



Geothermal Risk Mitigation Facility for Eastern Africa

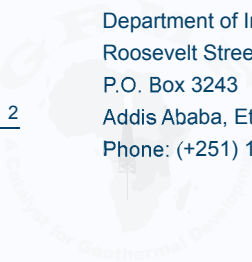


PROJECTS OVERVIEW AND ACTIVITIES



KfW

African Union Commission
Department of Infrastructure and Energy
Roosevelt Street, W21K19
P.O. Box 3243
Addis Ababa, Ethiopia
Phone: (+251) 11 518 2414



Background and history of the Geothermal Risk Mitigation Facility (GRMF)

Hydropower and fossil fuel fired thermal generation currently provide over 95% of electricity in Eastern Africa. Years of sustained droughts have reduced the generation available from hydropower resulting in supply shortages, instigation of emergency diesel generation and increased power prices. However, Eastern Africa has an estimated geo-thermal resource potential of over 15,000 MWe. Development of this resource has the potential to provide indigenous, low emission baseload generation for the region, to improve security of supply and reduce the frequency and severity of energy price fluctuations. Reduction of greenhouse gas emissions and adding low-cost power generation capacity in East African countries constitute further advantages of geothermal energy projects.

Despite this potential, geothermal resources in the region are largely unexploited primarily due to the high cost and the associated risk of discovering and proving the resource. Geothermal resources within East African countries are in general poorly defined with the exception of Kenya. Furthermore, the framework conditions (e.g. regulations together with financial and institutional arrangements) required to encourage geothermal development are insufficiently supportive.

In order to mitigate the high risk of exploration and reservoir confirmation drilling, the African Union Commission (AUC) with the German Federal Ministry for Economic Cooperation and the European Union (EU)-Africa Infrastructure Trust Fund through KfW Entwicklungsbank (KfW), have agreed to establish the Geothermal Risk Mitigation Facility (GRMF) for Eastern Africa (the Facility). In addition the UK Department for International Development (DFID) is making a contribution to the GRMF.

The GRMF is a grant programme designed to cost share exploration work (surface studies and drilling programmes) of public and private investors acting as geothermal project developers (applicants/eligible entities). The programme provides grants for siting, drilling and testing of wells to assist developers secure financing for subsequent wells and for Field Development Well (see Glossary). Furthermore, grants for infrastructure costs are foreseen. Depending on the availability of funds a contingent Continuation Premium for co-funding further production or confirmation drilling as well as a specified set of additional activities, may also be accessed.

In order to limit the risk to the GRMF, the grants will be awarded based on quality of the proposed project's geological, technical data and work programme, financial viability and environmental/social sustainability. Next to these, other evaluation criteria relate to the capacity and the experience of the applicants and their partners, as well as the overall coherence of the application.



ELIGIBLE COUNTRIES AND APPLICATION RESULTS

The map on page 5 shows the eleven eligible countries, as well as surface studies and drilling programmes that were awarded grants in the respective Application Rounds. You can find more information on the funded projects beginning on page 10 of this booklet.

So far, a total of 85.9 mUSD has been awarded to surface studies and drilling programmes in the five completed Application Rounds. In addition to this, there is a potential to award further grants of 31.5 mUSD to developers as continuation premium (CP). All sixteen drilling programmes that were awarded from AR 1 to AR 5 comprise a planned power plant capacity of approx. 2.8 GW_e in total. The planned investment volume of all 30 awarded projects from AR 1 to AR 5 amount to approx. 9 billion USD.





1 st Application Round	2 nd Application Round	3 rd Application Round	4 th Application Round	5 th Application Round
● Drilling Programmes	● Drilling Programmes	● Drilling Programmes	● Drilling Programmes	● Drilling Programmes
■ Surface Studies	■ Surface Studies	■ Surface Studies	■ Surface Studies	■ Surface Studies

GRMF ELIGIBLE ACTIVITIES AND FINANCIAL SUPPORT

1. SURFACE STUDIES

Financial support is available for surface studies to determine the optimal location for reservoir confirmation wells at geothermal prospects that have previously been studied extensively. Eligible activities for surface studies are geophysical surveys (e.g. seismic, gravity, magnetic, or magnetotelluric) as well as supplementary geological, hydrogeological, and geochemical surveys. The GRMF funds up to 80 % of approved eligible cost (excluding infrastructure cost).

