: Moderately Satisfactory

190. For budgeting, only four project documents were made available to the Evaluation Team, covering the expenditures statements from 2014 to 2017 (4 years out of 12 years), but no specific document had been provided to the Evaluation Team covering the budget planning. Later in the evaluation process, some additional financial data were provided to the Evaluation Team on specific expenditures for the period 2010-2013 and for period 2018-2020.

191. In order to allow monitoring of the project, ARGeo project has had a large number of meetings of the Steering Committee and of the ATAT team meetings, where all planning for the ARGeo project was continuously discussed during the 12 years of execution with at least two meetings yearly.

192. Participation of disaggregated groups (including gendered, vulnerable, or marginalised groups) in project activities were not mentioned in the beginning of the ARGeo project in 2010. Funds allocated for monitoring were not used to support this activity (we refer also to "Safeguards" and "Adaptive Management"). In the course of implementation of the ARGeo project strategies and resources have been utilised to ensure that female beneficiaries were targeted and that their social functions allowed participation.

Monitoring of project implementation

Rating: Satisfactory

193. The ARGeo project published a large number of documents to follow the progress of work in the ARGeo project, especially Technical Reports for the exploration sites (Component 2) and proceedings of the bi-annual conferences and respective training reports.

Project reporting

Rating: Highly Satisfactory

194. The Evaluation Team assessed the extent to which UNEP[50] and donor reporting commitments have been fulfilled. A huge number of reports had been provided to the Evaluation Team.

[50] UNEP has a centralised Project Information Management System (PIMS) in which project managers upload six-monthly progress reports against agreed project milestones.

195. For Component 1 the Evaluation Team has analysed a huge number of documents. The Evaluation Team has analysed Training Reports, ARGeo website, ARGeo database, Conference Proceedings, Daily Bulletins, Galleries, Annual Highlights and other flyers and brochures, so this could be rated as "Highly Satisfactory".

196. Technical Reports are available for 4 out of 5 exploration studies. One report is missing due to the fact that drilling has not started and therefore no report could be provided. Therefore, the Evaluation Team rated the reporting for Component 2 with "Highly Satisfactory", even as there is one report missing, but this is not a problem of reporting but due to issue with drillings and implementation of one exploration study.

Rating for monitoring and reporting:	**Satisfactory**

H. Sustainability

Socio-political sustainability

Rating: Highly Likely

197. The relevance of the topic of GtE in East Africa and in its countries increased enormously during the ARGeo project according to interviews with stakeholder in the participating countries. Without ARGeo intervention the topic of GtE would not be at the current level of attention in the participating countries. All persons interviewed stated, that the ARGeo project have encouraged geothermal development with technical assistance, conferences where several hundreds of scientific papers were presented.

198. Furthermore, ARGeo has established a project website in cooperation with UNEP where all technical papers and reports on geothermal activity is available on the AGID web site[51], AGID web site is an information sharing platform and hub for Geothermal related information in the East African Region. It aims at promoting the exploration, development and utilization of geothermal energy resources by storing, compiling, integrating of geothermal related information in the region and sharing it with end users – public and private entities[52]– (ARGeo have increased the sustainability of GtE development in EA with over 400 home grown experts (women and youth) were empowered to tap into Africa´s 20 GW geothermal energy[53]. ARGeo have achieved good results even when other priorities in a number of countries that are involved in green energy development due to other renewable resources (for example hydro power in Ethiopia).

Financial sustainability

Rating: Likely

[51] https://agid.theargeo.org/
[52] AGID home page.
[53] UNEP: UN Environment Programme GEF PIR Fiscal Year 2019).

199. For Component 1 the Evaluation Team does not see a continuation of ARGeo activities without external funding. Planned conferences and any training activities will require external supporting funds by UNEP, MFA or similar organisations.

200. For Component 2 the Evaluation Team sees the availability of funds from GRMF and other organisations as financial sustainability for next steps with exploration drilling that will lead into production drilling.

201. In order to get a higher financial sustainability after completion of the ARGeo project, interviewed experts recommended that focus of implementation of GtE should change over to "direct use" in Rwanda considering the results of the drilling in Karisimbi. Tanzania and Uganda are more likely to start developing geothermal that is suited for direct use, i.e., aquaculture, agriculture and drying processes. It is the expert's opinion that direct use also applies for other EAR countries.

202. A new project launch for agriculture grain drying started in Kenya in the beginning of 2022 that is important for knowledge base and technology transfer to increase agriculture production and food security. Direct use has been exercised in Kenya for a long time in green houses mainly established for large scale flower growing production and there is also a GtE spa built in Olkaria.

203. In all EAR countries there is a good possibility of cascading use of GtE for electrical production with Binary Circle power plants that utilize medium temperature geothermal fields.

204. In general, for Component 2 financial sustainability is ensured through GRMF but for Component 1 with very limited financial resources it would be possible to continue with all the detailed activities within Component 1.

Institutional sustainability

Rating: Likely

205. For the Evaluation Team, it is a concern regarding sustainability considering that the ARGeo project has ended, and the uncertainty related to the replacement of leading person that will continue with the ongoing activities in the field of GtE in East Africa. Therefore, institutional sustainability at UNEP level is limited, but on national level the respective institutions have been strengthened and will continue in the future implementing GtE in East Africa.

206. A stakeholder interviewed by the Evaluation Team put it as: "It is a concern what happens when the Project Manager retires, will the geothermal development continue, have a gap and shut down?" Also, "UNEP needs to set up a strategy for establishing a strong leader."

207. Other stakeholders mentioned and valued the input by the Project Management Team: The Project Manager "…is the driving motor of the project, without her the positive results of promoting GtE would not have been achieved". It is a general concern to many interviewers how will the outlook for GtE would be after the Project Manager retires. "UNEP and ARGeo need to find a replacement and find a new Project Manager" said one expert during interviews. With the overwhelming importance of the Project Manager in mind to the ARGeo project and in establishing the AGCE, the Evaluation Team sees possible difficulties in sustainability.

208. According to discussion with interviewed stakeholders, results of the studies conducted under the Technical Assistance programme will be used by member countries to develop and submit proposals responding to the requirements and criteria for accession to the AUC-KfW, Geothermal Risk Mitigation Funds (GRMF). The Geothermal Risk Mitigation Funds for GtE in East Africa are offering 40% grants against 60% upfront funds from the Government of individual countries. Many of the EAR countries do not have a possibility of raising the 60% to move the projects forward with exploration drillings. Some GtE projects have reached 80% grants from GRMF[54] this additional action of increasing the grant to 80% could catalyse development and ease the process of implementation of GtE in East Africa as implied by interviewed stakeholders.

209. Kenya is in a different position than the other countries participating in ARGeo. It has developed its resources for GtE within the ARGeo project and is probably, in general, in the position to continue its GtE development activities without any larger support from public sector. At the ARGeo Proceedings 8th Congress in 2020 update for Kenya states that KenGen and they have been in the process or finished surface exploration studies for six geothermal fields and KenGen have drilled a few deep wells in 3 of these geothermal prospects. For other countries the situation is different in 2022, they haven´t developed any geothermal prospects during the ARGeo project. and for participating countries Institutional structures that can operate efficiently on the topic of GtE without support by other institutions are rarely seen, as discussed with stakeholders in the interviews. For example, the exchange of ideas and experience on GtE in East Africa is established within the East African Branch of the Geothermal Association and this will continue, but on a lower level then with support by ARGeo project financed by UNEP.

210. During discussion with the experts from the ARGeo team it came out that one goal of the project was the creation of a regional network, information systems and capacity building for geothermal energy development. The project will support activities related to the development of a geothermal energy information database and creation of the AGID website available for the member countries. The database system of ARGeo was analysed by the TE team. As part of the database system the Evaluation Team has reviewed and observed the following: 40 organisations, 103 stakeholders, 6 programmes, 10 power plants, 475 reports, 66 maps, 123 sites, 990 people trained, 17 laboratories, and 401 pieces of equipment.

211. ARGeo staff confirmed during the interviews that GEF financing, which has ended in December 2021, is dependent on securing of the ARGeo database for the next 10 years, and the ARGeo database should be transferred to UNEP homepage in the near future. The Evaluation Team reviewed the AGID database, in 2022, and found that the data base is not up to date, projects are missing and regular maintains of the data base and upgrade of information is needed along with more user-friendly operation of the database.

212. A number of stakeholders recommended, knowing that UNEP could eventually support financing conferences and guidelines on GtE, that the Centre of Excellence for GtE could be financed by the African Union Commission (AUC), if funds by UNEP

[54] https://grmf-eastafrica.org/about-grmf/financial-support/, download on 2022-04-10.

would be limited. The countries involved in the ARGeo project are explicitly "grateful for assistance given by UNEP, the ARGeo project helped a lot."

Rating for sustainability:	**Likely**

I. Factors affecting performance and cross-cutting issues

Preparation and readiness

Rating: Satisfactory

213. After receiving the information on the limitations of geothermal resources in Rwanda, Steering Committee and Project Management were in the view of the Evaluation Team slow to change from "Electricity production with GtE" to "Low-temperature use of GtE". From the initial stages of ARGeo surface exploration study project all efforts had been on electricity production by GtE and low-temperature use was somehow neglected. The driver for this assumption is the success stories of electrical generation from geothermal resource in Olkaria but exploration and drilling have revealed that geothermal resources in the East African Rift are different in many ways. The surface exploration studies confirm continuous development of electrical generation in Kenya and Ethiopia but geothermal resources in Rwanda, Tanzania and Uganda support low to medium temperature development of direct use and limited possibility for electrical generation.

214. From various interviews the Evaluation Team has learned that there was a reluctance to shift from focussing on high temperature GtE for electrical production and add focus on low to medium temperature GtE despite early warnings from experts in the ARGeo project. Stakeholders interviewed said, that "…congresses, training, capacity building is very good from ARGeo side", and one interviewer was very glad that the "…representative of Rwanda stood up in the Rwanda congress and went through the exploration process in Rwanda and what went wrong in evaluation prior to the drilling and underlined that the GtE community should make decisions and learn by the failures and success, which is correct."

215. In general, all interviewed partners (national stakeholders and external experts) confirmed the necessity and the effectiveness of the project management of the ARGeo project. Project Management and Portfolio Management by UNEP followed the project outline as defined in the beginning.

Quality of project management and supervision

Rating: Highly Satisfactory[55]

216. Based on interviews, the topic of project management was addressed by the Evaluation Team in all its interviews. Without any exception, the project management

[55] This scoring refers to COMPONENT 1. For COMPONENT 2, where RfPs and ToRs are missing, the Evaluation Team gives no scoring. In this case the rating would be "Highly Unsatisfactory".

team was considered extremely helpful and efficient. Without the Project Manager for ARGeo the topic of GtE in East Africa would not reach the status of the current high level of attention. Supervision of the project was twofold: on one hand, Portfolio Management at UNEP was supervising the ARGeo project and there was no change in Portfolio Management at UNEP during the implementation of ARGeo project resulting in a continuation of supervision was positive. On the other hand, continuous meetings by SC and ATAT ensured high quality of planned outputs and scope of work.

217. The project design and execution has created project implementation units in each EAR country's for executing project activities beyond the specified surface exploration studies. The implementation unit coordinated development of information systems, organizing national training, capacity building, equipment use and promotes legal and regulatory framework. Each implementation unit was responsible for sharing experience and knowledge through workshops and biennial ARGeo geothermal conferences.

218. Experts interviewed during TE said that "There is no question about the importance of ARGeo, specially to increase geothermal awareness for the EAR countries on government and congresses level and vanguard marketing of geothermal energy. It is of great value to have the ARGeo as a platform for surface exploration and to promote direct use in the near future."

219. The ARGeo project design submits the first stage of implementing the project, is to activate a selection process for acquiring high level international scientists by sending out a TOR with a RfP for achieving competitive bidding for the surface exploration studies. It has been confirmed by interviewers that the ARGeo project manager reached out to the international scientists to explore their interest in working on the Silali surface exploration project. The ARGeo project manager's informal approach is highly questionable in regard to transparency of the project. The project planned at least four surface exploration studies viable and scientifically sound proposals ready for submission to GRMF at a budget cost of USD3.7 million.

220. The Evaluation Team has requested for the ToR for the Silali project and has received some information on the tendering of international and local scientists. The international scientists were asked about the ToR and they referred that they were "handpicked". It is highly questionable considering the budget allocated for this task. In August 2022, the Evaluation Team received documents posted 07/08/2013 by United Nations at Nairobi showing "Temporary Vacancy Announcement for Consultant" posted prior to the contracts of the consultants. The consultants selected to complete the technical and financial assistance for surface exploration studies for ARGeo were hired individually according to the "Temporary vacancy announcement for consultants" even though they would work on each surface exploration project as a team. The Evaluation Team has received a number of signed contracts (10) with consultants varying in value from USD30,000 to USD 70,000 USD. All of the signed contracts have a "work assignment" with short description in the contract and a reference to a detailed ToR. The Evaluation Team has not received the detailed ToR´s that describe the "work assignment" for consultants.

221. A group of international consultants was awarded the contract for executing the surface exploration studies for Silali in Kenya in cooperation with GDC, and a final report was published in 2017. According to the example of contract of consultants

provided to the Evaluation Team, the consultant was expected to "…review and prepare a report of the integrated geophysical data of Silali and to develop an integrated geophysical model with a view to targe sites for deep exploration wells". The Evaluation Team, however, has not seen ToR or RfP documents for the surface exploration study showing scope of work, deliverables and timeline.

222. The initial contract with the international consultants for Silali, Kenya was extended by ARGeo/UNEP to finalize the surface exploration studies for Ngozi, Tanzania and Kibiro, Uganda without ToR or RfP according to feedback from the interviews with the international scientists. The Evaluation Team has asked for, but not received, ToR and RfP documents for selecting consultants for the surface exploration in Tendaho, Ethiopia. The Evaluation Team underlines that the international experts selected were all considered highly qualified, within the geothermal community, to take on the task of surface exploration studies in the EAR countries. While the geology consultancy contracts specified that the consultant was expected to "…review the results of geological mapping of Silali geothermal prospect with a view to re-interpreting the geological model for exploration well siting", the "Terms of reference or work assignment (see section 3 of ST/A/2013/4[56]) has not been made available to the Evaluation Team.

223. The decision and terms for establishing the cooperation between the selected international experts with GDC does not seem to be documented and therefore not clear to the Evaluation Team. Both GDC and KenGen geothermal scientists were highly qualified for the supporting role of surface exploration and therefore both could be considered as regional experts to participate in competitive bidding in an open Tender process for the project. None of the other EAR countries[57] have reached the stage of scientific knowledge and human resources as GDC and KenGen and therefore, they would not be considered to participate in such an open tender at the time of implementing the ARGeo project.

224. It is the view of Evaluation Team that the ARGeo/UNEP selection process for hiring consultants lacked transparency based on the tender or procurement documentation provided to the Evaluation Team for selecting international or regional scientists. International competitive bidding (ICB) should be a standard procedure for all ARGeo projects to ensure that value for money is achieved and that the tender process is transparent and open for international and regional competition.

225. The interviews and lack of available documentation indicate faults in the tendering processing that need to be addressed and ensure practice meets all tender and procurement requirements of UNEP, including that of donors, which supported the surface exploration projects (here we refer to several interviews with MFA/ISOR/ICEIDA).

Stakeholder participation and cooperation

[56] ST/A/2013/4, Administrative Instruction, Consultants and individual contractors, United Nations Secretariat, 19 December 2913, Section 3 Conditions for contracting, Terms of Reference, paragraph 3.1-3.6.

[57] With respect to surface exploration, GDC and KenGen had a distinct advantage prior to 2015 but some individuals in Uganda, Tanzania and elsewhere have since then developed high levels of expertise in some disciplines. GDC and KenGen retain an advantage in experience with subsurface technology and surface facilities.

Rating: Highly Satisfactory

226. A Project Steering Committee (PSC) was maintained at the international level as a forum for project direction, coordination and information exchange on project progress and performance. The PSC met once a year and included nominated representatives of the six ARGeo countries. UNEP, the co-financing countries namely France, Germany, Iceland, Italy and USA. It was chaired on a rotation basis by one of the countries representatives[58]. The PSC reviewers have had significant relevance for the project progress, information exchange and quality of outcome.

227. The PMU was established and steered by UNEP. The PMU was set up at UNEP Regional Office for Africa in Nairobi with the purpose of overall management and administration of ARGeo components implemented by UNEP. It provided technical support to public applicants during project preparation to assist them in meeting ARGeo's eligibility criteria and provided an evaluation report on any project application.

228. The PMU has had high relevance for the project by increasing information exchange through conferences, workshops and capacity building which is aligned with donor strategies.

229. The ARGeo project has selected and assigned ATAT experts that provided neutral expertise to guide and review surface exploration assessments and the prefeasibility studies. The overall objective of ATAT was: (i) to enhance the quality of "proposal" (or ToR) for the surface exploration studies received from ARGeo Countries for financial assistance, and (ii) to evaluate results of surface exploration studies. The required enhancement helped to focus on the "proposal" to lead to identification of the best sites for applications to the GRMF funds for exploration wells and ultimate development. The ATAT review of the four exploration studies were executed in open workshops and conferences with participants from all EAR countries. These open meetings were highly important for the project progress, donors, government, scientific networking, exchange of information that led to increased knowledge of the geothermal systems and how they differed from country to country.

230. The output of surface exploration studies would facilitate ARGeo member countries to prepare and propose economically viable and scientifically sound projects for exploration drilling to the RMF. The ATAT experts were assigned to: (i) conduct a scientific and technical evaluation of project proposals submitted to UNEP for technical and financial assistance; (ii) provide guidance and advice in selecting the most appropriate exploration methods to solve the problems/issues identified by the country in its "proposal", and (iii) evaluate individual studies, and provide guidance, on the "conceptual models" of the concerned geothermal system that should be targeted to select the best sites for deep exploratory wells. The assessment of the ATAT experts was aligned to donors' requirements for project quality control of outcome of the surface exploration study's and if the project outcome was eligible to apply for further drilling activities and GRMF support. The applications received by GRMF were be evaluated by independent international

[58] ARGeo UNEP Project Document

scientist for approval or recommendations on further exploration studies to be conducted before re-evaluation of the site-project.

231. Without any doubt, the interviews and the respective protocols of SC meetings showed, that there was continuous and successful co-operation between the Members of SC and the ATAT team. This was always mentioned during interviews from participants of the meetings. Both, exchange of experience and supporting the efforts of GtE in the countries by sharing information that gave substantial support to GtE in EA. The "psychological" support between the persons responsible for GtE in the respective countries by its "peers" from neighbouring countries helped the responsible officials in their work on getting GtE into implementation.

Responsiveness to human rights and gender equality

Rating: Satisfactory

232. The project facilitated effective implementation of the SDG 5 and decisions made by Africa Environment Ministers (AMCEN) on empowering women in energy sector through the programme of "Women Entrepreneurs and Sustainable Energy in Africa-WESE". The approach was: (i) Ensuring Gender responsive policies in energy (e.g. geothermal) sector; (ii) Technical skill development; and (iii) Ensuring access to finance and market.

233. The ARGeo project championed the creation of "Women in Geothermal in Africa WING Africa" [59]that aims to drive economic and social contribution of African women in geothermal science and technology, through direct utilization, achieving versatile uses of geothermal energy and achieving sustainable development goals.

234. The project has also trained a total of about 150 Africa women in geothermal science and engineering where they are now working as department heads and experts in the geothermal projects of their respective countries[60].).

235. Evaluation Team found that the ARGeo actively tried to promote women in geothermal energy. It did not detect any direct negative impact on communities or environments of site-projects by the ARGeo project on human rights and on gender equality as this project was a more technical project in the field of GtE in East Africa.

Environmental and social safeguards

Rating: Satisfactory

236. Within the ARGeo project, environmental issues[61] were considered during the entire implementation of the project. This can be seen from documents published and by the discussions in the SC and the ATAT.

237. For the accomplishment of successful progress in GtE development legal and regulatory framework and governments are obliged to have technical capacity to

[59] For details we refer to: https://www.thinkgeoenergy.com/video-introducing-wing-africa-the-women-in-geothermal-group-on-the-african-continent/

[60] UNEP: UN Environment Programme GEF PIR Fiscal Year 2019

[61] It should be noted, that during one drilling on Rwanda a blow-out of the drilling hole occurred due to very limited experience of the drilling team and the absence of adequate drilling hole closure systems.

evaluate all aspects of geothermal development. This includes clear rules on licensing concessions, long term PPAs landowners' rights, land acquisition, project and ESIA approval.

238. The legal and regulatory framework are in place in Ethiopia and Kenya. A Geothermal licensing department has been set up under the Ethiopian Electricity Agency and Kenya has gained a lot of experience in regulatory framework from projects in recent years. The Tanzania Geothermal Development Company (TGDC) in Tanzania and Geothermal Resource Development (GRD) in Uganda have developed geothermal energy policy guidelines with institutional framework. Eritrea is yet to develop its specific geothermal policy as per the regional policy guideline developed jointly by UNEP and AUC. The legal and regulatory framework need to be clear from the early stages of planning geothermal projects and attract private investors to get involvement by private sector investors.

239. With reference to environmental issues, during interviews experts mentioned that "they started drilling in Kibiro and they got a blow-out62, which is an uncontrolled release of steam, two years ago due to unexperienced drilling crews that were doing the temperature gradient drilling and shallow drilling 300-500 m deep slim wells". And "since the blow-out in Kibiro they have not, to date, got government permission to proceed, which is at least 2-year delay". In this case the blow-out has had no or very limited negative impact on the environment.

Country ownership and driven-ness

Rating: Highly Satisfactory

240. Interviews with all stakeholders in the ARGeo project clearly showed the ownership of officials, researchers and national experts in the participating countries on GtE use. Without the efforts made by the ARGeo project, both within Component 1 and Component 2, the topic of GtE would not been developed as the current status shows now in 2022. Most of the countries, with exception of Kenya, were not in the position to take over the topic of promoting and developing GtE solely in their respective country.

241. Other experts interviewed by the Evaluation Team stated that "Kenya has been effective, and they have a tremendous geothermal system in Olkaria, considered one of the best in the world by many scientists." Ethiopia has very promising geothermal system and is considered second best in GtE potential in East Africa Rift but there is also a large hydro power potential in all of the countries.

242. The main reasons for progress slow in geothermal development are mainly at political and government level.". Development of hydro power have been favoured in development for electrical production but in later years with climate change resulting in lower uptime for hydro power plants, GtE power plants have demonstrated a positive 95% yearly uptime, which is likely to generate more interest for GtE power plant development in the near future.

[62] A blowout is the uncontrolled release of steam/gas from an well when a pressure control system has failed. Expected high temperature wells have blowout preventers intended to prevent such an occurrence.

Photo: Geothermal Power Plant´s few 6 MWel at KenGen in Kenya (Source: Runar Magnusson, 2016)

Communication and public awareness

Rating: Highly Satisfactory

243. Before the start of the ARGeo project there were nearly no activities in the GtE sector in East Africa, with the exception of Kenya. With the implementation of ARGeo for all participating countries communication on GtE increased heavily for those stakeholders, which were involved in the ARGeo project. And with the bi-annual conferences and other activities, for example training and establishment of ARGeo homepage, the visibility of GtE and awareness on GtE topics increased. All persons interviewed confirmed the enormous effect of ARGeo on better communication between the persons in the GtE field in EA. Communication between the stakeholders in the different countries was always a key element mentioned during interviews as the main strength of the ARGeo project.

244. According to discussions with stakeholders, internal communication on ARGeo within UNEP was not used as much as it could have been. For example, there are “Lunch Meetings” open to all staff at UNEP and there are sharing of newsletters with “Success Stories” at UNEP. These channels were not used by ARGeo. It could be that there was a lack of information flow within ARGeo, however, one interviewed person underlined that ARGeo was not to be perceived as a “one man show”.

Rating for factors affecting performance and cross-cutting issues:	**Highly Satisfactory**

VI. CONCLUSIONS, LESSONS AND RECOMMENDATIONS

A. Conclusions

245. The objective of the ARGeo project was to provide technical assistance and mitigate the risks associated with exploration studies to catalyse investments in geothermal power production in EAR countries by addressing financial, institutional, information and resource confirmation related barriers currently facing geothermal resource development in the region. Without ARGeo the use of GtE in East Africa would be on a much lower level of executing surface exploration studies and establishing conceptual models and feasibility studies in all participating countries in East Africa. The ARGeo project made progress in surface exploration studies, developing project pipelines in order to support countries to apply for GRMF funds for further development of the GtE development, and contributed to awareness raising, hands on training, capacity and institution building on GtE in East Africa.

246. The history of ARGeo GtE activities goes back to 2003, the surface exploration project was initiated by UNEP and the World Bank in 2010 but the World Bank pulled out in 2012 and other doners stepped in with funding for the project. The ARGeo project has been on going in 2012 and the results in GtE development are considered, by the Evaluation Team, disappointing for all EAR countries, except in Kenya. Implementation of investments in GtE in EAR countries have been very limited compared to other regions in the world (Turkey, Philippines, Indonesia).

247. The project fully achieved outcome 1 related to Component 1 of the project and achieved outcome 2 and 3 related to Component 2. It partially achieved outcome 4 on generating private investments under Component 2.

248. Findings related to the three strategic questions:

Q1: To what extent did the applied science-policy model work at regional and national level?

A1: In the ARGeo project, all investigations into newly explored geothermal fields started with reconnaissance scientific research, scientific methodology and knowledge, on the specific geothermal prospect. Depending on the scientific results of geothermal surface exploration using geophysical, geological and engineering disciplines, a conceptual model was developed with target sites for exploration drilling that would provide information for developing the geothermal field. Kenya and Ethiopia have reached the stage of construction of electrical generation from high temperature resources and on the policy side both countries have legal and regulatory frameworks in place permitting the process to support further development.

Q2: How did the project contribute to GEF and UNEP strategies on geothermal initiatives and discussions on emerging issues of priority?

A2: The ARGeo project fully supported the strategies of UNEP and GEF with the establishment of a regional network of East African institutions on promoting and implementing geothermal energy along the East African Rift System (EARS). A comprehensive technical assistance programme to confirm the presence of utilizable geothermal resources with the aim of presenting conceptual models with well targeting to minimizing drilling failure risk for GRMF.

Q3: To what extent were the public-private partnership mechanisms adapted to the local context and do they remain effective and sustainable?

A3: As the risk for targeting a high enthalpy geothermal resource for the electricity generation in GtE is high, in the early stages of development the average exploration drillings cost is usually more than USD 1 million for each well and the failure rate is in average at about 50% in the beginning but if the project is viable and it will continue then the success rate will increase. While the risk is high in the early stages the participation of the private sector this participation usually very limited. Anyhow, after successful exploration drillings and confirmation of the resource, especially after successful production drillings, the participation of the private sector could be much higher. In Kenya and Ethiopia, there are more than eight private developers investing in geothermal resources. Again, as mentioned above, worldwide, private investors with extensive geothermal expertise commonly accept significant exploration risk and drilling cost given a sufficient power price.

Key strengths of ARGeo project

249. Strengths of the ARGeo project: The main strengths of the ARGeo project lies awareness raising, training and institution building on GtE in EA. In detail, the strength of ARGeo is the following:

S1: Information exchange between the stakeholders as part of the ARGeo project has always been mentioned in the interviews concluded with the stakeholders in January and February 2022. This international exchange of information strengthened the persons within the respective countries and international scientists with their emphasis on geothermal energy use. This includes conferences and seminars and workshops during the entire period of the ARGeo project.

S2: Same strength applies for training of geothermal experts in the region where more than 900 individuals have been involved in training sessions and among them are over 150 women. Special training was concluded within the ARGeo project both, in Kenya for a two-week short training based on the training contributions in addition a short term GtE training at UNGTP in Iceland and is followed up with a long-term training for fewer individuals in Reykjavik for six months. All persons interviewed highlighted the usefulness of geothermal training and capacity building.

S3: Project management, in particular the efforts of the Project Manager were always mentioned as a prerequisite for a successful project. In the interviews, the Project Manager was referred to as the “motor of the project”.

S4: The Project Management Team kept contact to all stakeholders in the EARS and provided the countries with best international geothermal experts for the scientific training, surface exploration, data inturbidating, leapfrog programming, drilling activities and reviewing the results form drilling.

S5: Surface exploration equipment provided by UNEP within the ARGeo project assisted countries to build up internal national expertise and allows further exploration to support resource confirmation and drilling activity in the respective countries.

S6: Recruiting high level international experts needed to undertake the gathering of field data, quality control and interpret the outcome for establishing conceptual models for the geothermal fields was of great advantage as the respective countries do not have any “own” high level geothermal expertise.

S8: With employment and inclusion of local experts ARGeo strengthened country knowledge of geothermal technology in cooperation with the international experts. By this, Kenya has increased the number of geothermal experts within GDC and KenGen

significantly and this supports technology transfer by their involvement and support development in the EARS projects.

S9: Finally, ARGeo projects supports and strengthen the national governmental officials, who are "under pressure" from their colleagues from the renewable section (hydro, solar, wind) to keep the geothermal options in the national discussion of future development.

Key Weaknesses of ARGeo project

250. Weaknesses of the ARGeo project: The main weakness of the ARGeo project lies in the limitations of ensuring and implementing private investments in GtE in East Africa beyond Kenya and Ethiopia. In Kenya and Ethiopia, where the resource has been identified to be a high temperature resource there are more than eight private sectors involved in geothermal resource exploration and development. Participation of private sector in other countries (other than Kenya and Ethiopia) are limited due to the lack of high temperature resources. ARGeo has identified the existence of low to medium temperature geothermal resources in western branch of the East African Rift system, which is considered to be a major change in the understanding of the geothermal situation in the Eastern African rift system. This has also informed national decision makers and made them revise their geothermal energy policy. In detail, the weaknesses of the ARGeo project are as follows:

W1: The main weakness of ARGeo is the limitation of real investment projects in East Africa with GtE. It is considered a weakness that the technical level of expertise is very different within the EARS countries. Kenya is currently in the process of development of over 861 MWel and Ethiopia has 7.3 MWel while no geothermal project has been developed in Eritrea, Rwanda, Tanzania and Uganda in the last decade. For Uganda, the level of technical expertise is significant and has allowed repeating the mistakes made at Karisimbi.

W2: The projects in Ethiopia and Kenya took many years to reach the current stage and Eritrea surface exploration studies have been further delayed. The current situation in Tanzania and Uganda is in the process of planning TG wells and slim well drilling, that is almost 10 years after start-up of the project.

W3: The Evaluation Team considers the continuing delay of project outputs as the first actual TRM evaluation of the surface exploration projects had been initiated in 2014/2015 and then in the Western Branch Technical Workshop proceedings in Kigali Rwanda in 2016, that was 6 years after start-up. This includes the time lapsed from initiation of the project in 2010 until final reports were evaluated in the validation and workshops in 2015 and in 2016. Ideally, surface exploration study could have been finalized, validated and confirmed within two to three years considering that high level international experts are executing the project. It is noted that the ARGeo project was initiated in 2010 but the World Bank pulled out in 2012 and other donors stepped in and therefore 2012 is the initial start-up of the surface exploration studies.

W4: For Eritrea, it was reported that equipment bought and distributed by the ARGeo project was still unpacked. Two years later and due to technical progress of the surface exploration studies the equipment is unusable, because the software needs to be updated after 2 years. Training knowhow is lost due to lacl of experience with no surface exploration on going and licenses for geothermal software expired if it is renewed. The quality and capacity of the computers used for the data processing is also questionable after many years in the original packaging.

W5: The ARGeo support for preparation to countries to allocate GRMF funds for exploration drillings were not sufficient. It is reported that a number of applications to GRMF had

not been reviewed with a decision and were delayed due to missing documents according to GRMF rules. This could have been avoided with support from ARGeo in preparing these application documents during the period 2012 to 2021. Submissions to GRMF were formally made by the partner countries (not ARGeo) and as such the applicant country would be responsible for the application. A 40-60% application success rate was allegedly reported.

W6: In the initial stages of the project there were high expectations on electricity generation by geothermal energy, the use of low-temperature geothermal energy was for a long period neglected, only at later stage of the ARGeo project discussion started on low-temperature use of GtE.

W7: Neither for exploration drillings nor for international expertise the Project Management provided no ToR and no RfP for the selection process of International scientific experts nor the tendering process for selecting GDC as cooperation partners for data gathering and data processing for the five projects. In future, open or limited tendering should be a standard in UNEP and GEF financed projects.

B. Summary of project findings and ratings

251. Table 6 below provides a summary of the ratings and finding discussed in Chapter 0. Overall, the project demonstrates a total rating of **Satisfactory** (4.65).

Table 6. Summary of project findings and ratings

Criterion	Summary assessment	Rating
Strategic relevance	**ARGeo project is fully compatible to strategic issues by UNEP, GEF and other donor organisations**	**Satisfactory**
Alignment to UNEP MTS, POW and Strategic Priorities	ARGeo project is fully in line with UNEPs strategic priorities for fast tracking the development of GtE that supports electrical production and direct use.	Satisfactory
Alignment to UNEP Donor/GEF/Partner strategic priorities	ARGeo project is in line with UNEPs partner strategies and supported by the SC participation and projects quality controlled by the ATAT Evaluation Committee.	Satisfactory
Relevance to global, regional, sub-regional and national environmental priorities	GtE use for electricity production, which is supported by the ARGeo project assists in meeting global and GtE regional priorities supports the reduction of fossil fuels and meeting environmental goals.	Moderately Satisfactory
Complementarity with existing interventions / coherence	ARGeo project is a preparatory project and planed pipeline support for GRMF sources for GtE exploration and production drilling in East Africa.	Satisfactory
Quality of project design	**ARGeo project was initially designed for electrical production, but surface exploration has shown that the Western part of rift system allows only low and medium temperature use of GtE.** The project design was done before the surface exploration studies and detail technical geological and geodynamic assessments were done.	**Moderately Satisfactory**
Nature of external context	**ARGeo has no negative effects on conflicts or disasters, therefore the ARGeo project is considered neutral to external context**	**Favourable**
Effectiveness	**In general, the ARGeo project has met the planned outputs, outcomes and intended impacts in EAR Countries.**	**Satisfactory**
Availability of outputs	All planned outputs were delivered by the ARGeo project except for one technical exploration study.	Satisfactory
Achievement of project outcomes	Most of the planned outcomes are met, outcome 4 has been partially met by ARGeo	Moderately Satisfactory

Criterion	Summary assessment	Rating
Likelihood of impact	All planned impacts are likely, at least partially, to be met by contribution of the ARGeo project over time. The identification of the low to medium temperature geothermal systems in Western branch through scientific studies by the ARGeo project has changed national geothermal policies.	Likely
Financial management	**Financial management for Component 1 was adequately provided. For Component 2 no ToRs and RfP documentation were made available to the Evaluation Team.**	**Satisfactory**
Adherence to UNEP's financial policies and procedures	ARGeo as managed by UNEP-ROA is part of the UNEP budgeting system, therefore, compatibility with UNEP financial policy	Highly Satisfactory
Completeness of project financial information	Only 4 out 12 financial tables provided for Component 1, no financial table for Component 2 available	Unsatisfactory
Communication between finance and project management staff	Project management and financial supervision are within UNEP system, no communication problems seen	Highly Satisfactory
Efficiency	**For Component 1 huge number of documents produced and quality controlled by TE. For Component 2 costs for exploration studies and drillings quite high compared to international standards.**	**Satisfactory**
Monitoring and reporting	**In detail and well documented project. Reports had been published regularly, the homepage provides a large amount of information on GtE use in East Africa and the conference proceedings are very detailed and can be used in future.**	**Satisfactory**
Monitoring design and budgeting	No specific document found on budget planning, only Steering Committee discussions on budget planning. No ToR or RfP for the ARGeo is available for the surface exploration tendering for the scope of works.	Moderately Satisfactory
Monitoring of project implementation	Huge number of documents published on Component 1, for example proceedings of the Bi-Annual ARGeo Conferences. Four out of five exploration studies provided.	Satisfactory
Project reporting	Huge number of documents on GtE use in East Africa published, including leaflets, training reports, ARGeo database, daily bulletins, galleries, flyers, brochures, and conference proceedings.	Highly Satisfactory
Sustainability	**Component 1 needs additional support to continue. Component 2 can use international funds, for example, GRMF and similar funds.**	**Likely**
Socio-political sustainability	ARGeo has increased geothermal awareness that supports sustainable use of GtE in East African region.	Highly Likely
Financial sustainability	For Component 1 additional financial support to continue conferences and database needed. Component 2 will use international funds, f. ex. GRMF and similar funds for next phase of exploration drilling.	Likely
Institutional sustainability	Established East African Branch of Geothermal Association continues on a lower level. Other GtE activities continue with limited effects, with exception of Kenya (GtE sustainable).	Likely
Factors affecting performance	**Performance of ARGeo project is adequate and it was more or less the only trans-national entity providing support for GtE in East Africa with technical information exchange over country borders.**	**Highly Satisfactory**
Preparation and readiness	In general, Steering Committee, PM and ATAT are aware on specific situation of GtE in East Africa. For Rwanda they all were too reluctant in the beginning of the ARGeo project to move from "electricity production" and to add "low-temperature direct use".	Satisfactory

Criterion	Summary assessment	Rating
Quality of project management and supervision	Supervision by UNEP Portfolio Management and by the Steering Commitee monitoring continuously during ARGeo project period. Continuous project meetings and supervision by Steering Committee and ATAT ensured high quality of outputs and work.	Highly Satisfactory
Stakeholders' participation and cooperation	Through the system of Steering Committee and ATAT meetings a project procedure was established and executed ensuring wide stakeholder participation throughout the entire project period 2010-2021.	Highly Satisfactory
Responsiveness to human rights and gender equality	The Evaluation Team has not detected any negative impact by the ARGeo project on human rights and on gender equality.	Satisfactory
Environmental and social safeguards	Environmental aspects of GtE covered by ARGeo through Steering Committee and ATAT meetings.	Satisfactory
Country ownership and driven-ness	Full ownership of GtE use in East Africa showed by officials, researchers and national experts in the participating countries.	Highly Satisfactory
Communication and public awareness	High efficient support to public discussions on GtE use in East Africa (except for Kenya, where activities had already started before ARGeo) with the bi-annual conferences and other activities, for example, training and detailed homepage of ARGeo, the visibility of GtE and awareness on GtE topics increased.	Highly Satisfactory
Overall project performance rating	**For Component 1 the ARGeo project met the expectations of UNEP/GEF and has ensured very useful discussion on GtE in East Africa. For Component 2, four out of five exploration studies and drillings were completed. Based on these results and contribution to outcomes and with this information the type of GtE use in Western and Eastern part of EARS is now better identified.**	**Satisfactory**

C. Lessons learned

252. The lessons learned are rooted in actual project experiences in the ARGeo project from 2010 to end of 2021 and the lessons learned could be replicated in similar contexts. Alternatively, they are derived from problems encountered in the ARGeo project and mistakes made within the ARGeo project which should be avoided in the future.

253. The Evaluation Team have identified the following five lessons based on review of project documents and documentation and from interviews with stakeholders.