2. DRILLING PROGRAMMES

Exploration drilling and testing programmes are eligible for funding once the optimal locations of reservoir confirmation wells have been determined. According to the new GRMF regulations of August 2017, such a programme may comprise:

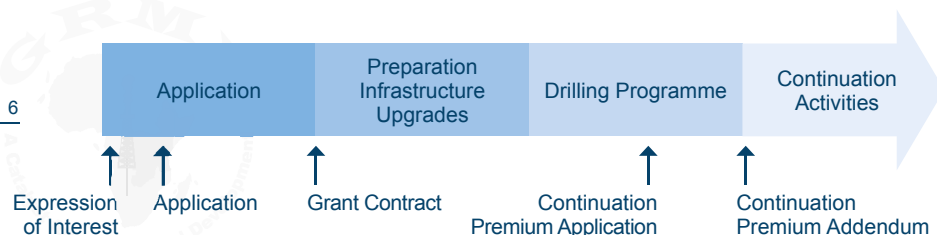
- up to three full size reservoir wells ($\geq 5"$ diameter of the last casing or liner) or
 - a combination of up to three slim hole wells ($< 5"$ diameter of last casing or liner) and one full size reservoir confirmation well or
 - a combination of up to two slim holes- and two full size reservoir confirmation wells.
- The GRMF funds up to 40 % of approved eligible cost (excluding infrastructure cost).

3. INFRASTRUCTURE UPGRADES

Infrastructure upgrades required for eligible surface studies or eligible drilling and testing programmes (e.g. access roads, water supply) can also receive GRMF funding. The infrastructure grant covers up to 20 % of approved eligible cost. It is only available in conjunction with a surface study or drilling programme grant.

4. CONTINUATION PREMIUM

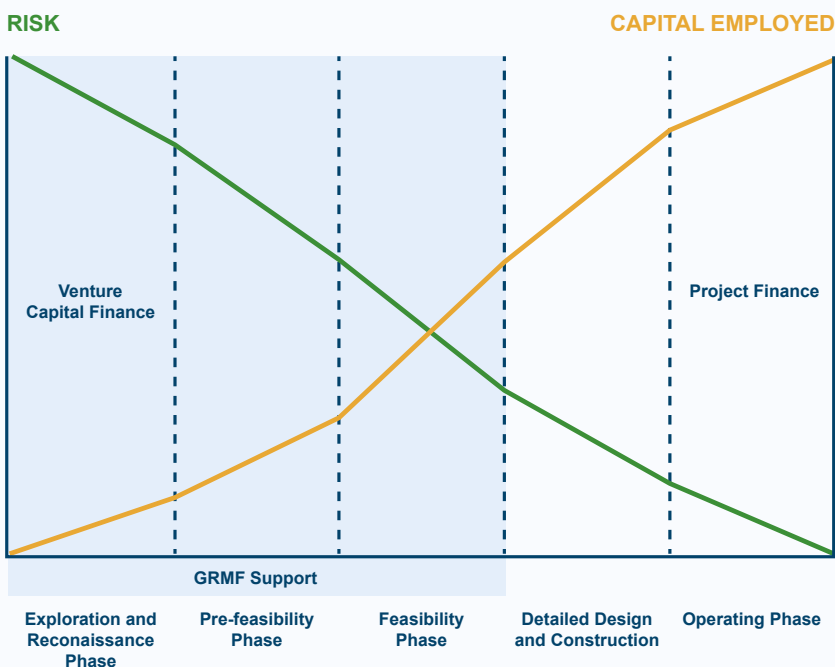
A continuation premium is available to beneficiaries who successfully complete a GRMF-funded drilling programme and fulfilled the original grant contract obligations. Depending on the initial drilling programme and the selected option for the wells (see above), the continuation premium may be applied towards an additional full size well, well-head unit(s) installation, long term discharge testing (minimum six months), a reservoir evaluation update, or a Feasibility Study. The maximum amount of the continuation premium is capped at the lower of either 30 % of approved eligible and expended continuation activity costs, or at 30 % of the developer's share of the approved eligible and expended costs of the preceding drilling programme (excluding infrastructure upgrades).