Lesson learned #1:	**Exchange of know-how and experience on GtE in East Africa, i.e., continuation of conferences (Bi-Annual ARGeo Conference), workshops and including improvement and update of database and AGID website on GtE in East Africa are in high demand and urgently needed.**
Context/comment:	According to interviews with all main stakeholders, the exchange of experience in conferences is for most countries (except for Kenya) more or less the only form of exchange of experiences. All officials responsible for GtE in the respective countries feel "under pressure" from non-GtE renewables and the ARGeo meetings are the only chance to get support by the peers on GtE promotion in the respective countries. UNEP plays an important role as convener and facilitator to

	strengthen international co-operation between persons responsible for GtE in East Africa.

254. The Evaluation Team has learned during the Terminal Evaluation that without the ARGeo project the information on and the use of GtE in East Africa would be on a significantly lower level. This is especially true for GtE awareness raising in the region and technical training of experts in the participating countries. Also, a formal and informal network of experts in GtE has been established, which is prerequisite for any further use of GtE in East Africa.

255. From this evaluation the Evaluation Team concludes that it is necessary for a certain period to continue supporting some of the activities, especially for: (1) upgrade of database and homepage with documents and (2) ARGeo congresses, conferences on GtE and (3) regional GtE associations and (4) regional training at AGCE. Prioritisation should focus on the content of the ARGeo homepage; there are many pages and topics missing.

256. The update of the homepage should be relatively easy for the current team as most of data are already available; any other trying to develop a similar data system would have to spend a lot of resources to arrive at the current level of detail and expertise. Continuing information gathering and publications at ARGeo homepage, that is all relevant documents should show up at the ARGeo homepage. The GtE know-how data base in East Africa should be upgraded using all existing studies and findings, technical training and "Refresher Courses" on GtE training in East Africa will strengthen the expert base for GtE in East Africa. The Evaluation Team recommends that further support is needed for the upgrade and to establish a user-friendly interface to gather all data from a workable and successful team in GtE use in East Africa.

Lesson learned #2:	**Continuation of capacity building, training and other similar activities are critical to the respective countries of the EAR system to improve their competencies and management capabilities. For most of the countries involved (except for Kenya) the ARGeo trainings by UNEP and ARGeo are the main means of accessing international expertise and transfer knowledge to the local context thereby strengthening national expertise, as professionals and technicians need opportunities to work and perform in other field development areas with world-class standards in their particular activity, for example by reducing drilling time or ensuring rig safety compliance.**
Context/comment:	For most of the countries involved (except for Kenya) the ARGeo trainings by UNEP ARGeo are the main means of strengthening national expertise in the East Africa countries. Of course, ARGeo was the main but not the only source of training in Uganda, Tanzania or Rwanda since DFID-EAGER, MFA ICEIDA and USAID also supplied such support.

257. The Evaluation Team has learned during the Terminal Evaluation that large parts of the project efforts were used to increase knowledge and awareness on GtE in East Africa and train people from all participating countries. One of the main goals of the project was to achieve favourable results in surface exploration studies and targeting sites for deep drilling that would catalyse investment GtE development that could lead to huge investments in the East Africa countries, but these investments were very limited.

258. From this evaluation the Evaluation Team concludes that it is necessary to concentrate soon on implementation of GtE, i.e., support on legislation, permitting and government financing of GtE in the respective countries by supporting private investors to get involved in GtE development, either by power plants or other direct use of GtE. Priority should be given to "private financing", for example, for IPP and respective long-term agreements on power purchase to the national electricity grid (PPA), for example at least 10 USc/kWh, it would not be sustainable to focus solely on the public sector for investments in GtE.

259. It is the view of the Evaluation Team that for a certain period, increased financial support in exploring GtE in East Africa from 40% to 60% would be beneficial, i.e., a reduction of local contribution from 60% to 40% for the GRMF funding. Additional support by GRMF would lead to increased investment as the financial risk would be lower as exploration costs are high and drilling risk is relatively high and key limiting factors for private investments.

Lesson learned #3:	**A detailed inventory assessment on GtE in East Africa using all existing know-how and expertise individually gathered from exploration studies, drillings and active use of GtE in East Africa would effectively help avoiding overlaps and duplication of work.**
Context/comment:	UNEP with ARGeo is currently the only institution with the capacity to organize a selection process based on detailed inventory assessments and review by an evaluation committee of international experts to select the most viable GtE resources for development.

260. The Evaluation Team has learned during the Terminal Evaluation that the ARGeo project concentration on electrical production from GtE for a number of African Rift areas was not appropriate. The surface explorations and the feasibility studies confirmed that the temperature and magnitude of GtE was in many cases limited. The exploration studies reveal that production of electricity with GtE is not economically sound due to limited GtE resource temperature and Enthalpy.

261. From the evaluation the Evaluation Team has concluded that it is necessary to move GtE utilization and development to "direct-use", "low-tec use", and "low-cost use", which is based on local GtE resources. The direct use of GtE should not have been excluded in the project design from the beginning of the ARGeo project. Future activities should focus on the entire energy development, that is combined electrical production with flash and binary power plants and cascading down stream, "direct

use" of GtE in East Africa. Comparing East Africa to the worldwide use of GtE shows that the utilization of direct use is quite higher in terms of MW_{th} than GtE for electricity production in terms of MW_{el}. For example, a worldwide installation of GtE amounts to 14,000 MW_{el} and 28,000 MW_{th} installed.

Lesson learned #4:	**Support to a single "Lighthouse-Project" instead of enlarging the number of GtE projects in each country that is involved in the EAR system might would allow for more efficient use of manpower and resources and increase implementation of GtE in East Africa.**
Context/comment:	The Evaluation Team found that at the beginning of the project there was a concentration of efforts on enlarging the number of countries participating in ARGeo. As the project has advanced and results of drillings activities were made available there has been growing interest from partners in how to further develop prospect sites by supporting single "Lighthouse-Projects". The "lighthouse" could be whichever field has the most active and efficient drilling and could change with time.

262. The Evaluation Team has learned during the Terminal Evaluation that the implementation of investments of GtE in East Africa is still lacking 10 years after implementation. It is though more activity within Kenya which have around 861 MWel and a small unit of 7.3 MWel was installed in Ethiopia during the project time.

263. From this observation the Evaluation Team concludes that it would be necessary for governments to raise support for additional development within countries that are without any GtE development up to date. For example, "Lighthouse Projects" could be supported by Kenya with participation of GDC and KenGen to stimulate similar GtE known investments in the neighbouring countries for a certain period. The Evaluation Team is convinced that the "Lighthouse Projects" would ease the implementation of investments in other East Africa countries by simple replication.

264. Finally, and in the long run, the GtE market must bring GtE to private investments without financial support from public institutions.

Lesson learned #5:	**There is a need to reduce the uncertainty in the early stages of investment in GtE development in order to attract more private investors to invest in GtE projects in East Africa.**
Context/comment:	For fast-tracking GtE in EAR countries a number of measures can be taken, mainly reducing financial risks in unsuccessful drillings, and also the preparation of legal framework, permitting and long-term contracts with PPAs and FITs (feed-in-tariffs) allowing GtE producing companies to sell its electricity production to the grid at a specific price per kWh.

265. The Evaluation Team has learned during the Terminal Evaluation that private investments in GtE in East Africa are lacking outside Kenya and Ethiopia. With reference to project outputs, it has been made clear, that the other countries are much slower in development compared to Kenya with GtE for electricity generation.

266. From this observation the Evaluation Team concludes that it is necessary to involve more East African countries with increased government support in the process of developing GtE. It is most important to enhance the support to other East African countries outside Kenya by increasing the participation of the respective countries in GtE. ARGeo project has increased local critical mass of experts for sustainable use of GtE development through training, awareness raising for financing and investment preparation. The current "Observer Status" of EAR countries governments interested in the use of GtE should be upgraded.

267. The Evaluation Team has learned during Terminal Evaluation that the responsible persons in the respective national ministries are under pressure from their colleagues in the renewable energy sector (solar, wind, hydro). The ET has learned from interviews with the national representatives, except for Kenya, that other renewable energies enjoy a level higher attention and priority than GtE. Therefore, the exchange of views with their peers is of great importance.

D. Recommendations

268. All recommendations are anchored in the conclusions of the report and are based on the interviews made in January and February 2022 as well as on the desk review of documentation received from UNEP. The recommendations[63] are feasible to implement within a 12-month timeframe and resources available including local capacities, specific in terms of who would do what and when and set a measurable performance target that the Evaluation Office of UNEP can monitor implementation of the recommendations[64].

Recommendation #1:	**Ensure a sound inventory survey**
Challenge/problem to be addressed by the recommendation:	A sound inventory survey on GtE in all countries of the EAR system would help singling out best places for use of GtE both, for electrical production and direct-use based on research information gathered in last decade. Only regional experts in a cooperation with international scientists in an international project like in a UNEP financed project are in the position to execute this inventory on an equal scale. Financial support from the Government of Italy, currently supports the implementation of a project on low-medium temperature GtE use

[63] Applications from the Western Branch and from the Eastern Branch of EARS should be considered separately as the characteristics of their geothermal resources are also different. This will help to boost the development of geothermal resource in both branches of EARS.

[64] Also, in some cases, the same challenge/problem can lead to separate recommendations (prescribed actions) to be addressed by different groups e. g. project or partners recommendations. In cases where the recommendation is addressed to a third party, compliance can only be monitored and assessed where a contractual/legal agreement remains in place. Without such an agreement, the recommendation should be formulated to say that UNEP project staff should pass on the recommendation to the relevant third party in an effective or substantive manner. The effective transmission by UNEP of the recommendation will then be monitored for compliance.

Recommendation #1:	**Ensure a sound inventory survey**
	with advanced technology and geothermal driving other catalytic sectors such as agriculture (food and water security).
Priority Level:	High priority
Type of Recommendation	General recommendation
Responsibility:	UNEP, UNEP/ ROA
Proposed implementation time-frame:	Implementation within 12 months

269. Pending on availability of additional UNEP funds or other financing resources, ensuring a sound inventory survey on GtE in all countries of the EAR system to single out best places for use of GtE both, for electricity production and direct-use based on the available information gathered in last decade. This could include Improving and updating of the database on current GtE activities in EAR countries to avoid overlapping and duplication of exploration work.

Recommendation #2:	**Define ARGeo as a facilitator for financing**
Challenge/problem to be addressed by the recommendation:	ARGeo should be a facilitator for financing and donor organisations to get involved in GtE in East Africa. The UNEP ARGeo project is already considered as a regional hub that organizes regular conferences (ARGeo-C9; Djibouti, November 2022) and is a host to the IPCU-AGCE. ARGeo is also involved in developing the "Africa Geothermal Resources Atlas".
Priority Level:	High priority
Type of Recommendation	General recommendation
Responsibility:	UNEP, UNEP/ ROA
Proposed implementation time-frame:	Implementation within 12 months

270. It is recommended that UNEP is in contact with national stakeholders and other financing organisations to ensure ARGeo's role in the future as a facilitator for the information hub, for AGID web and AGCE, and to financing and donor organisations to increase development in GtE in East Africa.

Recommendation #3:	**Ensure international norms for tendering processes**
Challenge/problem to be addressed by the recommendation:	All UNEP projects supporting the use of GtE in EA, especially all exploration studies and exploration drillings financed by UNEP should have a clear system of ToRs, RfPs and other international norms for tendering processes of external (international) expertise, external (exploration) studies and external (exploration and production) drillings that are not provided by UNEP directly. Some samples of UNOPS procurement documents for equipment acquired through the ARGeo project and some samples of Terms

	of Reference of international consultants contracted by the ARGeo project through UNON/HR and/or UNOPS were provided. Although it should be noted, that requiring and supporting effective ToRs and RfPs of large projects is important, for small projects like employing experts to present lectures, support RfP preparation or review reports, the high overhead of a full RfP process would discourage participation by suitable experts While oversight, monitoring and reporting are common and centralized tasks in the management of a project, projects should separate the administrative management of capacity building components and investment focused technical assistance components with large co-financing to increase transparency and strengthen tendering and procurement processes of the latter. The projects with sizable budgets (those budgets and thereof UNEP implementing agency fees allow) should acquire or develop expertise in tendering and procurement to adequately support and manage these processes.
Priority Level:	High priority
Type of Recommendation	General recommendation
Responsibility:	UNEP, UNEP/ ROA
Proposed implementation time-frame:	Implementation within 12 months

271. All future activities by UNEP projects supporting the use of GtE in East Africa, especially exploration studies and exploration drillings financed by UNEP should have a clear system of ToRs, RfPs and other international norms for tendering processes of external (international) expertise, external (exploration) studies and external (exploration and production) drillings that are not provided by UNEP directly.

Recommendation #4:	**Ensure exchange of experience within EAR countries on GtE**
Challenge/problem to be addressed by the recommendation:	Urgently needed exchange of experience within EAR countries on GtE should be continued through conferences and workshops and by sharing lessons learned on successful and unsuccessful implementation of exploration studies and exploration drillings. Supporting more opportunities for hands-on training with world-class mentors and supporting exchanges of staff on geothermal energy between developers is of priority. For example, by taking on a lead role in organizing the ARGeo C9 Conference to be held in Djibouti in November 2022. ARGeo also plans to organize side events for the World Geothermal Congress planned to be held in Beijing, China, in 2023.
Priority Level:	High priority
Type of Recommendation	General recommendation
Responsibility:	UNEP, UNEP/ ROA
Proposed implementation time-frame:	Implementation within 12 months

272. Depending on the availability of additional funds from UNEP or other financing sources, there should be a continuation of urgently needed exchange of experience within EAR countries on GtE use by conferences and workshops and by sharing lessons learned on successful and unsuccessful implementation of exploration studies and exploration drillings. For example, “concentrate on those countries with high potential of GtE”; these are high temperature countries. Following the two unsuccessful drillings in Rwanda which “confirmed very limited temperatures, in Uganda and Tanzania, the focus has shifted to GtE direct use”.

ANNEX I. PEOPLE CONSULTED DURING THE EVALUATION

During period from December 2021 to beginning of March 2022 in total 47 persons involved in the ARGeo project had been interviewed by the Evaluation Team (including 10 female experts and 24 East African based experts). Most of the interviews were done using internet communication, with some persons the ET has had multiple interviews, which totals to 54 interviews.

Table 7. People consulted during the Terminal Evaluation (December 2021 – March 2022)

Organisation	Last name, first name	Position	Gender
Geothermal Resource Group Inc	Abraham, Sam	Vice President-Operations at GRG. Experts within the ARGeo project	M
KfW - Kreditanstalt für Wiederaufbau, Frankfurt	Andres, Michael	KfW - Kreditanstalt für Wiederaufbau	M
ISOR, Iceland	Árnason, Knútur	Chief Geophysicist at ISOR	M
Geothermal Training Program, UNESCO GRO	Axelson, Gudni	Director for GTP, Geothermal Training Program, UNESCO GRO	M
Ministry of Energy, Uganda	Bahati, Godfrey	Uganda, Member Steering Committee	M
UNEP EO	Bech, Susanne	Evaluation Officer	F
ICEIDA, Iceland	Bjarnasson, David	Former director for ICEIDA, Member of SC and Experts for ARGeo project	M
UNEP, Nairobi	Colville, Geordie	Portfolio Manager	M
Geophysicist expert, USA	Cummings, Bill	Geophysicist, Lead Expert for the ARGeo surface exploration project	M
Ministry of Energy and Mines, Department of Mines, Eritrea	Ermias, Yohannes	Eritrea Ministry of Energy and Mines, Department of Mines	M
Geology expert, USA	Melosh, Glen	Geology expert for ARGeo surface exploration project	M
ICEIDA, Iceland	Gudmundsson, Engilbert	Former director for ICEIDA, retired, Experts within the ARGeo project	M
UNEP, Nairobi	Hagelberg, Niklas	Head of Climate Change, UNEP	M
Tanzania Geothermal Development Company	Kabaka, Kato	Tanzania, Member of Steering Committee, Former General Manager of TGDC, Tanzania Geothermal Development Company	M
Ministry of Energy, Department of Energy, Zambia	Kafuwe, Agnelli	Ministry of Energy, Department of Energy, ZAMBIA	M
KenGen, Kenya	Kandie, Beatrice	Human Resources Manager Experts within the ARGeo project	F
Ministry of Energy and Minerals, Uganda	Kato, Vincent	Geologist at Ministry of Energy and minerals Experts within the ARGeo project	M
Geothermal Exploration of Ethiopia	Kebede, Solomon	Director at Geothermal Exploration of Ethiopia Experts within the ARGeo project	M

Organisation	Last name, first name	Position	Gender
GDC, Kenya	Lagat, John	Manager, Geothermal Resource Assessment at GDC Experts within the ARGeo project	M
UNEP, Nairobi	Magare, Cicilia	Programme Assistant	F
KenGen, Kenya	Mangi, Peketsa	KenGen, Kenya, Member of SC Geothermal Development Director	M
University professor	Mariita, Nicholas	Members of universities and research institutes	M
Geochemist expert, Italy	Marini, Luigi	Geochemist, Surface Exploration Experts within the ARGeo project	M
Tanzania Geothermal Development Company	Mwangomba, Matthew	Tanzania, General Manager of TGDC, Tanzania Geothermal Development Company	M
UNEP-ROA, Nairobi	Mbego, Moses	Assistant to Project Manager	M
Geothermal expert	Melaku, Markus	Experts within the ARGeo project	M
Department of Geological Survey, Ethiopia	Melka, Hundie	Ethiopia, Member of Steering Committee, Director of Department of Geological Survey Ethiopia	M
ODDEG, Djibouti	Moussa, Kayad	Directeur Général de l'ODDEG/ Coordinateur du projet Geothermique d'Assal	M
GDC, Kenya	Muia, George	GDC, Kenya. Member of SC, General Manager - Strategy Research and Innovation	M
UNEP-EO, Nairobi	Mwangi, Mercy	Assistant to Evaluation Officer	F
Ministry of Energy and Mineral Development, Uganda	Natukunda, James	Experts within the ARGeo project Geologist at Ministry of Energy and Mineral Development	M
UNEP-ROA, Nairobi	Ndomi, Ryan	Assistant to Project Manager	M
MFA, Iceland	Oddson, Geir	Division Manager MFA Iceland, Member of Steering Committee	M
IGA ARB, Iceland	Omenda, Peter	Independent Consultant, IGA ARB Iceland, Member of Steering Committee	M
U.S. Energy Association	Palmateer, Andrew	Members of co-financing institutions, Program Director at U.S. Energy Association	M
KenGen, Kenya	Peketsa, Mangi	KenGen, Kenya, Member of SC Geothermal Development Director	M
UNEP, Paris	Radka, Mark	Member Steering Committee Chief of Energy and Climate Branch Organization, UNEP	M
Energy Development Corporation Ltd/Rwanda Energy Group	Rutagarama, Uwera	Rwanda, Member of SC Director Off-grid and Alternative Energies at Energy Development Corporation Ltd/Rwanda Energy Group	F
BGR - Bundesanstalt für Geowissenschaften und Rohstoffe, Hannover	Schwarz, Franca	Environmental Engineer, BGR - Bundesanstalt für Geowissenschaften und Rohstoffe, Hannover	F

Organisation	Last name, first name	Position	Gender
Tanzania Geothermal Development Company	Shakina, Idrissa	Tanzania, Business Director of TGDC, Tanzania Geothermal Development Company	F
BGR - Bundesanstalt für Geowissenschaften und Rohstoffe, Hannover	Stechern, Dr Andre	BGR - Bundesanstalt für Geowissenschaften und Rohstoffe, Hannover	F
ISOR, Iceland	Steingrímsson, Benedikt	Retired KENGEN former division manager for ISOR Geophysics	M
UNEP, Nairobi	Turyatunga, Frank	Deputy Director Regional Office Africa, UNEP	M
GEF, Nairobi	Twahir, Fatma	Administrative Officer, Climate Change, GEF	F
Geothermal expert, France	Varet, Jacques	Member of Steering Committee, Member of ATAT	M
Bundesgesellschaft für Endlagerung (BGE), Hanover	Winchenbach, Max	Project geologist, Head of BGR's GEOTHERM II Programme	M
UNEP-ROA, Nairobi	Zemedkum, Dr Meseret Teklemaria	Project Manager, UNEP-ROA	F

ANNEX II. PROJECT BUDGET AND EXPENDITURES

Table 8. Project budget and co-financing

Project budget and co-financing	Planned in M USD	Actual in M USD
GEF	4,75	4,83
UNEP ROA	0,25	0,25
BGR	1,60	0,15
ICEIDA	0,25	0,92
IAEA	0,31	0,00
ETHIOPIA	1,65	0,76
ERITREA	0,25	0,01
KENYA	2,50	2,83
TANZANIA	0,45	4,65
RWANDA	1,00	0,14
UGANDA	1,00	0,28
AUC-KfW (GRMF)	65,00	65,00
OTHERS	0,00	0,00
Project preparation by UNEP GEF financing	0,88	0,00
Leveraged co-finance US Power Africa	0,00	0,00
Leveraged co-finance Italian Agency for Development	0,00	0,00
TOTAL	79,89	79,82
Component 1	*4,75*	*4,83*
Component 2	*75,14*	*74,99*
TOTAL	*79,89*	*79,82*

Table 9. Annual actual expenditures to the GEF Trust Fund

Year	Actual expenditures in USD
2010	98.427
2011	162.248
2012	244.453
2013	948.208
2014	734.623
2015	1.460.138
2016	354.906
2017	273.052
2018	286.673
2019	139.622
2020	97.051
2021	30.599
Total	**4.830.000**

Sources:
(a) Project document revision 6 and 7, PIR 2019-2020. Total disbursement as of 30 June 2020 was US$ 4,705,000. Total expenditures shown as of 30 June 2020. GEF grant includes project preparation grant and GEF agency fees.
(b) ARGeo: Final Report (April 2021), 24 pages, dated 8 December 2021.
(c) Evaluation Office of UNEP: Draft Terms of References, Terminal Evaluation of the UNEP/GEF project "African Rift Geothermal Development Facility (ARGeo)" (GEF ID/2119), Nairobi July 2021, page 1f.
(d) ARGeo: Report on planned and actual co-finance, signed by PU, no date.

ANNEX III. KEY DOCUMENTS CONSULTED AND REFERENCES

- Abegaz, K. B: Mid-term Review of the UN Environment GEF Funded Project "African Rift Geothermal Development Facility (ARGeo) Project to Accelerate the Development and Utilization of Geothermal Resources in the Rift Valley as a Pathway to Low Carbon Development in the Region", GEF project ID 2119, Addis Ababa May 2017.
- African Geothermal Center of Excellence (AGCE), Geothermal solutions to Africa´s energy Nairobi, Kenya 12-13 August 2015. Validation Workshop on the Feasibility Study, Nairobi 2015
- AGCE African Geothermal Center of Excellence, various documents, various dates.
- AGCE African Geothermal Inventory Database: http://agid.theargeo.org/
- AGCE Feasibility Study: http://theargeo.org/files/CoE%20Vision%20PPT%20v%2017.pptx
- AGCE Flyer: http://theargeo.org/files/AGCE_low%20resolution.pdf
- AGCE Revised Skill Gap Report: http://theargeo.org/files/Revised%20Skill%20gap%20report%20(280815).pdf
- AGCE SCM: http://theargeo.org/files/AGCE%20SCM%20RECORD%20NOTES%20revised.pdf
- AGCE Skill Gap Report: http://theargeo.org/files/Skill%20gap%20report%20(280815).pdf
- AGCE Validation Workshop: http://theargeo.org/files/Validation%20Workshop%20report.pdf
- Annual Project Implementation Review
- Annual Project Revision Report
- Annual work plans and budgets or equivalent, revisions to the project
- ARGeo Biennial Conference Reports
- ARGeo Biennial Conference Reports:
- ARGeo C5 Short Course: http://theargeo.org/files/C5%20short%20Courses-print%203.pdf
- ARGeo- C7 Short Course: https://theargeo.org/Reports/Short%20Courses%20Revised.pdf
- ARGeo conference technical documents & training, 2014-2020
- ARGeo database, African Geothermal Inventory Database (AGID)
- ARGeo PIR Documents 2010- 2021
- ARGeo Project Design Document
- ARGeo Project Revision documents 1ff
- ARGeo Project Steering Committee Meeting Record Notes: ARGeo-SCM 6: http://theargeo.org/files/SCM6.pdf
- ARGeo Project Steering Committee Meeting Record Notes: ARGeo-SCM 3: http://theargeo.org/files/Revised%20Skill%20gap%20report%20(280815).pdf
- ARGeo Project Steering Committee Meeting Record Notes: ARGeo-SCM 4: https://theargeo.org/files/Record%20notes%20of%20Fourth%20ARGeo%20Steering%20Committee%20Meeting.pdf
- ARGeo Technical review meetings.
- ARGeo: Project Document Supplement

- ARGeo, Proceedings, 8th African Rift Geothermal Conference 2nd – 6th November 2020, ARGeo-C8: https://theargeo.org/C8/presentations/ download 16.02.2022
- ARGeo, Technical Workshop on the Geologic Development and Geophysics of the Western Branch of the Greater East African Rift System, Kigali, Rwanda, 9-11 March 2016.
- ARGeo: Co-financing analysis, country budgets & financing reports
- ARGeo: Conference papers, list of attendees (number)
- ARGeo: Country proposals
- ARGeo: Final Mid Term Review of the ARGeo Project (2016-2017)
- ARGeo: Final Report (April 2021), 24 pages, Nairobi, dated 8 December 2021
- ARGeo: Inventory for equipment
- ARGeo: Logical framework and its budget
- ARGeo: Minutes of ATAT meeting
- ARGeo: Minutes of Steering Committee meetings
- ARGeo: Mission reports
- ARGeo: Other minutes, relevant correspondance etc.;
- ARGeo: Project reports such as six-monthly progress and financial reports
- ARGeo: Relevant background documentation, reports and summary documents, media
- ARGeo: Reports on surface explorations
- ARGeo: Six-months Project Highlight
- ARGeo: ToR from 2010, additional ToR (2010-2021)
- ARGeo: Training concepts and documents, list of attendees (number)
- ARGeo: Training reports: http://theargeo.org/AGCE/Reports/
- ARGeo: Workshops, AGCE validation on feasibility, skill gap reports and related documents
- ARGeo-C6 Short Courses (2016): https://theargeo.org/C6/Short%20Course%20I.pdf
- ARGeo-C8 Short Courses (2020): https://theargeo.org/C8/Shortcourses/
- Biennial Conference Reports: ARGeo-C7 Report (2018): http://theargeo.org/files/ARGeo-C7%20Final%20Conference%20Report.pdf
- Biennial Conference Reports: ARGeo-C4 Report (2012): http://theargeo.org/files/ARGeoC4%20report%20and%20Conference%20Statement%20(2012)_1.pdf
- Biennial Conference Reports: ARGeo-C5 Report (2014): http://theargeo.org/files/ARGeo-C5%20report%20and%20statement.pdf
- Biennial Conference Reports: ARGeo-C6 Report (2016): https://theargeo.org/C6/files/C6%20background.pdf
- Biennial Conference Reports: ARGeo-C8 Report (2020): http://theargeo.org/C8/files/ARGeo-C8%20REPORT.pdf
- Biomass Desk Study Report: http://theargeo.org/files/3.%20Biomass%20Report_%20DRAFT%2022%20Nov.pdf
- Canadian Geothermal Reporting Code for Public Reporting, 2010 edition. CanGEA Canadian Geothermal Energy Association PO Box 1462 Station M Calgary, Alberta, Canada T2P 2L6 info@cangea.ca
- Conference Proceedings: ARGeo-C1 (2006): https://theargeo.org/fullpapers/papers1.html

- Conference Proceedings: ARGeo-C2 (2008): https://theargeo.org/fullpapers/papers2.html
- Conference Proceedings: ARGeo-C3 (2010): https://theargeo.org/fullpapers/papers3.html
- Conference Proceedings: ARGeo-C4 (2012): https://theargeo.org/fullpapers/papers4.html
- Conference Proceedings: ARGeo-C5 (2014): https://theargeo.org/fullpapers/papers.html
- Conference Proceedings: ARGeo-C6 (2016): https://theargeo.org/fullpapers/
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ANNEX IV. BRIEF CV OF THE EVALUATORS

Andreas H. Jahn

Profession	Energy Economist
Nationality	German
Country experience	Europe: Germany, Belgium, Georgia, Armenia, Russian Federation, Serbia, Greece, Turkey, Middle East: Lebanon, Syria, Egypt, Palestine Africa: South Africa Americas: Uruguay, Argentina, Ecuador Asia: Thailand, China, India
Education	Diplom-Volkswirt, Technical University Berlin, Energy Economist

Short biography: Andreas H. Jahn (68) is an Energy Economist with more than 40 years of experience in the energy sector. Mr Jahn completed in recent years a number of evaluation projects on behalf of UNEP, UNDP, EU, AFD, KfW; and EIB on energy projects in various countries (Namibia, Lebanon, China, Brazil, South Africa, CIS countries, and EU countries). Mr Jahn has studied at Technical University Berlin and was for 18 years Managing Director of an Engineering and Consulting company. Since 2006 he works as an independent freelance consultant.

Key specialties and capabilities cover: Technical and economic energy expertise, feasibility studies, acquisition of projects, tender preparation, technical and economic analyses of infrastructure projects, financing of projects, project management, project report revision, mid-term project evaluation and final project evaluation, quality control, feasibility (pre-feasibility) studies, supervision of works, preparation of Terms of Reference (ToR), programme evaluation.

Selected assignments and experiences and independent evaluations:

- Jahn, A.: Country Energy Efficiency and Renewable Energy Demonstration Project for the Recovery of Lebanon - Final Evaluation Services for CEDRO I Project, funded by the Government of Spain through the Lebanon Recovery Fund, on behalf of United Nations Development Programme (UNDP), Project Number: LEB/CO IC/37/11; Reference Code: RFP1211, Beirut, Lebanon November 2011.
- Jahn, A.: Mid-term Evaluation of the Project "Facility in Support of Small and Medium Enterprises Energy Efficiency Investments" (MEFE), Reference Number: Decision ENPI/2007/018-883, project on behalf of NIXUS Consulting and Training Services / OCA GROUP, for EU Delegation to Lebanon, Beirut
- Jahn, A.: Support to the Design, Implementation and Evaluation of Municipal Energy Efficiency Programmes in South Africa, SAGEN Phase 2 (SDIEMEEP2), Project on behalf of Prognos AG, for Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH South African-German Energy Programme (SAGEN2), Pretoria / Berlin
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J. Runar Magnusson

Profession	Mechanical Engineer
Nationality	Iceland
Country experience	Europe: Croatia, Iceland, , Turkey, Africa: Kenya, Tanzania and Uganda Americas: Chile, El Salvador Asia: Thailand, China, India
Education	(Cand. Polyt.) Ms.Sc, Aalborg University Center Denmark

Short biography: J. Runar Magnusson (66) is a Mech. Engineer with over 35 years' experience in utilization of Geothermal energy and power plant design. Mr. Magnusson has currently been working on a few surface exploration projects and feasibility studies in El Salvador, Kenya, Tanzania and Uganda funded by the World Bank, Eager Facility UK, Ministry of Foreign Affairs. In recent years Mr. Magnusson has been working on few feasibility studies for geothermal surface exploration and predesign for Geothermal Power plants from high and low enthalpy geothermal fields using direct flash and binary power plant design. Mr. Magnusson studied Mechanical Engineering in Aalborg University Center in Denmark and since then worked as Geothermal Thermal Energy Consultant. Since October 2021 J. Runar Magnusson is working as independent freelance consultant.

Key specialties and capabilities cover: Rúnar´s expertise ranges from design, supervision, commissioning and testing the thermal-, mechanical- and heat transfer system in power plants and other industrial processes. Rúnar has a long-term experience for system design for low enthalpy ORC (Binary) systems for electrical production and increasing plant efficiency´s for geothermal downstream flow for direct use, such as, SPA & lagoons, swimming pools systems, Greenhouse systems, fish farming, drying processes for fish and agriculture products, absorption technology, CO_2 capture and purification from geothermal resources

Selected assignments and experiences and independent evaluations:

- Magnusson, J. Runar: Geothermal specialist for EAGER facility project group to undertake a technical evaluation of the possible direct use of geothermal hot water systems with special focus on Songwe in Tanzania. The ongoing evaluation of the geothermal system shows that it will have a small contribution for electrical production, but the geothermal resource can support direct use for industry, drying facilities for agriculture products and support fish farming. The British Governments Department for International Development (DFID). Project Nr. T64-D05, Tanzania, 2018.
- Magnusson, J. Runar.: A Geothermal specialist for EAGER facility project group to undertake a technical evaluation to facilitate the development of geothermal energy for power generation and other uses in the African countries of Ethiopia, Kenya, Rwanda, Uganda and Tanzania of the possible direct use of geothermal hot water systems with special focus on direct use. The British Governments Department for International Development (DFID). Eager Assignment Nr. U32 and U33-D06-Uganda, 2018.
- Magnusson, J. Runar.: Geothermal Expert review on Increasing Power Generation from two Geothermal Resources in El Salvador: Technical support on review of two feasibility studies delivered for WB approval of geothermal development of the San Vicente and Chinameca fields. Contracted by Ministry of Foreign Affairs in Iceland 2019.
- Magnusson, J. Runar.: A comprehensive evaluation of new and existing data from previous studies including desktop data review, field exploration, data analysis and interpretation and

report review resulting in a conceptual model for the Suswa geothermal prospect. Based on the conceptual model the immediate objective is to define potential drilling targets and well design in preparation for the exploration drilling stage of the Suswa geothermal system. The study was finalized by the consultant with GDC scientists with focus on capacity building. Contracted by Icelandic International Development fund and Nordic Development Fund (NDF).

ANNEX V. EVALUATION TORS (WITHOUT ANNEXES)

TERMS OF REFERENCE

Terminal Evaluation of the UNEP/GEF project "African Rift Geothermal Development Facility (ARGeo)" (GEF ID/2119)

Section 1: PROJECT BACKGROUND AND OVERVIEW

Project General Information

Table 1. Project summary

GEF Project ID:	2119		
Implementing Agency:	UNEP	***Executing Agency:***	UNEP ROA
Relevant SDG(s) and indicator(s):	SDG 7: 7.1 By 2030, ensure universal access to affordable, reliable and modern energy services. 7.2 By 2030, increase substantially the share of renewable energy in the global energy mix. 7.a By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology. SDG 9: 9.4 By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities. 13.2 Integrate climate change measures into national policies, strategies and planning. Indicator(s): 7.1.1 Proportion of population with access to electricity. 7.1.2 Proportion of population with primary reliance on clean fuels and technology. 7.a.1 International financial flows to developing countries in support of clean energy research and development and renewable energy production, including in hybrid systems. 9.4.1 CO2 emission per unit of value added. 13.2.1 Number of countries that have communicated the establishment or operationalization of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production (including a national adaptation plan, nationally determined contribution, national communication, biennial update report or other).		
GEF Core Indicator Targets (identify these for	GEF-3		

projects approved prior to GEF-7)			
Sub-programme:	SP1: Climate Change	***Expected Accomplishment(s):***	EA (b): Countries increasingly adopt and/or implement low greenhouse gas emission development strategies and invest in clean technologies
UNEP approval date:		***Programme of Work Output(s):***	2010-2011 2012-2013 2014-2015 2016-2017 2018–2019 Indicator (s): Increase in climate finance invested by countries or institutions for clean energy, energy efficiency and/or amount of decarbonized assets. Unit of measure: Number of countries that have adopted or are implementing plans, strategies or policies on energy efficiency, renewable energy
GEF approval date:	24 September 2009	***Project type:***	Full-Size Project
GEF Operational Programme #:	Operational Program #6: Promoting the Adoption of Renewable Energy by Removing Barriers and Reducing Implementation Costs	***Focal Area(s):***	Climate Change
		GEF Strategic Priority:	CC-2 Increased Access to local sources of financing for Renewable energy and energy efficiency CC-3: Power sector policy frameworks supply of Renewable

			Energy and Energy Efficiency
Expected start date:	12 April 2010	***Actual start date:***	April 2010
Planned completion date:	31 December 2018	***Actual operational completion date:***	30 June 2020
Planned project budget at approval:	$ 80,390,704	***Actual total expenditures reported as of 28 April 2021:***	$ 25,507,654
GEF grant allocation:	$ 4,750,000	***GEF grant expenditures reported as of 28 April 2021:***	$ 4,607,465
Project Preparation Grant - GEF financing:	$ 880,000	***Project Preparation Grant - co-financing:***	$ 499,052
Expected Full-Size Project co-financing:	$ 74,261,652	***Secured Medium-Size Project/Full-Size Project co-financing:***	$ 20,944,926
Date of first disbursement:	01 December 2010	***Planned date of financial closure:***	31 January 2021*
No. of formal project revisions:	7	***Date of last approved project revision:***	22 March 2019
No. of Steering Committee meetings:	11	***Date of last/next Steering Committee meeting:***	Last: 11 November 2020 / Next:
Mid-term Review/ Evaluation (planned date):	December 2016	***Mid-term Review/ Evaluation (actual date):***	May 2017
Terminal Evaluation (planned date):	31 July 2020	***Terminal Evaluation (actual date):***	July 2021
Coverage – Country(ies):	Eritrea, Ethiopia, Kenya, Rwanda, Tanzania and Uganda	***Coverage – Region(s):***	Africa
Dates of previous project phases:	ARGeo initiated in 2003	***Status of future project phases:***	N/A

*** The actual financial closure of the project is expected to be done by 31 December 2021**

Project Rationale

1. Geothermal energy is a key energy resource for East Africa. Scientific work conducted to date confirms that the EARS has abundant geothermal resources suited to electricity development, as well as to uses in industry, agriculture, health, tourism and recreation. It stands out as one of the most promising and sustainable alternatives for low cost electricity production to complement hydropower and reduce growth of petroleum based thermal generation in the region. However, countries in the region still face a number of barriers to the development and utilization of geothermal resources. These barriers include: (i) Incomplete and often inadequate geoscientific information and analysis in most of the potential geothermal sites identified by the countries, (ii) Insufficient capabilities, in terms of human resources, institutional setups and technical infrastructure, to carry out surveys for discovering and characterizing geothermal systems, as well as, for installing, operating and maintaining the geothermal resource

development infrastructure and power plants; (iii) Insufficient investment for geothermal energy development.