OBJECTIVE AND FINANCIERS

The Geothermal Risk Mitigation Facility (GRMF) was established to fund, facilitate, and accelerate geothermal development in eleven partner countries in the Eastern African Rift region. It is hosted and managed by the African Union Commission (AUC). Funding is provided by the German Federal Ministry for Economic Cooperation and Development (BMZ), together with the EU-Africa Infrastructure Trust Fund (EU Africa ITF) via KfW Development Bank (KfW), and the UK Department for International Development (DFID).

The GRMF was launched in 2012. It conducts a series of Application Rounds to identify eligible projects and determine appropriate project funding levels. The 5th Application Round was finalised in October 2018. The GRMF programme has a total funding volume of approximately 100 million USD, which may be increased at the donors' discretion.



The overall objective of the GRMF is to encourage public and private sector investment into geothermal power generation. This is achieved by providing financial support to mitigate the early stage exploration risk associated with geothermal power projects in order to improve project bankability and secure external financing. The GRMF therefore acts as a catalyst in establishing geothermal energy as a strategic option for power generation capacity expansion in the partner countries.

APPLICATION PROCEDURE

The GRMF provides grants to developers by means of the following competitive, transparent, and rigorous two-stage application process:

PRE-QUALIFICATION PHASE

The first stage of the application procedure is an open pre-qualification process. Potential applicants are invited to submit their expressions of interest (Eols) by a specified deadline.

Eols for eligible activities scoring above a certain threshold successfully pass pre-qualification and will be invited to participate in a mandatory pre-bidding workshop, and to submit a full application.

APPLICATION PHASE & PROJECT PIPELINE

In the second stage, applicants with pre-qualified Eols must submit a full application by a set deadline. Applications that score above a certain threshold will be included in a project pipeline upon approval by the GRMF Oversight Committee. Only these projects will be invited for grant contract signing subject to the availability of funds under condition that project information as requested by the Facility are submitted and approved.

GRANT CONTRACT

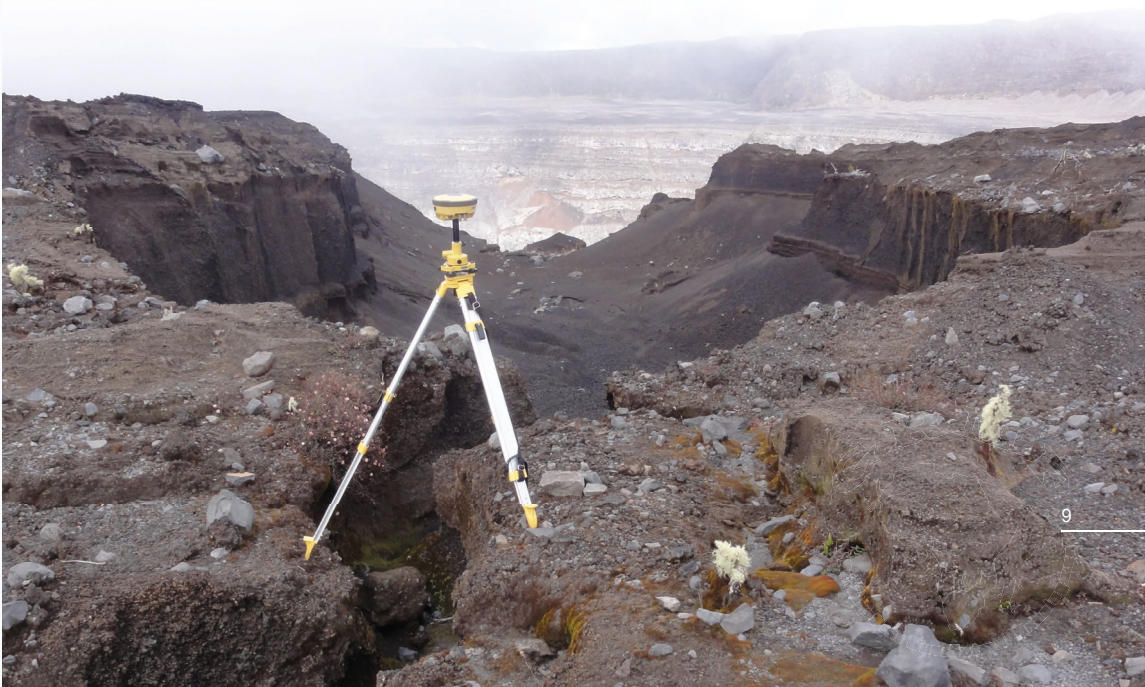
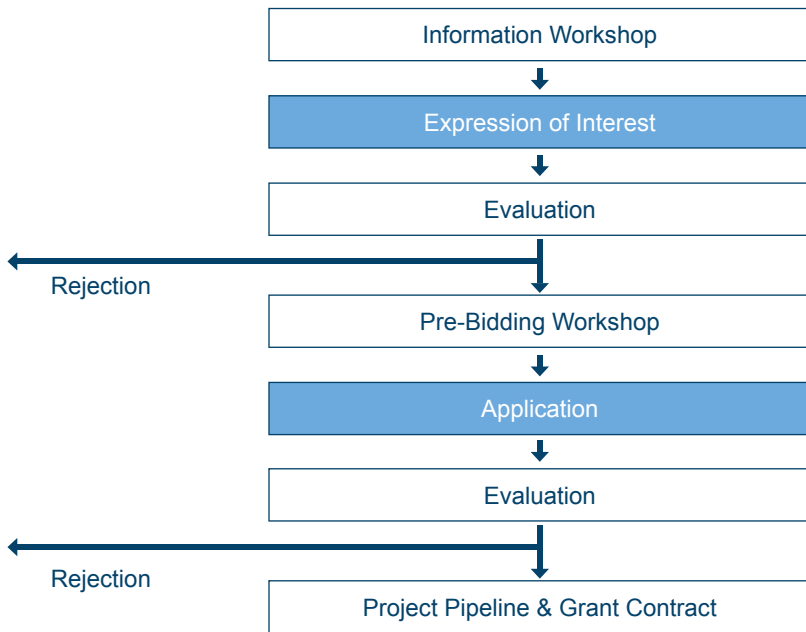
Once the beneficiary has successfully fulfilled all requirements, a grant contract will be signed between the AUC and the applicant accordingly.