2. In order to produce the systematic development of geothermal energy in the region, the African Rift Geothermal Development Facility (ARGeo) was initiated in 2003 under the direction of the United Nations Environment Program (UNEP) with the participation of six East African countries: Eritrea, Ethiopia, Kenya, Rwanda, Tanzania and Uganda. The present ARGeo project, which was launched in 2010, aimed to accelerate geothermal energy investments by both public and private sectors. The intention was to displace diesel-based production, diversify energy resources and lead to the reduction of greenhouse gas emissions. It would provide working examples for other private sector investments in the region. Furthermore, the implementation of the project would respect high level rules of social and environmental safeguards.
3. The Project was consistent with the GEF Operational Strategy for its Climate Change Focal Area, and supports the objectives set out in Operational Program #6: Promoting the Adoption of Renewable Energy by Removing Barriers and Reducing Implementation Costs. ARGeo was developed under GEF 3 set of priorities and Operational Program 6. Although this was the starting point, the project was in line with the GEF-4 overarching goal to reduce GHG emissions through transformation markets. It was aligned with the GEF-4 strategic objectives in the Climate Change Focal Area. In particular, it addressed the strategic objective 4 (to promote market approaches for renewable energy).
4. The expected outcome was to be the growth in the investment and market for geothermal power in participating ARGeo countries. The results of surface exploration studies would be used by countries (with UNEP's support) to develop scientifically sound proposals for the African Union Commission-Kreditanstalt für Wiederaufbau Geothermal Risk Mitigation Facility (AUC-KfW GRMF). It would provide grants for exploration drilling and, as a result, facilitate geothermal power production development and generation of electricity. All ARGeo countries had significant geothermal energy generation potential and had made the development of a geothermal energy program a high priority. ARGeo included a combination of: (i) regional networking, capacity building, information systems; and (ii) technical assistance for surface exploration studies with a view to minimize risks of drilling and develop project pipelines for the AUC-KfW GRMF. This would support the AUC-KfW GRMF to enhance the geothermal investment in the region with a view to generate electricity from a clean, renewable and environmentally clean energy resource: geothermal energy by replacing the use of fossil fuel for power generation.

Project Results Framework

5. The project objective was to facilitate investments in geothermal power production in the Rift Valley by addressing the barriers related to financial, institutional, information, and resource confirmation, currently facing geothermal resource development in the region. Long-term impact of the ARGeo Program would be to remove barriers to renewable energy technologies thereby contributing to CO_2-emission reduction by increased and accelerated development of geothermal resources for power production, industrial process and other thermal applications. However, accompanying benefits related to reduction in deforestation, reduction in criteria air pollution, increase in industrial output and associated decrease in poverty levels would also be seen as positive impacts of developing the region's geothermal potential. Table 2 provides an overview of the results framework.

Table 2. Results framework

Project components	***Planned Outputs***	***Expected Outcomes***	***Indicators***
COMPONENT 1: Regional Networking, Information Systems, capacity Building, Policy Advice and awareness creation	1.1 Regional Network of geothermal agencies established in the region in support of the project and as an instrument to promote the optimal use of resources in the region 1.2 Regional information system set up and strengthened national information base is created and used. 1.3 Regional forums, ARGeo biennial conferences, are created for the exchange and sharing of experience, research, and technical advances, and outreach to international and regional geothermal events is increased. 1.4 Regional training and technical capacity building programme responding to the needs and expectations of the countries, and making optimal use of human resources and on-going exploration campaigns in the region to build technical capacity. 1.5 Regional programme for awareness raising and the promotion of policies and regulatory frameworks needed for geothermal development and private sector investment.	Outcome 1: Enhanced institutional capacity, enhanced knowledge and awareness of the potential and requirements for geothermal development in the Rift Valley at the regional and national levels, optimal use of resources in the region (human, institutional, equipment).	- Regional expertise used in integrated geothermal development (surface exploration studies, geothermal field operation)
COMPONENT 2: Technical Assistance for surface Exploration studies (Institutional and technical capacity building)	2.1 Technical assistance and finance provided for the confirmation of priority prospects identified in the pipeline, through surface exploration 2.2 Joint Geophysical Image (JGI) and other equipment in the equipment pool are used in exploration in the region. 2.3 ARGeo Technical Advisory Team (ATAT) is established and is operational.	Outcome 2: Priority prospects are confirmed through surface exploration to a stage that exploration drilling can commence and good quality applications based on pre-feasibility studies are submitted to the Risk Mitigation Fund (RMF).	- Reviewed Project proposals and results of surface exploration studies in terms of their scientific and technical content to enhance the quality of results and minimize the risk for drilling. - At least out of the 5 surface explorations (pre-feasibility) reviewed three will be submitted/ forwarded to

Project components	Planned Outputs	Expected Outcomes	Indicators
			the G RMF and other investment projects.
		Outcome 3: Legal and regulatory framework are conducive of geothermal development and governments have the capacity to efficiently negotiate with the private sector	- Clear rules on licensing, concessions, PPAs and environmental and social impact assessments in place in 1 country by mid project and in 3 countries at project end. - Informed decisions made by geothermal development agencies and ministries. - Negotiations between governments and private sector result in deal closure.
		Outcome 4: Private sector investments are catalyzed through the building of reliable, robust and sustainable public-private sector relationships.	- Feasibility studies are of satisfactory quality to the private sector/investor and to financial institutions. - Additional co-financing and leveraged financing. ARGeo model is replicated, and other countries in the Rift want to join.

Executing Arrangements

5. UNEP, through the Economy Division (formerly UNEP/DTIE), was the implementing agency for the project with overall responsibility for project implementation. The Project Management Unit (PMU) was hosted by the UNEP Regional Office for Africa (ROA) in Nairobi to execute the project

together with the National Project Management Unit (NPMU) at the regional and national levels, respectively.

6. The African Union Commission (AUC) hosted and executed the AUC-Kreditanstalt für Wiederaufbau Geothermal Risk Mitigation Facility (AUC-KfW GRMF) to promote geothermal investments in the region. The facility was based in Addis Ababa, Ethiopia and financed through its own sources of co-financing. The UNEP ARGeo component and AUC-KfW GRMF were to work in direct partnership for supporting the development of geothermal energy and related investments in the East African Rift System by collaborating on: (1) Regional Networking, Information Systems and Awareness Creation: (i) Eastern Africa Geothermal Database; (ii) Website, Outreach and communication material; (iii) Organization of regional geothermal forums; (iv) Policy Development and harmonization; and Capacity Building (institution and infrastructure); and (2) Technical Assistance: UNEP Technical Assistance component does the "up-stream" surface geo-scientific investigation work aiming to target the best sites for drilling and to minimize "drilling failure risk" and therefore support the development of a pipeline of projects for submission to AUC-KfW GRMF.

6. The ARGeo Project Steering Committee (PSC) was established and to be maintained at the international level as a forum for project direction, coordination and information exchange on project progress and performance. The PSC would meet once a year and include nominated representatives of the six ARGeo countries, UNEP, donors, co-financing countries namely Iceland, USA, Germany, Italy and France including AUC, KfW and chaired on a rotation basis by one of the countries' representatives.

7. The project also established an ARGeo Advisory Technical Team (ATAT) whose overall objective was: (i) to enhance the quality of proposals (or TOR) for the surface exploration studies received from ARGeo Countries for financial assistance, and (ii) to evaluate results of surface exploration studies. The required enhancement would help to focus these proposals to lead to identification of the best sites for exploration wells for ultimate development. In turn, the output of such studies would facilitate ARGeo member countries to prepare and propose economically viable and scientifically sound projects (with minimized drilling failure risks) for exploration drilling to the AUC-KfW GRMF.

9. ATAT was composed of international and regional experts, selected on the basis of their experience and knowledge of geothermal activities in East Africa or areas of similar geological environment. The ATAT experts would provide neutral expertise to guide and review surface assessments and pre-feasibility studies. Specifically, ATAT experts would: (i) conduct a scientific and technical evaluation of project proposals submitted to UNEP for technical and financial assistance; (ii) provide guidance and advice in selecting the most appropriate exploration methods to solve the problems/issues identified by the country in its "proposal", and (iii) evaluate individual studies, and provide guidance, on the "conceptual models" of the concerned geothermal system that should be targeted to select the best sites for deep exploratory wells.

10. National Project Management Units (NPMU) were established in each country comprising representatives from the National Executing Agencies, and relevant Ministries to ensure coordination at the national level.

11. An organization overview of the ARGeo project is presented in Figure 1.

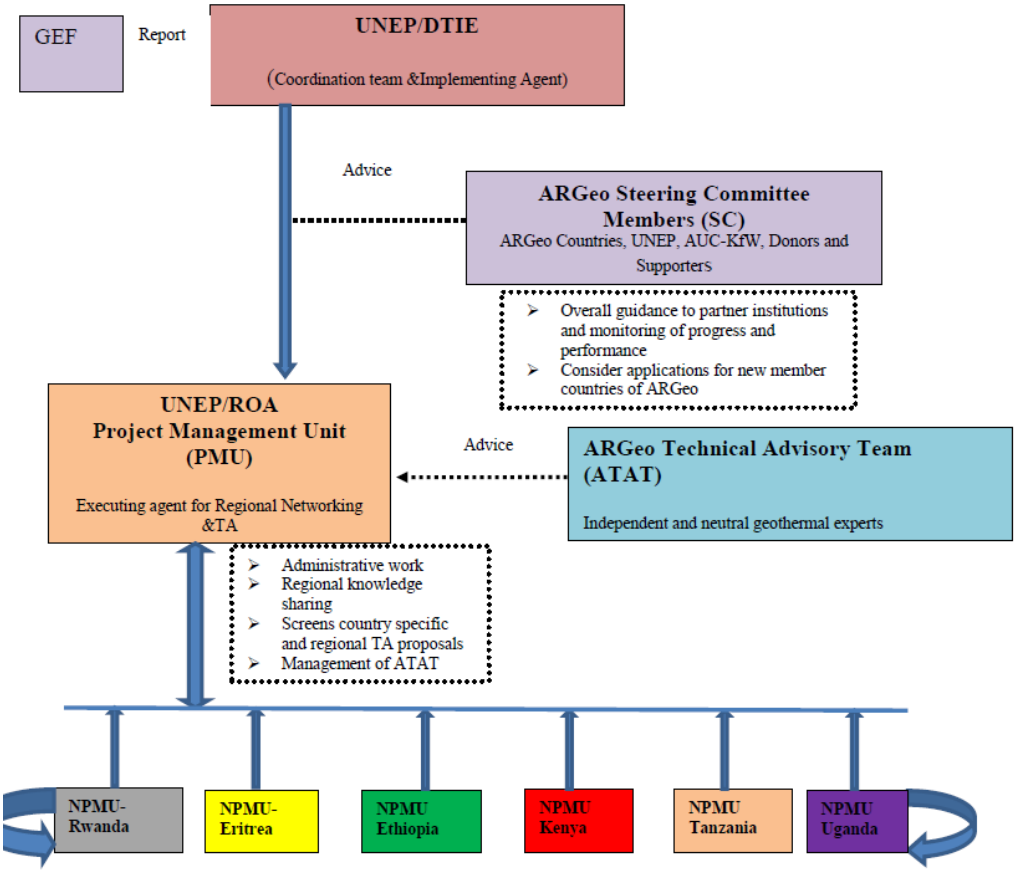

Figure 1. Organisational overview

Project Cost and Financing

12. The total cost of the approved full-sized project was US$79,011,652 which comprised of US$ 4,750,000 funding from the GEF Trust and planned co-financing (cash and in-kind) of US$ 74,261,652 of which US$ 250,000 was from ROA, US$ 6,850,000 from participating countries, and US$ 67,411,652 from Bilateral and Multilateral Support (Iceland, Germany, IAEA and AUC-KfW). The total co-finance committed to the project to be mobilized during the course of implementation was US$74,011,652 representing over 90% of the total cost of the project. Table 3 and table 4 show the planned project budget and cost by project component.

Table 3. Project budget

Particulars	***US$***
Cost to the GEF Trust Fund	4,750,000
In-kind contribution from ROA	250,000
Third party co-finance (in-kind)	9,011,652
Third party co-finance (cash)	65,000,000
Total cost of the project	***79,011,652***

Table 4: Cost by component

Component	*US$*
COMPONENT 1: Regional Networking, Information Systems, capacity Building, Policy Advice and awareness creation	1,000,000
COMPONENT 2: Technical Assistance for surface Exploration studies (Institutional and technical capacity building)	3,337,500
Total	***4,337,500***
Project Management Cost	***412,500***
Total GEF Grant	***4,750,000***

13. Actual co-finance during the project from Bilateral and Multilateral Support amounted to US$20,944,926 and from participating countries US$ 8,701,174. Project revisions were undertaken to revise annual expenditure and commitments to the GEF Trust Fund during the implementation of the project. Annual expenditures are presented in table 5.

Table 5. Annual expenditures to the GEF Trust Fund

Year	Amount/ US$
2010	98,427
2011	162,248
2012	244,453
2013	948,208
2014	734,623
2015	1,460,138
2016	354,906
2017	273,052
2018	286,673
2019	139,622
2020 (Adjustments)	(97,051)
Total	4,607,465

Implementation Issues

14. The project document assessed potential lack of private sector interest as carrying a substantial risk whereas modest risks were associated with slower than expected project portfolio build-up, insufficient local equity financing of subprojects, and governments potentially would not implement required conducive policies. During implementation, these risks would be mitigated, and risks were assessed to be low except for the risk associated with geothermal resource exploration and minimizing the risk of drilling a dry well, which was consistently rated as modest. This risk was mitigated through application of joint geophysical imaging (JGI), development of a conceptual model of the geothermal system to target best sites for slim hole and deep exploratory drilling, and setting up of Technical Review Meetings to enhance and optimize the quality of studies.

15. The mid-term review conducted in May 2017 raised 13 recommendations, which related to strengthening partnerships, creating a conducive investment environment, and enhancing financial sustainability and resource mobilization, including performance management, monitoring and data management.

16. Specifically, the recommendations addressed the need for: 1) tax exemptions for investments; 2) funding from multilateral and bilateral development partners; 3) clear targets and

performance indicators supporting timely monitoring by AGCE; 4) strengthen partnership with AUC; 5) strengthen the Centre; 6) update data and information stored by AGID; 7) update ARGeo website on biennial conferences; 8) ATAT ton continue its work during the remaining period of the project; 9) revise AUC-KfW Grant requirements and lower matching fund requirements; 10) financial and management support to the AGA association; 11) AGCE, AGA and Eritrea to use funds from ICEIDA on time; 12) increase women participation in the geo-thermal geo-science profession; and 13) ARGeo, AUC and project partners to secure funds for support to the additional countries that have joined the project.

17. Other implementation issues include challenges working with national partners and private investors such as getting the Government of Eritrea to agree to re-start the halted implementation of surface exploration studies in 2015.

18. Further, the project implementation approach required flexibility in timely fund management and implementation of activities as reflected in the seven revisions made to reflect actual annual expenditures to the GEF Trust Fund and to budget the balance forward.

19. Also, there was delay in Renewal of the legalization status of African Regional Branch due to change of its name from East Africa Regional Branch to Africa Regional Branch at a request of countries. The branch eventually received its legal status and elected BOD members and permanent subcommittee as per its renewed legal entity.

Section 2. OBJECTIVE AND SCOPE OF THE EVALUATION

Objective of the Evaluation

20. In line with the UNEP Evaluation Policy[65] and the UNEP Program Manual[66], the Terminal Evaluation is undertaken at completion of the project to assess project performance (in terms of relevance, effectiveness and efficiency), and determine outcomes and impacts (actual and potential) stemming from the project, including their sustainability. The evaluation has two primary purposes: (i) to provide evidence of results to meet accountability requirements, and (ii) to promote operational improvement, learning and knowledge sharing through results and lessons learned among UNEP, AUC-KfW, donors and national agencies. Therefore, the evaluation will identify lessons of operational relevance for future project formulation and implementation, especially where a second phase of the project is being considered.

Key Evaluation Principles

21. Evaluation findings and judgements will be based on **sound evidence and analysis**, clearly documented in the evaluation report. Information will be triangulated (i.e. verified from different sources) as far as possible, and when verification is not possible, the single source will be mentioned (whilst anonymity is still protected). Analysis leading to evaluative judgements should always be clearly spelled out.

22. **The "Why?" Question.** As this is a terminal evaluation and a follow-up project is likely [or similar interventions are envisaged for the future], particular attention will be given to learning from the experience. Therefore, the "*Why?*" question should be at the front of the consultants' minds all through the evaluation exercise and is supported by the use of a theory of change approach. This means that the consultant(s) needs to go beyond the assessment of "*what*" the project performance was and make a serious effort to provide a deeper understanding of "*why*" the performance was as it was. This should provide the basis for the lessons that can be drawn from the project.

65 https://www.unenvironment.org/about-un-environment/evaluation-office/policies-and-strategies
66 https://wecollaborate.unep.org

23. **Attribution, Contribution and Credible Association:** In order to *attribute* any outcomes and impacts to a project intervention, one needs to consider the difference between what has happened with, and what would have happened without, the project (i.e. take account of changes over time and between contexts in order to isolate the effects of an intervention). This requires appropriate baseline data and the identification of a relevant counterfactual, both of which are frequently not available for evaluations. Establishing the *contribution* made by a project in a complex change process relies heavily on prior intentionality (e.g. approved project design documentation, logical framework) and the articulation of causality (e.g. narrative and/or illustration of the Theory of Change). Robust evidence that a project was delivered as designed and that the expected causal pathways developed supports claims of contribution and this is strengthened where an alternative theory of change can be excluded. A *credible association* between the implementation of a project and observed positive effects can be made where a strong causal narrative, although not explicitly articulated, can be inferred by the chronological sequence of events, active involvement of key actors and engagement in critical processes.

24. **Communicating evaluation results.** A key aim of the evaluation is to encourage reflection and learning by UNEP staff and key project stakeholders. The consultant(s) should consider how reflection and learning can be promoted, both through the evaluation process and in the communication of evaluation findings and key lessons. Clear and concise writing is required on all evaluation deliverables. Draft and final versions of the main evaluation report will be shared with key stakeholders by the Evaluation Manager. There may, however, be several intended audiences, each with different interests and needs regarding the report. The consultant(s) will plan with the Evaluation Manager which audiences to target and the easiest and clearest way to communicate the key evaluation findings and lessons to them. This may include some, or all, of the following; a webinar, conference calls with relevant stakeholders, the preparation of an evaluation brief or interactive presentation.

Key Strategic Questions

25. In addition to the evaluation criteria outlined in Section 10 below, the evaluation will address the **strategic questions** listed below. These are questions of interest to UNEP and to which the project is believed to be able to make a substantive contribution. Also included are five questions that are required when reporting in the GEF Portal and these must be addressed in the TE:

Q1: To what extent did the applied science-policy model work at regional and national level?

Q2: How did the project contribute to GEF and UNEP strategies on geothermal initiatives and discussions on emerging issues of priority?

Q3: To what extent were the public-private partnership mechanisms adapted to the local context and do they remain effective and sustainable?

26. Address the questions required for the GEF Portal in the appropriate parts of the report and provide a **summary of the findings in the Conclusions section of the report**:

Under Monitoring and Reporting/Monitoring of Project Implementation:

What was the performance at the project's completion against Core Indicator Targets? (For projects approved prior to GEF-7, these indicators will be identified retrospectively and comments on performance provided).

Under Factors Affecting Performance/Stakeholder Participation and Cooperation:

What were the progress, challenges and outcomes regarding engagement of stakeholders in the project/program as evolved from the time of the MTR? *(This should be based on the description included in the Stakeholder Engagement Plan or equivalent documentation submitted at CEO Endorsement/Approval)*

Under Factors Affecting Performance/Responsiveness to Human Rights and Gender Equality:

What were the completed gender-responsive measures and, if applicable, actual gender result areas? *(This should be based on the documentation at CEO Endorsement/Approval, including gender-sensitive indicators contained in the project results framework or gender action plan or equivalent)*

Under Factors Affecting Performance/Environmental and Social Safeguards:

What was the progress made in the implementation of the management measures against the Safeguards Plan submitted at CEO Approval? The risk classifications reported in the latest PIR report should be verified and the findings of the effectiveness of any measures or lessons learned taken to address identified risks assessed. *(Any supporting documents gathered by the Consultant during this review should be shared with the Task Manager for uploading in the GEF Portal)*

Under Factors Affecting Performance/Communication and Public Awareness:

What were the challenges and outcomes regarding the project's completed Knowledge Management Approach, including: Knowledge and Learning Deliverables (e.g. website/platform development); Knowledge Products/Events; Communication Strategy; Lessons Learned and Good Practice; Adaptive Management Actions? *(This should be based on the documentation approved at CEO Endorsement/Approval)*

Evaluation Criteria

27. All evaluation criteria will be rated on a six-point scale. Sections A-I below, outline the scope of the criteria and a table for recording the ratings is listed in Annex 1). A weightings table will be provided in excel format (listed in Annex 1) to support the determination of an overall project rating. The set of evaluation criteria are grouped in nine categories: (A) Strategic Relevance; (B) Quality of Project Design; (C) Nature of External Context; (D) Effectiveness, which comprises assessments of the availability of outputs, achievement of outcomes and likelihood of impact; (E) Financial Management; (F) Efficiency; (G) Monitoring and Reporting; (H) Sustainability; and (I) Factors Affecting Project Performance. The evaluation consultant(s) can propose other evaluation criteria as deemed appropriate.