Among others, the grant contract delineates requirements for follow-up monitoring and reporting regarding the project and specifies the milestones and disbursement schedule of the grant.

TIME SCHEDULE

Deadlines to submit Eols and full applications for an Application Round are announced on the GRMF website.

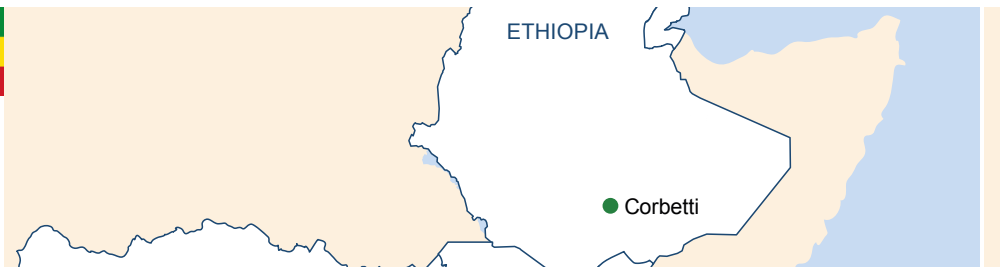




PROJECT BRIEFING

ETHIOPIA

FIRST APPLICATION ROUND



CORBETTI GEOTHERMAL PROJECT

● Drilling Programme

Beneficiary	Reykjavik Geothermal ehf (RG)
Location	Corbetti, Oromia
Estimated Resource Potential (MW _e)	1,000
Planned Power Plant Capacity (MW _e)	250
Grant volume including CP (in USD)	7,994,035
Current status of project	Awarded, in Project pipeline (PP)



KENYA

FIRST APPLICATION ROUND



BOGORIA-SILALI GEOTHERMAL PROJECT

● Drilling Programme

Beneficiary	Geothermal Development Company (GDC)
Location	Silali, Baringo and Turkana County
Estimated Resource Potential (MW _e)	800
Planned Power Plant Capacity (MW _e)	800
Grant volume including CP (in USD)	6,026,786
Current status of project	Awarded, in Project pipeline (PP)

LONGONOT GEOTHERMAL PROJECT

● Drilling Programme

Beneficiary	Africa Geothermal International Ltd. (AGIL)
Location	Mount Longonot, Nakuru County
Estimated Resource Potential (MW _e)	580
Planned Power Plant Capacity (MW _e)	140
Grant volume including CP (in USD)	8,437,024
Current status of project	Awarded, in Project pipeline (PP)