Strategic Relevance

28. The evaluation will assess the extent to which the activity is suited to the priorities and policies of the donors, implementing regions/countries and the target beneficiaries. The evaluation will include an assessment of the project's relevance in relation to UNEP's mandate and its alignment with UNEP's policies and strategies at the time of project approval. Under strategic relevance an assessment of the complementarity of the project with other interventions addressing the needs of the same target groups will be made. This criterion comprises four elements:

Alignment to the UNEP Medium Term Strategy[67] (MTS), Programme of Work (POW) and Strategic Priorities

29. The evaluation should assess the project's alignment with the MTS and POW under which the project was approved and include, in its narrative, reflections on the scale and scope of any contributions made to the planned results reflected in the relevant MTS and POW. UNEP strategic priorities include the Bali Strategic Plan for Technology Support and Capacity Building[68] (BSP) and South-South Cooperation (S-SC). The BSP relates to the capacity of governments to: comply with international agreements and obligations at the national level;

[67] *UNEP's Medium Term Strategy (MTS) is a document that guides UNEP's programme planning over a four-year period. It identifies UNEP's thematic priorities, known as Sub-programmes (SP), and sets out the desired outcomes, known as Expected Accomplishments (EAs), of the Sub-programmes. https://www.unenvironment.org/about-un-environment/evaluation-office/our-evaluation-approach/un-environment-documents*

[68] *http://www.unep.fr/ozonaction/about/bsp.htm*

promote, facilitate and finance environmentally sound technologies and to strengthen frameworks for developing coherent international environmental policies. S-SC is regarded as the exchange of resources, technology and knowledge between developing countries.

Alignment to Donor/GEF/Partner Strategic Priorities

30. Donor, including GEF, strategic priorities will vary across interventions. GEF priorities are specified in published programming priorities and focal area strategies. The Evaluation will assess the extent to which the project is suited to, or responding to, donor priorities. In some cases, alignment with donor priorities may be a fundamental part of project design and grant approval processes while in others, for example, instances of 'softly-earmarked' funding, such alignment may be more of an assumption that should be assessed.

Relevance to Global, Regional, Sub-regional and National Environmental Priorities

31. The evaluation will assess the alignment of the project with global priorities such as the SDGs and Agenda 2030. The extent to which the intervention is suited, or responding to, the stated environmental concerns and needs of the countries, sub-regions or regions where it is being implemented will be considered. Examples may include: national or sub-national development plans, poverty reduction strategies or Nationally Appropriate Mitigation Action (NAMA) plans or regional agreements etc. Within this section consideration will be given to whether the needs of all beneficiary groups are being met and reflects the current policy priority to leave no one behind.

Complementarity with Existing Interventions/Coherence[69]

32. An assessment will be made of how well the project, either at design stage or during the project inception or mobilization[70], took account of ongoing and planned initiatives (under the same sub-program, other UNEP sub-programs, or being implemented by other agencies within the same country, sector or institution) that address similar needs of the same target groups. The evaluation will consider if the project team, in collaboration with Regional Offices and Sub-Program Coordinators, made efforts to ensure their own intervention was complementary to other interventions, optimized any synergies and avoided duplication of effort. Examples may include UN Development Assistance Frameworks or One UN programming. Linkages with other interventions should be described and instances where UNEP's comparative advantage has been particularly well applied should be highlighted.

<u>*Factors affecting this criterion may include:*</u>

Stakeholders' participation and cooperation
Responsiveness to human rights and gender equity
Country ownership and drivenness

Quality of Project Design

33. The quality of project design is assessed using an agreed template during the evaluation inception phase, ratings are attributed to identified criteria and an overall Project Design Quality rating is established (www.unenvironemnt.org/about-un-environment/our-evaluation-approach/templates-and-tools). This overall Project Design Quality rating is entered in the final evaluation ratings table as item B. In the Main Evaluation Report a summary of the project's strengths and weaknesses at design stage is included, while the complete Project Design Quality template is annexed in the Inception Report.

<u>*Factors affecting this criterion may include (at the design stage):*</u>

Stakeholders' participation and cooperation
Responsiveness to human rights and gender equity

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[69] *This sub-category is consistent with the new criterion of 'Coherence' introduced by the OECD-DAC in 2019.*

[70] *A project's inception or mobilization period is understood as the time between project approval and first disbursement. Complementarity during project implementation is considered under Efficiency, see below.*

Nature of External Context

34. At evaluation inception stage a rating is established for the project's external operating context (considering the prevalence of conflict, natural disasters and political upheaval[71]). This rating is entered in the final evaluation ratings table as item C. Where a project has been rated as facing either an Unfavourable or Highly Unfavourable external operating context, and/or a negative external event has occurred during project implementation, the ratings for Effectiveness, Efficiency and/or Sustainability may be increased at the discretion of the evaluation consultant and Evaluation Manager together. A justification for such an increase must be given.

Effectiveness

i. Availability of Outputs[72]

35. The evaluation will assess the project's success in producing the programmed outputs and achieving milestones as per the project design document (ProDoc). Any *formal* modifications/revisions made during project implementation will be considered part of the project design. Where the project outputs are inappropriately or inaccurately stated in the ProDoc, reformulations may be necessary in the reconstruction of the TOC. In such cases a table should be provided showing the original and the reformulation of the outputs for transparency. The availability of outputs will be assessed in terms of both quantity and quality, and the assessment will consider their ownership by, and usefulness to, intended beneficiaries and the timeliness of their provision. It is noted that emphasis is placed on the performance of those outputs that are most important to achieve outcomes. The evaluation will briefly explain the reasons behind the success or shortcomings of the project in delivering its programmed outputs and meeting expected quality standards.

Factors affecting this criterion may include:

Preparation and readiness
Quality of project management and supervision[73]

Achievement of Project Outcomes[74]

36. The achievement of project outcomes is assessed as performance against the project outcomes as defined in the reconstructed[75] Theory of Change. These are outcomes that are intended to be achieved by the end of the project timeframe and within the project's resource envelope. Emphasis is placed on the achievement of project outcomes that are most important for attaining intermediate states. As with outputs, a table can be used where substantive amendments to the formulation of project outcomes is necessary. The evaluation should report evidence of attribution between UNEP's intervention and the project outcomes. In cases of normative work or where several actors are collaborating to achieve common outcomes, evidence of the nature and magnitude of UNEP's 'substantive contribution' should be included

[71] *Note that 'political upheaval' does not include regular national election cycles, but unanticipated unrest or prolonged disruption. The potential delays or changes in political support that are often associated with the regular national election cycle should be part of the project's design and addressed through adaptive management by the project team.*

[72] *Outputs are the availability (for intended beneficiaries/users) of new products and services and/or gains in knowledge, abilities and awareness of individuals or within institutions (UNEP, 2019)*

[73] *In some cases 'project management and supervision' will refer to the supervision and guidance provided by UNEP to implementing partners and national governments while in others, specifically for GEF funded projects, it will refer to the project management performance of the executing agency and the technical backstopping provided by UNEP.*

[74] *Outcomes are the use (i.e. uptake, adoption, application) of an output by intended beneficiaries, observed as changes in institutions or behavior, attitude or condition (UNEP, 2019)*

[75] *All submitted UNEP project documents are required to present a Theory of Change with all submitted project designs. The level of 'reconstruction' needed during an evaluation will depend on the quality of this initial TOC, the time that has lapsed between project design and implementation (which may be related to securing and disbursing funds) and the level of any formal changes made to the project design.*

and/or 'credible association' established between project efforts and the project outcomes realised.

Factors affecting this criterion may include:

Quality of project management and supervision
Stakeholders' participation and cooperation
Responsiveness to human rights and gender equity
Communication and public awareness

Likelihood of Impact

37. Based on the articulation of long-lasting effects in the reconstructed TOC *(i.e. from project outcomes, via intermediate states, to impact),* the evaluation will assess the likelihood of the intended, positive impacts becoming a reality. Project objectives or goals should be incorporated in the TOC, possibly as intermediate states or long-lasting impacts. The Evaluation Office's approach to the use of TOC in project evaluations is outlined in a guidance note available on the Evaluation Office website, https://www.unenvironment.org/about-un-environment/evaluation and is supported by an excel-based flow chart, 'Likelihood of Impact Assessment Decision Tree'. Essentially the approach follows a 'likelihood tree' from project outcomes to impacts, taking account of whether the assumptions and drivers identified in the reconstructed TOC held. Any unintended positive effects should also be identified and their causal linkages to the intended impact described.

38. The evaluation will also consider the likelihood that the intervention may lead, or contribute to, unintended negative effects (e.g. will vulnerable groups such as those living with disabilities and/or women and children, be disproportionally affected by the project?). Some of these potential negative effects may have been identified in the project design as risks or as part of the analysis of Environmental and Social Safeguards.

39. The evaluation will consider the extent to which the project has played a catalytic[76] role or has promoted scaling up and/or replication as part of its Theory of Change and as factors that are likely to contribute to longer term impact.

40. Ultimately UNEP and all its partners aim to bring about benefits to the environment and human well-being. Few projects are likely to have impact statements that reflect such long-term or broad-based changes. However, the evaluation will assess the likelihood of the project to make a substantive contribution to the long-lasting changes represented by the Sustainable Development Goals and/or the intermediate-level results reflected in UNEP's Expected Accomplishments and the strategic priorities of funding partners.

Factors affecting this criterion may include:

Quality of Project Management and Supervision (including adaptive management)
Stakeholders participation and cooperation
Responsiveness to human rights and gender equity
Country ownership and drivenness
Communication and public awareness

[76] *A catalytic effect is one in which desired changes take place beyond the initial scope of a project (i.e. the take up of change is faster than initially expected or change is taken up in areas/sectors or by groups, outside the project's initial design). Scaling up refers to an initiative, or one of its components, being adopted on a much larger scale, but in a very similar context (e.g a small scale, localized, pilot being adopted at a larger, perhaps national, scale). Replication refers more to approaches being repeated or lessons being explicitly applied in new/different contexts e.g. other geographic areas, different target groups etc. Effective replication typically requires some form of revision or adaptation to the new context. It is possible to replicate at either the same or a different scale.*

Financial Management

41. Financial management will be assessed under three themes: *adherence* to UNEP's financial policies and procedures, *completeness* of financial information and *communication* between financial and project management staff. The evaluation will establish the actual spend across the life of the project of funds secured from all donors. This expenditure will be reported, where possible, at output level and will be compared with the approved budget. The evaluation will verify the application of proper financial management standards and adherence to UNEP's financial management policies. Any financial management issues that have affected the timely delivery of the project or the quality of its performance will be highlighted. The evaluation will record where standard financial documentation is missing, inaccurate, incomplete or unavailable in a timely manner. The evaluation will assess the level of communication between the Project/Task Manager and the Fund Management Officer as it relates to the effective delivery of the planned project and the needs of a responsive, adaptive management approach.

Factors affecting this criterion may include:

Preparation and readiness
Quality of project management and supervision

Efficiency

42. The evaluation will assess the extent to which the project delivered maximum results from the given resources. This will include an assessment of the cost-effectiveness and timeliness of project execution. Focusing on the translation of inputs into outputs, cost-effectiveness is the extent to which an intervention has achieved, or is expected to achieve, its results at the lowest possible cost. Timeliness refers to whether planned activities were delivered according to expected timeframes as well as whether events were sequenced efficiently. The evaluation will also assess to what extent any project extension could have been avoided through stronger project management and identify any negative impacts caused by project delays or extensions. The evaluation will describe any cost or time-saving measures put in place to maximise results within the secured budget and agreed project timeframe and consider whether the project was implemented in the most efficient way compared to alternative interventions or approaches.

43. The evaluation will give special attention to efforts made by the project teams during project implementation to make use of/build upon pre-existing institutions, agreements and partnerships, data sources, synergies and complementarities[77] with other initiatives, programmes and projects etc. to increase project efficiency.

44. The factors underpinning the need for any project extensions will also be explored and discussed. As management or project support costs cannot be increased in cases of 'no cost extensions', such extensions represent an increase in unstated costs to implementing parties.

Factors affecting this criterion may include:

Preparation and readiness (e.g. timeliness)
Quality of project management and supervision
Stakeholders' participation and cooperation

Monitoring and Reporting

45. The evaluation will assess monitoring and reporting across three sub-categories: monitoring design and budgeting, monitoring implementation and project reporting.

[77] *Complementarity with other interventions during project design, inception or mobilization is considered under Strategic Relevance above.*

i. Monitoring Design and Budgeting

46. Each project should be supported by a sound monitoring plan that is designed to track progress against SMART[78] results towards the provision of the project's outputs and achievement of project outcomes, including at a level disaggregated by gender, marginalization or vulnerability, including those living with disabilities. In particular, the evaluation will assess the relevance and appropriateness of the project indicators as well as the methods used for tracking progress against them as part of conscious results-based management. The evaluation will assess the quality of the design of the monitoring plan as well as the funds allocated for its implementation. The adequacy of resources for mid-term and terminal evaluation/review should be discussed if applicable.

Monitoring of Project Implementation

47. The evaluation will assess whether the monitoring system was operational and facilitated the timely tracking of results and progress towards projects objectives throughout the project implementation period. This assessment will include consideration of whether the project gathered relevant and good quality baseline data that is accurately and appropriately documented. This should include monitoring the representation and participation of disaggregated groups (including gendered, marginalized or vulnerable groups, such as those living with disabilities) in project activities. It will also consider the quality of the information generated by the monitoring system during project implementation and how it was used to adapt and improve project execution, achievement of outcomes and ensure sustainability. The evaluation should confirm that funds allocated for monitoring were used to support this activity.

48. The performance at project completion against Core Indicator Targets should be reviewed. For projects approved prior to GEF-7, these indicators will be identified retrospectively and comments on performance provided.

Project Reporting

49. Project reporting information will be provided to the Evaluation Consultant(s) by the Evaluation Manager. Some projects have additional requirements to report regularly to funding partners, which will be supplied by the project team (e.g. the Project Implementation Reviews and Tracking Tool for GEF-funded projects). The evaluation will assess the extent to which both UNEP and donor reporting commitments have been fulfilled. Consideration will be given as to whether reporting has been carried out with respect to the effects of the initiative on disaggregated groups.

Factors affecting this criterion may include:

Quality of project management and supervision
Responsiveness to human rights and gender equity (e.g. disaggregated indicators and data)

Sustainability

50. Sustainability[79] is understood as the probability of project outcomes being maintained and developed after the close of the intervention. The evaluation will identify and assess the key conditions or factors that are likely to undermine or contribute to the endurance of achieved project outcomes (ie. 'assumptions' and 'drivers'). Some factors of sustainability may be embedded in the project design and implementation approaches while others may be contextual circumstances or conditions that evolve over the life of the intervention. Where

[78] *SMART refers to results that are specific, measurable, achievable, relevant and time-oriented. Indicators help to make results measurable.*

[79] *As used here, 'sustainability' means the long-term maintenance of outcomes and consequent impacts, whether environmental or not. This is distinct from the concept of sustainability in the terms 'environmental sustainability' or 'sustainable development', which imply 'not living beyond our means' or 'not diminishing global environmental benefits' (GEF STAP Paper, 2019, Achieving More Enduring Outcomes from GEF Investment)*

applicable an assessment of bio-physical factors that may affect the sustainability of project outcomes may also be included.

Socio-political Sustainability

51. The evaluation will assess the extent to which social or political factors support the continuation and further development of project outcomes. It will consider the level of ownership, interest and commitment among government and other stakeholders to take the project achievements forwards. In particular the evaluation will consider whether individual capacity development efforts are likely to be sustained.

Financial Sustainability

52. Some project outcomes, once achieved, do not require further financial inputs, e.g. the adoption of a revised policy. However, in order to derive a benefit from this outcome further management action may still be needed e.g. to undertake actions to enforce the policy. Other project outcomes may be dependent on a continuous flow of action that needs to be resourced for them to be maintained, e.g. continuation of a new resource management approach. The evaluation will assess the extent to which project outcomes are dependent on future funding for the benefits they bring to be sustained. Secured future funding is only relevant to financial sustainability where the project's outcomes have been extended into a future project phase. Even where future funding has been secured, the question still remains as to whether the project outcomes are financially sustainable.

Institutional Sustainability

53. The evaluation will assess the extent to which the sustainability of project outcomes (especially those relating to policies and laws) is dependent on issues relating to institutional frameworks and governance. It will consider whether institutional achievements such as governance structures and processes, policies, sub-regional agreements, legal and accountability frameworks etc. are robust enough to continue delivering the benefits associated with the project outcomes after project closure. In particular, the evaluation will consider whether institutional capacity development efforts are likely to be sustained.

Factors affecting this criterion may include:

Stakeholders' participation and cooperation
Responsiveness to human rights and gender equity (e.g. where interventions are not inclusive, their sustainability may be undermined)
Communication and public awareness
Country ownership and drivenness

Factors Affecting Project Performance and Cross-Cutting Issues

(These factors are rated in the ratings table but are discussed within the Main Evaluation Report as cross-cutting themes as appropriate under the other evaluation criteria, above. Where the issues have not been addressed under other evaluation criteria, the consultant(s) will provide summary sections under the following headings.)

ii. Preparation and Readiness

54. This criterion focuses on the inception or mobilization stage of the project (i.e. the time between project approval and first disbursement). The evaluation will assess whether appropriate measures were taken to either address weaknesses in the project design or respond to changes that took place between project approval, the securing of funds and project mobilization. In particular the evaluation will consider the nature and quality of engagement with stakeholder groups by the project team, the confirmation of partner capacity and development of partnership agreements as well as initial staffing and financing arrangements. *(Project preparation is included in the template for the assessment of Project Design Quality).*

Quality of Project Management and Supervision

55. In some cases 'project management and supervision' will refer to the supervision and guidance provided by UNEP to implementing partners and national governments while in others, specifically for GEF funded projects, it will refer to the project management performance of the executing agency and the technical backstopping and supervision provided by UNEP.

56. The evaluation will assess the effectiveness of project management with regard to: providing leadership towards achieving the planned outcomes; managing team structures; maintaining productive partner relationships (including Steering Groups etc.); maintaining project relevance within changing external and strategic contexts; communication and collaboration with UNEP colleagues; risk management; use of problem-solving; project adaptation and overall project execution. Evidence of adaptive management should be highlighted.

Stakeholder Participation and Cooperation

57. Here the term 'stakeholder' should be considered in a broad sense, encompassing all project partners, duty bearers with a role in delivering project outputs and target users of project outputs and any other collaborating agents external to UNEP and the Executing Agency. The assessment will consider the quality and effectiveness of all forms of communication and consultation with stakeholders throughout the project life and the support given to maximize collaboration and coherence between various stakeholders, including sharing plans, pooling resources and exchanging learning and expertise. The inclusion and participation of all differentiated groups, including gender groups should be considered.