COMOROS

SECOND APPLICATION ROUND



GEOHERMAL SURFACE EXPLORATION OF **GRANDE COMORE**

■ Surface Study

Beneficiary	Ministère de la Production, de l'Environnement, de l'Energie de l'Industrie et de l'Artisanat Bureau Géologique des Comores (BGC)
Location	Karthala Volcano, Grande Comore
Grant volume (in USD)	844,860
Current status of project	Before final disbursement

ETHIOPIA

SECOND APPLICATION ROUND



FANTALE GEOTHERMAL DEVELOPMENT PROJECT

■ Surface Study

Beneficiary	Cluff Geothermal Ltd.
Location	Fantale, Metehara, Oromia
Grant volume (in USD)	857,251
Current status of project	Before final disbursement

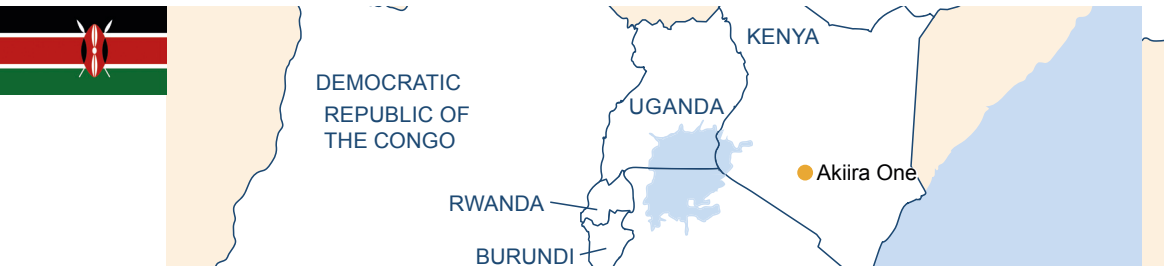
TULU-MOYE GEOTHERMAL PROJECT

■ Surface Study

Beneficiary	Reykjavik Geothermal ehf (RG)
Location	Tulu Moye, Itaya, Oromia
Grant volume (in USD)	1,314,000
Current status of project	Project fully implemented

KENYA

SECOND APPLICATION ROUND



AKIIRA ONE GEOTHERMAL PROJECT

● Drilling Programme

Beneficiary	Akiira Geothermal Ltd. (AGL)
Location	Naivasha Town, Nakuru County
Estimated Resource Potential (MW _e)	205
Planned Power Plant Capacity (MW _e)	140
Grant volume including CP (in USD)	3,311,483
Current status of project	Before final disbursement

COMOROS

THIRD APPLICATION ROUND



KARTHALA GEOTHERMAL PROJECT

● Drilling Programme

Beneficiary	Ministere de la Production, de l'Environnement, de l'Energie de l'Industrie et de l'Artisanat; Bureau Geologique des Comores (BGC)
Location	Karthala Volcano, Grande Comore
Estimated Resource Potential (MW _e)	43
Planned Power Plant Capacity (MW _e)	10
Grant volume including CP (in USD)	10,870,124
Current status of project	Awarded, in Project pipeline (PP)



DJIBOUTI

THIRD APPLICATION ROUND



GEOHERMAL ENERGY DEVELOPMENT IN **ARTA** GEOTHERMAL PROSPECT

■ Surface Study

Beneficiary	l'Office Djiboutien de Développement de l'Energie Géothermique (ODDEG)
Location	Arta Town, Arta District
Grant volume (in USD)	831,867
Current status of project	Before 1st disbursement



ETHIOPIA

THIRD APPLICATION ROUND



BUTAJIRA GEOTHERMAL DEVELOPMENT PROJECT

■ Surface Study

Beneficiary	Cluff Geothermal Ltd.
Location	Butajira, Southern Nations, Nationalities and People's Region
Grant volume (in USD)	609,200
Current status of project	Awarded, in Project pipeline (PP)

FANTALE GEOTHERMAL DEVELOPMENT PROJECT

● Drilling Programme

Beneficiary	Cluff Geothermal Ltd.
Location	Fantale, Metehara, Oromia
Estimated Resource Potential (MW _e)	750
Planned Power Plant Capacity (MW _e)	30
Grant volume including CP (in USD)	5,407,298
Current status of project	Awarded, in Project pipeline (PP)