58. The progress, challenges and outcomes regarding engagement of stakeholders in the project/program occurring since the MTR should be reviewed. *(This should be based on the description included in the Stakeholder Engagement Plan or equivalent documentation submitted at CEO Endorsement/Approval).*

Responsiveness to Human Rights and Gender Equity

59. The evaluation will ascertain to what extent the project has applied the UN Common Understanding on the human rights-based approach (HRBA) and the UN Declaration on the Rights of Indigenous People. Within this human rights context the evaluation will assess to what extent the intervention adheres to UNEP's Policy and Strategy for Gender Equality and the Environment[80].

60. In particular the evaluation will consider to what extent project-implementation and monitoring have taken into consideration: (i) possible inequalities (especially those related to gender) in access to, and the control over, natural resources; (ii) specific vulnerabilities of disadvantaged groups (especially women, youth and children and those living with disabilities) to environmental degradation or disasters; and (iii) the role of disadvantaged groups (especially those related to gender) in mitigating or adapting to environmental changes and engaging in environmental protection and rehabilitation.

61. The completed gender-responsive measures and, if applicable, actual gender result areas should be reviewed. (This should be based on the documentation at CEO Endorsement/Approval, including gender-sensitive indicators contained in the project results framework or gender action plan or equivalent).

[80] *The Evaluation Office notes that Gender Equality was first introduced in the UNEP Project Review Committee Checklist in 2010 and, therefore, provides a criterion rating on gender for projects approved from 2010 onwards. Equally, it is noted that policy documents, operational guidelines and other capacity building efforts have only been developed since then and have evolved over time. https://wedocs.unep.org/bitstream/handle/20.500.11822/7655/-Gender_equality_and_the_environment_Policy_and_strategy-2015Gender_equality_and_the_environment_policy_and_strategy.pdf.pdf?sequence=3&isAllowed=y*

Environmental and Social Safeguards

62. UNEP projects address environmental and social safeguards primarily through the process of environmental and social screening at the project approval stage, risk assessment and management (avoidance, minimization, mitigation or, in exceptional cases, offsetting) of potential environmental and social risks and impacts associated with project and programme activities. The evaluation will confirm whether UNEP requirements[81] were met to: *review* risk ratings on a regular basis; *monitor* project implementation for possible safeguard issues; *respond* (where relevant) to safeguard issues through risk avoidance, minimization, mitigation or offsetting and r*eport* on the implementation of safeguard management measures taken. UNEP requirements for proposed projects to be screened for any safeguarding issues; for sound environmental and social risk assessments to be conducted and initial risk ratings to be assigned are evaluated above under Quality of Project Design).

63. The evaluation will also consider the extent to which the management of the project minimized UNEP's environmental footprint.

64. Implementation of the management measures against the Safeguards Plan submitted at CEO Approval should be reviewed, the risk classifications verified and the findings of the effectiveness of any measures or lessons learned taken to address identified risks assessed. Any supporting documents gathered by the Consultant should be shared with the Task Manager.

Country Ownership and Drivenness

65. The evaluation will assess the quality and degree of engagement of government / public sector agencies in the project. While there is some overlap between Country Ownership and Institutional Sustainability, this criterion focuses primarily on the forward momentum of the intended projects results, ie. either a) moving forwards from outputs to project outcomes or b) moving forward from project outcomes towards intermediate states. The evaluation will consider the involvement not only of those directly involved in project execution and those participating in technical or leadership groups, but also those official representatives whose cooperation is needed for change to be embedded in their respective institutions and offices (e.g. representatives from multiple sectors or relevant ministries beyond Ministry of Environment). This factor is concerned with the level of ownership generated by the project over outputs and outcomes and that is necessary for long term impact to be realized. Ownership should extend to all gendered and marginalized groups.

Communication and Public Awareness

66. The evaluation will assess the effectiveness of: a) communication of learning and experience sharing between project partners and interested groups arising from the project during its life and b) public awareness activities that were undertaken during the implementation of the project to influence attitudes or shape behavior among wider communities and civil society at large. The evaluation should consider whether existing communication channels and networks were used effectively, including meeting the differentiated needs of gendered or marginalized groups, and whether any feedback channels were established. Where knowledge sharing platforms have been established under a project the evaluation will comment on the sustainability of the communication channel under either socio-political, institutional or financial sustainability, as appropriate.

67. The project's completed Knowledge Management Approach, including: Knowledge and Learning Deliverables (e.g. website/platform development); Knowledge Products/Events; Communication Strategy; Lessons Learned and Good Practice; Adaptive Management Actions

[81] *For the review of project concepts and proposals, the Safeguard Risk Identification Form (SRIF) was introduced in 2019 and replaced the Environmental, Social and Economic Review note (ESERN), which had been in place since 2016. In GEF projects safeguards have been considered in project designs since 2011.*

should be reviewed. This should be based on the documentation approved at CEO Endorsement/Approval.

Section 3. EVALUATION APPROACH, METHODS AND DELIVERABLES

68. The Terminal Evaluation will be an in-depth evaluation using a participatory approach whereby key stakeholders are kept informed and consulted throughout the evaluation process. Both quantitative and qualitative evaluation methods will be used as appropriate to determine project achievements against the expected outputs, outcomes and impacts. It is highly recommended that the consultant(s) maintains close communication with the project team and promotes information exchange throughout the evaluation implementation phase in order to increase their (and other stakeholder) ownership of the evaluation findings. Where applicable, the consultant(s) will provide a geo-referenced map that demarcates the area covered by the project and, where possible, provide geo-reference photographs of key intervention sites (e.g. sites of habitat rehabilitation and protection, pollution treatment infrastructure, etc.)

69. The findings of the evaluation will be based on the following:

(a) A **desk review** of:

Relevant background documentation;
Project design documents (including minutes of the project design review meeting at approval); Annual Work Plans and Budgets or equivalent, revisions to the project (Project Document Supplement), the logical framework and its budget;
Project reports such as six-monthly progress and financial reports, progress reports from collaborating partners, meeting minutes, relevant correspondence and including the Project Implementation Reviews and Tracking Tool etc.;
Project outputs: technical reports, workshop and training reports, scientific papers, ARGeo conference proceedings, including websites: ARGeo: www.theargeo.org , Africa Geothermal Inventory Database (AGID): http://agid.theargeo.org/ , African Geothermal Center of Excellence (AGCE): https://www.theargeo.org/AGCE/ , Technical Review Meeting (TRM): http://theargeo.org/files/TRMnew.pdf
Mid-Term Review of the project;
Evaluations/reviews of similar projects.

Interviews (individual or in group) with:

UNEP Task Manager (TM), UNEP Economy Division;
Project management team, including the Project Manager within UNEP/ ROA;
UNEP Fund Management Officers (FMOs of Economy Division and ROA);
Portfolio Manager and Sub-Program Coordinator, where appropriate;
Project partners, including National Executing Agencies and National Project Management Units;
Relevant resource persons, including members of ATAT and ARGeo Steering Committee, private sector investors and donors;
Representatives from civil society and specialist groups (such as women's, farmers and trade associations, etc.), as appropriate.

Survey with National Executing Agencies representatives, as appropriate.

Field visits are not deemed likely due to Covid-19 related travel restrictions.

Other data collection tools.

70. An **Evaluation Reference Group** (ERG) is good practice for TEs of larger programs or large 'flagship' projects but is not compulsory or advisable for the majority of project evaluations. The ERG will provide strategic direction to the evaluation -based on their own experiences and

contextual knowledge- and boost buy-in to, and the credibility and legitimacy of, the evaluation process across the range of evaluation stakeholders).

71. The ERG will be comprised of representatives from the ARGeo Steering Committee, UNEP and AUC-KfW and donors.

72. The ERG will discuss and provide comments on:

    the demand for the evaluation – to ensure the evaluation will meet the needs of its intended users (through a review of evaluation terms of reference);
    the overall evaluation approach and the reconstructed Theory of Change of the project to help shape the evaluation;
    the preliminary findings and recommendations of the evaluation; and
    the draft evaluation report, including the evaluation recommendations.

73. The ERG will appoint one of their members as the Chair. The Evaluation Office of UNEP will provide the secretariat to the ERG. ERG feedback and comments at different stages of the evaluation process will be collated by the Evaluation Manager during planned discussion meetings. The Evaluation Manager will, in consultation with the Chair and other ERG members, set the agenda for the discussion meetings and support these meetings logistically. It is expected that four such meetings will be held during the evaluation process, as shown in Table 6.

Table 6. Evaluation Reference Group meetings

Meeting	*Purpose*	*Location*	*Tentative date*
1st	Introduce the ERG members Elect the Chair Discuss the TORs	Virtual	August 2021
2nd	Discuss the Theory of Change of the project Discuss the evaluation framework	Virtual	August 2021
3rd	Discuss the draft evaluation report including the recommendations	Virtual	November 2021

Evaluation Deliverables and Review Procedures

74. The evaluation team will prepare:

    Inception Report: (see Annex 1 for list of all templates, tables and guidance notes) containing an assessment of project design quality, a draft reconstructed Theory of Change of the project, project stakeholder analysis, evaluation framework and a tentative evaluation schedule.
    Preliminary Findings Note: typically, in the form of a PowerPoint presentation, the sharing of preliminary findings is intended to support the participation of the project team, act as a means to ensure all information sources have been accessed and provide an opportunity to verify emerging findings. In the case of highly strategic project/portfolio evaluations or evaluations with an Evaluation Reference Group, the preliminary findings may be presented as a word document for review and comment.
    Draft and Final Evaluation Report: (see in Annex 1) containing an executive summary that can act as a stand-alone document; detailed analysis of the evaluation findings organized by evaluation criteria and supported with evidence; lessons learned and recommendations and an annotated ratings table.

75. An **Evaluation Brief,** (a 2-page overview of the evaluand and key evaluation findings) for wider dissemination through the UNEP website may be required. This will be discussed with the Evaluation Manager no later than during the finalization of the Inception Report.

76. Review of the draft evaluation report. The evaluation team will submit a draft report to the Evaluation Manager and revise the draft in response to their comments and suggestions. Once a draft of adequate quality has been peer-reviewed and accepted, the Evaluation Manager will share the cleared draft report with the Task Manager and Project Manager, who will alert the Evaluation Manager in case the report contains any blatant factual errors. The Evaluation Manager will then forward revised draft report (corrected by the evaluation consultant(s) where necessary) to other project stakeholders, for their review and comments. Stakeholders may provide feedback on any errors of fact and may highlight the significance of such errors in any conclusions as well as providing feedback on the proposed recommendations and lessons. Any comments or responses to draft reports will be sent to the Evaluation Manager for consolidation. The Evaluation Manager will provide all comments to the evaluation consultant(s) for consideration in preparing the final report, along with guidance on areas of contradiction or issues requiring an institutional response.

77. Based on a careful review of the evidence collated by the evaluation consultants and the internal consistency of the report, the Evaluation Manager will provide an assessment of the ratings in the final evaluation report. Where there are differences of opinion between the evaluator and the Evaluation Manager on project ratings, both viewpoints will be clearly presented in the final report. The Evaluation Office ratings will be considered the final ratings for the project.

78. The Evaluation Manager will prepare a **quality assessment** of the first draft of the main evaluation report, which acts as a tool for providing structured feedback to the evaluation consultants. The quality of the final report will be assessed and rated against the criteria specified in template listed in Annex 1 and this assessment will be appended to the Final Evaluation Report.

79. At the end of the evaluation process, the Evaluation Office will prepare a **Recommendations Implementation Plan** in the format of a table, to be completed and updated at regular intervals by the Task Manager. The Evaluation Office will track compliance against this plan on a six-monthly basis for a maximum of 18 months.

The Evaluation Team

80. For this evaluation, the evaluation team will consist of a Principal Evaluator and one Specialist Evaluator who will work under the overall responsibility of the Evaluation Office represented by an Evaluation Manager (Susanne Bech), in consultation with the UNEP Task Manager (Geordie Colville), Fund Management Officer (Leena Darlington), Executing Project Manager UNEP Regional Office for Africa (Dr Meseret Teklemariam Zemedkun) and the Sub-program Coordinators of Climate Change (Niklas Hagelberg). The consultants will liaise with the Evaluation Manager on any procedural and methodological matters related to the evaluation. It is, however, each consultant's individual responsibility (where applicable) to arrange for their visas and immunizations as well as to plan meetings with stakeholders, organize online surveys, obtain documentary evidence and any other logistical matters related to the assignment. The UNEP Task Manager and project team will, where possible, provide logistical support (introductions, meetings, etc.) allowing the consultants to conduct the evaluation as efficiently and independently as possible.

81. The Principal Evaluator will be hired over a period of 6 months from 1 October 2021 to 31 March 2022 and should have the following: a university degree in environmental sciences, international development or other relevant political or social sciences area is required and an advanced degree in the same areas is desirable; a minimum of 7 years of technical / evaluation experience is required, preferably including evaluating large, regional or global programs and

using a Theory of Change approach; experience from developing countries, including East Africa. Good/broad understanding of renewable energy and energy investment, including geothermal energy, is desired. English and French are the working languages of the United Nations Secretariat. For this consultancy, fluency in oral and written English is a requirement. Working knowledge of the UN system and specifically the work of UNEP is an added advantage. The work will be home-based with possible field visits, if permitted by Covid-19 restrictions.

82. The Evaluation Specialist will be hired over a period of 6 months from 01 October 2021 to 31 March 2022 and should have the following: a university degree in environmental sciences, international development or other relevant technical, political or social sciences area is required; a minimum of 7 years of technical/monitoring/evaluation experience is required, experience from developing countries, including East Africa, and broad understanding of renewable energy with expertise in geochemistry and geothermal energy technology. English and French are the working languages of the United Nations Secretariat. For this consultancy fluency in oral and written English is a requirement. The work will be home-based with possible field visits, if permitted by Covid-19 restrictions.

83. The Principal Evaluator will be responsible, in close consultation with the Evaluation Office of UNEP for overall management of the evaluation and timely provision of its outputs, described above in Section 11 Evaluation Deliverables, above. The Evaluation Specialist will make substantive and high- quality contributions to the evaluation process and outputs. Both consultants will ensure together that all evaluation criteria and questions are adequately covered.

84. Specifically, Evaluation Team members will undertake the following:

Specific Responsibilities for Principal Evaluator:

85. The Principal Evaluator will be responsible, in close consultation with the Evaluation Manager, for overall management of the evaluation and timely provision of its outputs, described above in Section 11 Evaluation Deliverables.

Specific Responsibilities for the Evaluation Specialist:

86. The Evaluation Specialist will make substantive and high-quality contributions to the evaluation process and outputs. Both consultants will ensure together that all evaluation criteria and questions are adequately covered.

87. Specifically, Evaluation Team members will undertake the following:

Inception phase of the evaluation, including:

preliminary desk review and introductory interviews with project staff;
draft the reconstructed Theory of Change of the project;
prepare the evaluation framework;
develop the desk review and interview protocols;
draft the survey protocols (if relevant);
develop and present criteria for country and/or site selection for the evaluation mission;
plan the evaluation schedule;
prepare the Inception Report, incorporating comments until approved by the Evaluation Manager

Data collection and analysis phase of the evaluation, including:

conduct further desk review and in-depth interviews with project implementing and executing agencies, project partners and project stakeholders;
(where appropriate and agreed, if travel restrictions due to the COVID-19 pandemic permit) conduct an evaluation mission(s) to selected countries, visit the project locations, interview

project partners and stakeholders, including a good representation of local communities. Ensure independence of the evaluation and confidentiality of evaluation interviews.
regularly report back to the Evaluation Manager on progress and inform of any possible problems or issues encountered and;
keep the Project/Task Manager informed of the evaluation progress.

Reporting phase, including:

draft the Main Evaluation Report, ensuring that the evaluation report is complete, coherent and consistent with the Evaluation Manager guidelines both in substance and style;
liaise with the Evaluation Manager on comments received and finalize the Main Evaluation Report, ensuring that comments are taken into account until approved by the Evaluation Manager
prepare a Response to Comments annex for the main report, listing those comments not accepted by the evaluation consultant and indicating the reason for the rejection; and
(where agreed with the Evaluation Manager) prepare an Evaluation Brief (2-page summary of the evaluand and the key evaluation findings and lessons)

Managing relations, including:

maintain a positive relationship with evaluation stakeholders, ensuring that the evaluation process is as participatory as possible but at the same time maintains its independence;
communicate in a timely manner with the Evaluation Manager on any issues requiring its attention and intervention.
Schedule of the evaluation

88. The table below presents the tentative schedule for the evaluation.

Table 7. Tentative schedule for the evaluation

Milestone	***Tentative Dates***
Evaluation Initiation Meeting	October 2021
Inception Report	October 2021
E-based interviews, surveys etc.	October-December 2021
PowerPoint/presentation on preliminary findings and recommendations	December 2021
Draft report to Evaluation Manager (and Peer Reviewer)	December 2021
Draft Report shared with UNEP Project Manager and UNEP ROA project team	December/January 2021
Draft Report shared with Evaluation Reference Group	January 2022
Draft Report shared with wider group of stakeholders	February 2022
Final Report	March 2022
Final Report shared with all respondents	March 2022

Contractual Arrangements

89. Evaluation consultants will be selected and recruited by the Evaluation Office of UNEP under an individual Special Service Agreement (SSA) on a "fees only" basis (see below). By signing the service contract with UNEP /UNON, the consultant(s) certify that they have not been associated with the design and implementation of the project in any way which may jeopardize their independence and impartiality towards project achievements and project partner performance. In addition, they will not have any future interests (within six months after

completion of the contract) with the project's executing or implementing units. All consultants are required to sigh the Code of Conduct Agreement Form.

90. Fees will be paid on an instalment basis, paid on acceptance by the Evaluation Manager of expected key deliverables. The schedule of payment is as follows:

Schedule of Payment for the Principal Evaluator:

Deliverable	**Percentage Payment**
Approved Inception Report (as per annex document 9)	30%
Approved Draft Main Evaluation Report (as per annex document 10)	30%
Approved Final Main Evaluation Report	40%

Schedule of Payment for the Evaluation Specialist:

Deliverable	Percentage Payment
Approved Inception Report (as per annex document 9)	30%
Approved Draft Main Evaluation Report (as per annex document 10)	30%
Approved Final Main Evaluation Report	40%

91. Fees only contracts: Note that due to the COVID-19 pandemic travel remains unlikely and therefore purchase of air tickets and Daily Subsistence Allowance for authorized travel mission are not applied.
92. The consultants may be provided with access to a shared folder on SharePoint, or other, as applicable and if such access is granted, the consultants agree not to disclose information from that system to third parties beyond information required for, and included in, the evaluation report.
93. In case the consultants are not able to provide the deliverables in accordance with these guidelines, and in line with the expected quality standards by the UNEP Evaluation Office, payment may be withheld at the discretion of the Director of the Evaluation Office until the consultants have improved the deliverables to meet UNEP's quality standards.
94. If the consultants fail to submit a satisfactory final product to UNEP in a timely manner, i.e. before the end date of their contract, the Evaluation Office reserves the right to employ additional human resources to finalize the report, and to reduce the consultants' fees by an amount equal to the additional costs borne by the Evaluation Office to bring the report up to standard.

ANNEX VI. WEIGHTING TABLE FOR EVALUATION CRITERIA

Evaluation criteria	Rating	Score	Weight	Weighted Score
Strategic Relevance [select the ratings for sub-categories]	**Satisfactory**	**4.58**	6	0.3
Alignment to UNEP's MTS, POW and strategic priorities	Satisfactory	5	0.5	
Alignment to Donor/Partner strategic priorities	Satisfactory	5	0.5	
Relevance to regional, sub-regional and national issues and	Moderately Satisfactory	4	2.5	
Complementarity with existing interventions	Satisfactory	5	2.5	
Quality of Project Design	Moderately Satisfactory	4	4	0.2
Nature of External Context	Favourable			
Effectiveness [select the ratings for sub-categories]	**Satisfactory**	**4.33**	45	2.0
Availability of outputs	Satisfactory	5	5	
Achievement of project outcomes	Moderately Unsatisfactory	4	30	
Likelihood of impact	Likely	5	10	
Financial Management [select the ratings for sub-categories]	**Satisfactory**	**4.67**	5	0.2
Adherence to UNEP's policies and procedures	Highly Satisfactory	6		
Completeness of project financial information	Unsatisfactory	2		
Communication between finance and project management st	Highly Satisfactory	6		
Efficiency	Satisfactory	5	10	0.5
Monitoring and Reporting [select the ratings for sub-categori	**Satisfactory**	**5.00**	5	0.3
Monitoring design and budgeting	Moderately Satisfactory	4		
Monitoring of project implementation	Satisfactory	5		
Project reporting	Highly Satisfactory	6		
Sustainability [select the ratings for sub-categories]	**Likely**	5.00	20	1.0
Socio-political sustainability	Highly Likely	6		
Financial sustainability	Likely	5		
Institutional sustainability	Likely	5		
Factors Affecting Performance [select the ratings for sub-cate	**Highly Satisfactory**	**5.67**	5	0.3
Preparation and readiness	Satisfactory	5		
Quality of project management and supervision	Highly Satisfactory	6.00		
UNEP/Implementing Agency [select the rating for sub-categories]	Highly Satisfactory	6		
Partner/Executing Agency [select the rating for sub-categories]	Highly Satisfactory	6		
Stakeholder participation and cooperation	Highly Satisfactory	6		
Responsiveness to human rights and gender equity	Satisfactory	5		
Environmental and social safeguards	Satisfactory	5		
Country ownership and driven-ness	Highly Satisfactory	6		
Communication and public awareness	Highly Satisfactory	6		
			100	**4.65**
				Satisfactory

ANNEX VII. QUALITY ASSESSMENT OF THE EVALUATION REPORT

All UNEP evaluations are subject to a quality assessment by the Evaluation Office. This is an assessment of the quality of the evaluation product (i.e. evaluation report) and is dependent on more than just the consultants' efforts and skills.

	UNEP Evaluation Office Comments	Final Report Rating
Substantive Report Quality Criteria		
Quality of the Executive Summary: The Summary should be able to stand alone as an accurate summary of the main evaluation product. It should include a concise overview of the evaluation object; clear summary of the evaluation objectives and scope; overall evaluation rating of the project and key features of performance (strengths and weaknesses) against exceptional criteria (plus reference to where the evaluation ratings table can be found within the report); summary of the main findings of the exercise, including a synthesis of main conclusions (which include a summary response to key strategic evaluation questions), lessons learned and recommendations.	Final report: Executive Summary provides a satisfactory standalone summary of the evaluand, evaluation purpose and scope, key findings, summary response to key strategic questions, main conclusions, lessons learned and recommendations.	5
I. Introduction A brief introduction should be given identifying, where possible and relevant, the following: institutional context of the project (sub-programme, Division, regions/countries where implemented) and coverage of the evaluation; date of PRC approval and project document signature); results frameworks to which it contributes (e.g. Expected Accomplishment in POW); project duration and start/end dates; number of project phases (where appropriate); implementing partners; total secured budget and whether the project has been evaluated in the past (e.g. mid-term, part of a synthesis evaluation, evaluated by another agency etc.) Consider the extent to which the introduction includes a concise statement of the purpose of the evaluation and the key intended audience for the findings?	Final report: Concise introduction of the ARGeo project, phase 2 key information on institutional alignment, the Terminal Evaluation and its users and ARGeo challenges.	5
II. Evaluation Methods A data collection section should include: a description of evaluation methods and information sources used, including the number and type of respondents; justification for methods used (e.g. qualitative/ quantitative; electronic/face-to-face); any selection criteria used to identify respondents, case studies or sites/countries visited; strategies used to increase stakeholder engagement and consultation; details of how data were verified (e.g.	Final report: To the point description of evaluation approach, framework, data sources and limitations and data	4.5

triangulation, review by stakeholders etc.). Efforts to include the voices of different groups, e.g. vulnerable, gender, marginalised etc) should be described. Methods to ensure that potentially excluded groups (excluded by gender, vulnerability or marginalisation) are reached and their experiences captured effectively, should be made explicit in this section. The methods used to analyse data (e.g. scoring; coding; thematic analysis etc.) should be described. It should also address evaluation limitations such as: low or imbalanced response rates across different groups; gaps in documentation; extent to which findings can be either generalised to wider evaluation questions or constraints on aggregation/disaggregation; any potential or apparent biases; language barriers and ways they were overcome. Ethics and human rights issues should be highlighted including: how anonymity and confidentiality were protected, and strategies used to include the views of marginalised or potentially disadvantaged groups and/or divergent views. Is there an ethics statement? E.g. *'Throughout the evaluation process and in the compilation of the Final Evaluation Report efforts have been made to represent the views of both mainstream and more marginalised groups. All efforts to provide respondents with anonymity have been made.*	collection tools of the evaluation. Short mentioning of ethics, human rights and gender issues considerations.	
III. The Project This section should include: • *Context:* Overview of the main issue that the project is trying to address, its root causes and consequences on the environment and human well-being (i.e. synopsis of the problem and situational analyses). • *Results framework*: Summary of the project's results hierarchy as stated in the ProDoc (or as officially revised) • *Stakeholders:* Description of groups of targeted stakeholders organised according to relevant common characteristics • *Project implementation structure and partners:* A description of the implementation structure with diagram and a list of key project partners • *Changes in design during implementation:* Any key events that affected the project's scope or parameters should be described in brief in chronological order • *Project financing:* Completed tables of: (a) budget at design and expenditure by components (b) planned and actual sources of funding/co-financing	Final report: Section provides a concise overview of context, results framework, stakeholders, implementation structure, changes during implementation and project financing Informative figures included.	5
IV. Theory of Change The *TOC at Evaluation* should be presented clearly in both diagrammatic and narrative forms. Clear articulation of each major causal pathway is expected, (starting from outputs to long term impact), including explanations of all drivers and assumptions as well as the expected roles of key actors.	Final report: Concise presentation of ToC and description of major pathways. Assumption on women and vulnerable group included.	5

This section should include a description of how the *TOC at Evaluation*[82] was designed (who was involved etc.) and applied to the context of the project? Where the project results as stated in the project design documents (or formal revisions of the project design) are not an accurate reflection of the project's intentions or do not follow UNEP's definitions of different results levels, project results may need to be re-phrased or reformulated. In such cases, a summary of the project's results hierarchy should be presented for: a) the results as stated in the approved/revised Prodoc logframe/TOC and b) as formulated in the *TOC at Evaluation. The two results hierarchies should be presented as a two-column table to show clearly that, although wording and placement may have changed, the results 'goal posts' have not been 'moved'.* This table may have initially been presented in the Inception Report and should appear somewhere in the Main Review report.		
V. Key Findings **A. Strategic relevance:** This section should include an assessment of the project's relevance in relation to UNEP's mandate and its alignment with UNEP's policies and strategies at the time of project approval. An assessment of the complementarity of the project at design (or during inception/mobilisation[83]), with other interventions addressing the needs of the same target groups should be included. Consider the extent to which all four elements have been addressed: i. Alignment to the UNEP Medium Term Strategy (MTS), Programme of Work (POW) and Strategic Priorities ii. Alignment to Donor/GEF/Partners Strategic Priorities iii. Relevance to Regional, Sub-regional and National Environmental Priorities iv. Complementarity with Existing Interventions	Final report: Findings for each sub-criteria under strategic relevance provided with accompanying ratings.	5
B. Quality of Project Design To what extent are the strength and weaknesses of the project design effectively summarized?	Final report: Well-summarized analysis of key strengths and weaknesses.	5
C. Nature of the External Context For projects where this is appropriate, key external features of the project's implementing context that limited the project's performance (e.g. conflict, natural disaster, political	Final report: Relevant key external factors addressed,	5

[82] During the Inception Phase of the evaluation process a *TOC at Evaluation Inception* is created based on the information contained in the approved project documents (these may include either logical framework or a TOC or narrative descriptions), formal revisions and annual reports etc. During the evaluation process this TOC is revised based on changes made during project intervention and becomes the *TOC at Evaluation*.

[83] A project's inception or mobilization period is understood as the time between project approval and first disbursement. Complementarity during project implementation is considered under Efficiency, see below.

upheaval[84]), and how they affected performance, should be described.	including COVID-19 and case of Eritrea.	
D. Effectiveness **(i) Outputs and Project Outcomes:** How well does the report present a well-reasoned, complete and evidence-based assessment of the a) availability of outputs, and b) achievement of project outcomes? How convincing is the discussion of attribution and contribution, as well as the constraints to attributing effects to the intervention? The effects of the intervention on differentiated groups, including those with specific needs due to gender, vulnerability or marginalisation, should be discussed explicitly.	Final report: Concise description of outputs and outcomes delivered with supporting evidence.	5
(ii) Likelihood of Impact: How well does the report present an integrated analysis, guided by the causal pathways represented by the TOC, of all evidence relating to likelihood of impact? How well are change processes explained and the roles of key actors, as well as drivers and assumptions, explicitly discussed? Any unintended negative effects of the project should be discussed under Effectiveness, especially negative effects on disadvantaged groups.	Final report: Satisfactory assessment of likelihood of impacts 1-4, including discussion of assumptions and drivers from outcome to likelihood of impact.	5
E. Financial Management This section should contain an integrated analysis of all dimensions evaluated under financial management and include a completed 'financial management' table. Consider how well the report addresses the following: • *Adherence* to UNEP's financial policies and procedures • *completeness* of financial information, including the actual project costs (total and per activity) and actual co-financing used • *communication* between financial and project management staff	Final report: *(if this section is rated poorly as a result of limited financial information from the project, this is not a reflection on the consultant per se, but will affect the quality of the evaluation report)* *Analysis of financial management related to the project based on the available documentation with it limitations provided at the start of the*	4

[84] Note that 'political upheaval' does not include regular national election cycles, but unanticipated unrest or prolonged disruption. The potential delays or changes in political support that are often associated with the regular national election cycle should be part of the project's design and addressed through adaptive management of the project team.

	evaluation process and later in the process.	
F. Efficiency To what extent, and how well, does the report present a well-reasoned, complete and evidence-based assessment of efficiency under the primary categories of cost-effectiveness and timeliness including: • Implications of delays and no cost extensions • Time-saving measures put in place to maximise results within the secured budget and agreed project timeframe • Discussion of making use during project implementation of/building on pre-existing institutions, agreements and partnerships, data sources, synergies and complementarities with other initiatives, programmes and projects etc. • The extent to which the management of the project minimised UNEP's environmental footprint.	Final report: Concise efficiency analysis with geo-technical insights.	5
G. Monitoring and Reporting How well does the report assess: • Monitoring design and budgeting *(including SMART results with measurable indicators, resources for MTE/R etc.)* • Monitoring of project implementation *(including use of monitoring data for adaptive management)* • Project reporting *(e.g. PIMS and donor reports)*	Final report: Analysis of monitoring and reporting based on the extent to which availability of project documentation had limitations	4
H. Sustainability How well does the evaluation identify and assess the key conditions or factors that are likely to undermine or contribute to the persistence of achieved project outcomes including: • Socio-political Sustainability • Financial Sustainability • Institutional Sustainability	Final report: Analysis of monitoring and reporting based on the extent to which availability of project documentation had limitations	5
I. Factors Affecting Performance These factors are <u>not</u> discussed in stand-alone sections but are **integrated in criteria A-H as appropriate**. Note that these are described in the Evaluation Criteria Ratings Matrix. To what extent, and how well, does the evaluation report cover the following cross-cutting themes: • Preparation and readiness • Quality of project management and supervision[85]	Final report: Satisfactory section with findings and ratings provided for each of the factors.	5

[85] In some cases 'project management and supervision' will refer to the supervision and guidance provided by UNEP to implementing partners and national governments while in others, specifically for GEF funded projects, it will refer to the project management performance of the executing agency and the technical backstopping provided by UNEP. This includes providing the answers to the questions on Core Indicator Targets, stakeholder engagement, gender responsiveness, safeguards and knowledge management, required for the GEF portal.

• Stakeholder participation and co-operation • Responsiveness to human rights and gender equality • Environmental and social safeguards • Country ownership and driven-ness • Communication and public awareness		
VI. Conclusions and Recommendations **i) Quality of the conclusions:** The key strategic questions should be **clearly** and succinctly addressed within the conclusions section. This includes providing the answers to the questions on Core Indicator Targets, stakeholder engagement, gender responsiveness, safeguards and knowledge management, required for the GEF portal. It is expected that the conclusions will highlight the main strengths and weaknesses of the project and connect them in a compelling story line. Human rights and gender dimensions of the intervention (e.g. how these dimensions were considered, addressed or impacted on) should be discussed explicitly. Conclusions, as well as lessons and recommendations, should be consistent with the evidence presented in the main body of the report.	Final report: Section provides key findings, detailed analysis of strengths and weaknesses, responses to strategic questions, summary table of project findings and ratings.	5
ii) Quality and utility of the lessons: Both positive and negative lessons are expected and duplication with recommendations should be avoided. Based on explicit evaluation findings, lessons should be rooted in real project experiences or derived from problems encountered and mistakes made that should be avoided in the future. Lessons are intended to be adopted any time they are deemed to be relevant in the future and must have the potential for wider application (replication and generalization) and use and should briefly describe the context from which they are derived and those contexts in which they may be useful.	Final report: Four forward looking lessons building on the findings of the evaluation and relevant to the future of the ARGeo initiative.	5.5
iii) Quality and utility of the recommendations: To what extent are the recommendations proposals for specific action to be taken by identified people/position-holders to resolve concrete problems affecting the project or the sustainability of its results? They should be feasible to implement within the timeframe and resources available (including local capacities) and specific in terms of who would do what and when. At least one recommendation relating to strengthening the human rights and gender dimensions of UNEP interventions, should be given. Recommendations should represent a measurable performance target in order that the Evaluation Office can monitor and assess compliance with the recommendations. In cases where the recommendation is addressed to a third party, compliance can only be monitored and assessed where a contractual/legal agreement remains in place. Without such an agreement, the recommendation should be formulated to say that UNEP project staff should pass on the recommendation to the relevant third party in an effective or substantive manner. The effective transmission	Final report: Concise recommendations, short description of challenge/ problems. Further short elaboration provided for each recommendation.	5.5

by UNEP of the recommendation will then be monitored for compliance. Where a new project phase is already under discussion or in preparation with the same third party, a recommendation can be made to address the issue in the next phase.		
VII. Report Structure and Presentation Quality		
i) Structure and completeness of the report: To what extent does the report follow the Evaluation Office guidelines? Are all requested Annexes included and complete?	Final report: Overall report structure in line with Evaluation Office guidance.	5
ii) **Quality of writing and formatting:** Consider whether the report is well written (clear English language and grammar) with language that is adequate in quality and tone for an official document? Do visual aids, such as maps and graphs convey key information? Does the report follow Evaluation Office formatting guidelines?	Final report: Concise report. Good selection and use of maps, figures and photos.	5
OVERALL REPORT QUALITY RATING		**4.9**

A number rating 1-6 is used for each criterion: Highly Satisfactory = 6, Satisfactory = 5, Moderately Satisfactory = 4, Moderately Unsatisfactory = 3, Unsatisfactory = 2, Highly Unsatisfactory = 1. The overall quality of the evaluation report is calculated by taking the mean score of all rated quality criteria.

At the end of the evaluation, compliance of the evaluation process against the agreed standard procedures is assessed, based on the table below. *All questions with negative compliance must be explained further in the table below.*

Evaluation Process Quality Criteria	**Compliance**	
	Yes	**No**
Independence:		
1. Were the Terms of Reference drafted and finalised by the Evaluation Office?	**x**	
2. Were possible conflicts of interest of proposed Evaluation Consultant(s) appraised and addressed in the final selection?	**x**	
3. Was the final selection of the Evaluation Consultant(s) made by the Evaluation Office?	**x**	
4. Was the evaluator contracted directly by the Evaluation Office?	**x**	
5. Was the Evaluation Consultant given direct access to identified external stakeholders in order to adequately present and discuss the findings, as appropriate?	**x**	
6. Did the Evaluation Consultant raise any concerns about being unable to work freely and without interference or undue pressure from project staff or the Evaluation Office?		**x**
7. If Yes to Q6: Were these concerns resolved to the mutual satisfaction of both the Evaluation Consultant and the Evaluation Manager?		

Financial Management:		
8. Was the evaluation budget approved at project design available for the evaluation?	**x**	
9. Was the final evaluation budget agreed and approved by the Evaluation Office?	**x**	
10. Were the agreed evaluation funds readily available to support the payment of the evaluation contract throughout the payment process?		**x**
Timeliness:		
11. If a Terminal Evaluation: Was the evaluation initiated within the period of six months before or after project operational completion? Or, if a Mid Term Evaluation: Was the evaluation initiated within a six-month period prior to the project's mid-point?		**x**
12. Were all deadlines set in the Terms of Reference respected, as far as unforeseen circumstances allowed?	**x**	
13. Was the inception report delivered and reviewed/approved prior to commencing any travel?	**x**	
Project's engagement and support:		
14. Did the project team, Sub-Programme Coordinator and identified project stakeholders provide comments on the evaluation Terms of Reference?	**x**	
15. Did the project make available all required/requested documents?	**x**	
16. Did the project make all financial information (and audit reports if applicable) available in a timely manner and to an acceptable level of completeness?		**x**
17. Was adequate support provided by the project to the evaluator(s) in planning and conducting evaluation missions?	**x**	
18. Was close communication between the Evaluation Consultant, Evaluation Office and project team maintained throughout the evaluation?	**x**	
19. Were evaluation findings, lessons and recommendations adequately discussed with the project team for ownership to be established?	x	
20. Did the project team, Sub-Programme Coordinator and any identified project stakeholders provide comments on the draft evaluation report?	**x**	
Quality assurance:		
21. Were the evaluation Terms of Reference, including the key evaluation questions, peer-reviewed?	**x**	
22. Was the TOC in the inception report peer-reviewed?	**x**	
23. Was the quality of the draft/cleared report checked by the Evaluation Manager and Peer Reviewer prior to dissemination to stakeholders for comments?	**x**	
24. Did the Evaluation Office complete an assessment of the quality of both the draft and final reports?	**x**	
Transparency:		
25. Was the draft evaluation report sent directly by the Evaluation Consultant to the Evaluation Office?	**x**	
26. Did the Evaluation Manager disseminate (or authorize dissemination) of the cleared draft report to the project team, Sub-Programme Coordinator and other key internal personnel (including the Reference Group where appropriate) to solicit formal comments?	**x**	
27. Did the Evaluation Manager disseminate (or authorize dissemination) appropriate drafts of the report to identified external stakeholders, including key partners and funders, to solicit formal comments?	**x**	
28. Were all stakeholder comments to the draft evaluation report sent directly to the Evaluation Office	**x**	
29. Did the Evaluation Consultant(s) respond adequately to all factual corrections and comments?	**x**	
30. Did the Evaluation Office share substantive comments and Evaluation Consultant responses with those who commented, as appropriate?	**x**	

Provide comments / explanations / mitigating circumstances below for any non-compliant process issues.

Process Criterion Number	Evaluation Office Comments
	The start of the evaluation was delayed due to staff shortages in the Evaluation Office at the time.
	The project made extensively use of procurement processes and co-financing, which provided to be a constraint to retrieving all financial documents requested by the Evaluation Team. By extra effort of project management some essential financial documentation were made available late in the evaluation process.