KENYA

THIRD APPLICATION ROUND



BARRIER GEOTHERMAL PROJECT

■ Surface Study

Beneficiary	Olsuswa Energy Ltd.
Location	Barrier Volcanic Complex, Turkana County
Grant volume (in USD)	980,568
Current status of project	Before 2nd disbursement

KOROSI GEOTHERMAL PROJECT

● Drilling Programme

Beneficiary	Geothermal Development Company (GDC)
Location	Korosi, Baringo County
Estimated Resource Potential (MW _e)	450
Planned Power Plant Capacity (MW _e)	350
Grant volume including CP (in USD)	6,212,935
Current status of project	Awarded, in Project pipeline (PP)

PAKA GEOTHERMAL PROJECT

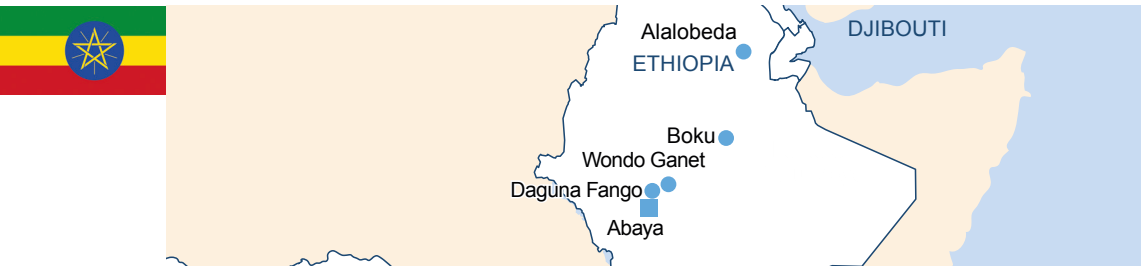
● Drilling Programme

Beneficiary	Geothermal Development Company (GDC)
Location	Paka, Baringo County
Estimated Resource Potential (MW _e)	450
Planned Power Plant Capacity (MW _e)	350
Grant volume including CP (in USD)	6,862,426
Current status of project	Awarded, in Project pipeline (PP)



ETHIOPIA

FOURTH APPLICATION ROUND



ABAYA GEOTHERMAL PROJECT

■ Surface Study

Beneficiary	Reykjavik Geothermal ehf (RG)
Location	Abaya, Southern Nations, Nationalities and People's Region
Grant volume (in USD)	1,376,566
Current status of project	Before grant contract (GC) signing

ALALOBEDA GEOTHERMAL PROJECT

● Drilling Programme

Beneficiary	Ethiopia Electric Power (EEP)
Location	Alalobeda, Afar Rift, Tendaho Graben
Estimated Resource Potential (MW _e)	60
Planned Power Plant Capacity (MW _e)	33
Grant volume including CP (in USD)	8,294,344
Current status of project	Awarded, in Project pipeline (PP)

BOKU GEOTHERMAL PROJECT

● Drilling Programme

Beneficiary	OrPower 12 Inc.
Location	Boku, near Lake Koka in Adama
Estimated Resource Potential (MW _e)	70
Planned Power Plant Capacity (MW _e)	35
Grant volume including CP (in USD)	7,342,814
Current status of project	Awarded, in Project pipeline (PP)

DAGUNA FANGO GEOTHERMAL PROJECT

● Drilling Programme

Beneficiary	OrPower 12 Inc.
Location	Daguna Fango volcanic complex, north of Lake Abaya
Estimated Resource Potential (MW _e)	50
Planned Power Plant Capacity (MW _e)	35
Grant volume including CP (in USD)	6,437,839
Current status of project	Awarded, in Project pipeline (PP)

WONDO GANET GEOTHERMAL PROJECT

● Drilling Programme

Beneficiary	OrPower 12 Inc.
Location	Wondo Ganet, near Awasa
Estimated Resource Potential (MW _e)	150
Planned Power Plant Capacity (MW _e)	35
Grant volume including CP (in USD)	5,808,877
Current status of project	Awarded, in Project pipeline (PP)

KENYA

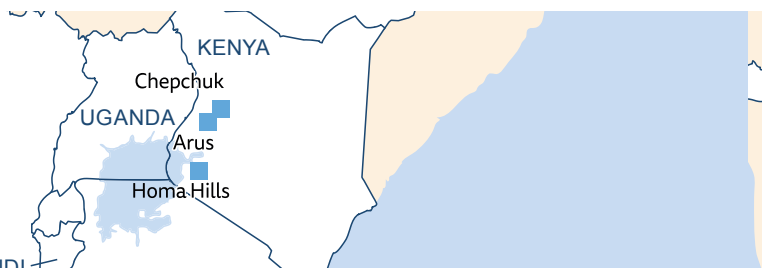
FOURTH APPLICATION ROUND



DEMOCRATIC
REPUBLIC OF
THE CONGO

RWANDA

RUANDA



ARUS GEOTHERMAL PROJECT

■ Surface Study

Beneficiary	Arus Energy Ltd.
Location	Arus, west-central Kenya adjacent to Lake Bogoria in the northern Kenya Rift Valley
Grant volume (in USD)	448,646
Current status of project	Awarded, in Project pipeline (PP)

CHEPCHUK GEOTHERMAL PROJECT

■ Surface Study

Beneficiary	Maralal Energy Ltd.
Location	Maralal, northeast of Lake Baringo in the northern Kenya Rift Valley
Grant volume (in USD)	586,137
Current status of project	Awarded, in Project pipeline (PP)

DETAILED SURFACE STUDIES FOR HOMA HILLS GEOTHERMAL PROJECT

■ Surface Study

Beneficiary	Capital Power Ltd.
Location	Homa Hills, in Kenya's Homa Bay County within the E-W Nyanzian Rift of the main N-S East African Rift System
Grant volume (in USD)	720,490
Current status of project	Awarded, in Project pipeline (PP)

TANZANIA

FOURTH APPLICATION ROUND



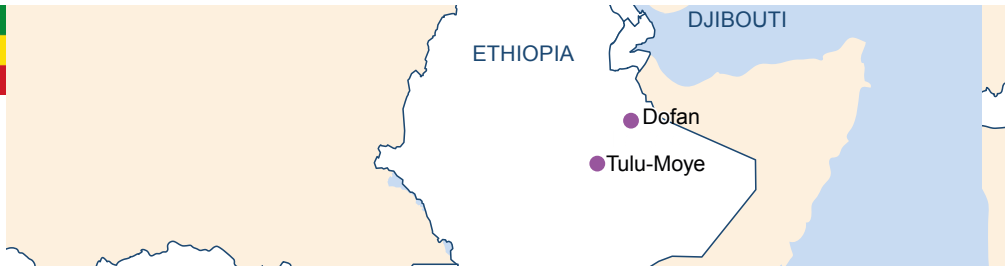
DRILLING PROGRAMME AND INFRASTRUCTURE FOR **NGOZI** PROJECT

● Drilling Programme

Beneficiary	Tanzania Geothermal Development Company Ltd. (TGDC)
Location	Ngozi, within Rungwe Volcanic Province (RVP), southwest Tanzania
Estimated Resource Potential (MW _e)	36
Planned Power Plant Capacity (MW _e)	30
Grant volume including CP (in USD)	3,661,358
Current status of project	Awarded, in Project pipeline (PP)

ETHIOPIA

FIFTH APPLICATION ROUND



DOFAN GEOTHERMAL PROJECT

● Drilling Programme

Beneficiary	OrPower 12 Inc.
Location	Dofan Volcanic Complex, Afar region
Estimated Resource Potential (MWe)	60
Planned Power Plant Capacity (MWe)	35
Grant volume including CP (in USD)	4,890,893
Current status of project	Awarded, in Project pipeline (PP)

TULU-MOYE GEOTHERMAL PROJECT

● Drilling Programme

Beneficiary	TM Geothermal Operations PLC (TMGO)
Location	Gnaro
Estimated Resource Potential (MWe)	1,300
Planned Power Plant Capacity (MWe)	500
Grant volume including CP (in USD)	14,481,553
Current status of project	Awarded, in Project pipeline (PP)



TANZANIA

FIFTH APPLICATION ROUND



NATRON GEOTHERMAL PROJECT

■ Surface Study

Beneficiary	Tanzania Geothermal Development Company Ltd. (TGDC)
Location	Longido, Monduli and Ngorongoro Districts, Arusha Region
Grant volume (in USD)	439,188
Current status of project	Awarded, in Project pipeline (PP)

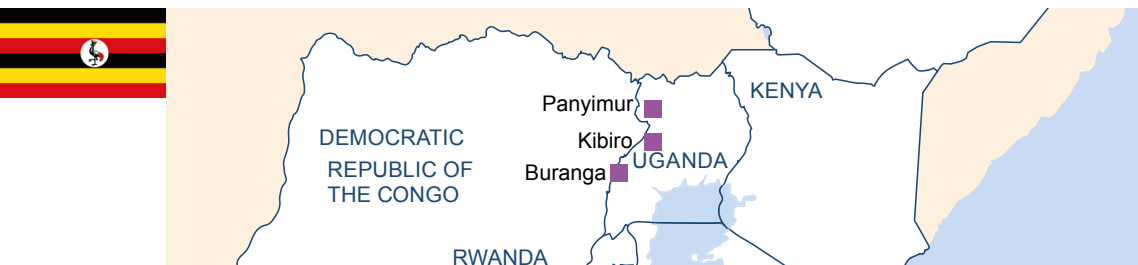
KIEJO-MBAKA GEOTHERMAL PROJECT

● Drilling Programme

Beneficiary	Tanzania Geothermal Development Company Ltd. (TGDC)
Location	Rungwe District, Mbeya Region
Estimated Resource Potential (MWe)	13
Planned Power Plant Capacity (MWe)	10
Grant volume including CP (in USD)	6,666,356
Current status of project	Awarded, in Project pipeline (PP)

UGANDA

FIFTH APPLICATION ROUND



BURANGA GEOTHERMAL PROJECT

■ Surface Study

Beneficiary	GIDS Consult Ltd.
Location	Buranga, Bundibugyo District
Grant volume (in USD)	885,072
Current status of project	Awarded, in Project pipeline (PP)

KIBIRO GEOTHERMAL PROJECT

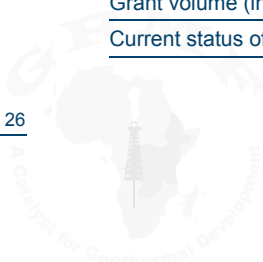
■ Surface Study

Beneficiary	Geothermal Resources Department (GRD)
Location	Kibiro geothermal prospect, Hoima District
Grant volume (in USD)	332,200
Current status of project	Awarded, in Project pipeline (PP)

PANYIMUR GEOTHERMAL PROJECT

■ Surface Study

Beneficiary	Geothermal Resources Department (GRD)
Location	Panyimur Geothermal Prospect
Grant volume (in USD)	313,000
Current status of project	Awarded, in Project pipeline (PP)



AR 1 TO AR 5

OVERVIEW OF AWARDED PROJECTS

The following table shows a summary of all awarded projects under the GRMF, from the first to the fifth Application Round. In total, 30 projects in 6 different countries were awarded, with a planned power plant capacity of approx. 2.8 GW_e.

APPLICATION ROUND	NO. OF PROJECTS	NO. OF SURFACE STUDIES	NO. OF DRILLING PROGRAMMES	NO. OF COUNTRIES				
AR 1	3	0	3	2	2,380	1,190	23	5,904
AR 2	4	3	1	3	205	140	6	705
AR 3	7	3	4	4	1,693	740	32	1,085
AR 4	9	4	5	3	366	168	29	980
AR 5	7	4	3	3	458	545	28	576
Total	30	14	16	6	6,017	2,783	117	9,249

ESTIMATED RESOURCE POTENTIAL (MW_e)
 PLANNED POWER PLANT CAPACITY (MW_e)
 GRANT VOLUME INCLUDING CONTINUATION
 PREMIUM (IN MUSD)
 PLANNED INVESTMENT
 VOLUME (IN MUSD)





Geothermal Risk Mitigation Facility for Eastern Africa

For more information and updates
please visit the GRMF online:
www.grmf-eastafrica.org

For general queries concerning the
GRMF please contact us via email:
grmf@africa-union.org
grmf@roedl.com

African Union Commission
Department of Infrastructure and
Energy
Roosevelt Street, W21 K19
P.O. Box 3243
Addis Ababa, Ethiopia

Phone: (+251) 11 518 2414



KfW