East Africa Geothermal Energy:

Review of Donor Initiatives and Current Regulatory Framework

Economic Consultants Associated Ltd

October 2012

EVIDENCE ON DEMAND

CLIMATE & ENVIRONMENT
INFRASTRUCTURE | LIVELIHOODS

Disclaimer

This report has been produced by Evidence on Demand with the assistance of the UK Department for International Development (DFID) contracted through the Climate, Environment, Infrastructure and Livelihoods Professional Evidence and Applied Knowledge Services (CEIL PEAKS) programme, jointly managed by HTSPE Limited and IMC Worldwide Limited.

The views expressed in the report are entirely those of the author and do not necessarily represent DFID's own views or policies, or those of Evidence on Demand. Comments and discussion on items related to content and opinion should be addressed to the author, via enquiries@evidenceondemand.org.

Contents

Tables

1 Introduction

1.1 Assignment

Economic Consulting Associates (ECA) was contracted to conduct a short term assignment: ***East Africa Geothermal Energy – Review of Donor Initiatives and Current Regulatory Position*** on the 21st of August 2012.

The objective of the assignment is to review the current geothermal sector development in Rwanda, Tanzania, Ethiopia and Uganda, in particular:

- To update and add to existing information on the current state of geothermal regulation and development (mapping/drilling situation, concession rights, mining/regulator existence, taxation, power plant tariffs, other permits, existence of a standardised power purchase agreement). This report should therefore be read in conjunction with such information ;

- To review existing and planned donor initiatives that support private sector investment in geothermal energy in the East African rift valley. This should include country and regional initiatives, by bilateral and multilateral agencies.

A meeting with DFID was conducted at the start of the assignment on the 22nd of August 2012, to clarify the tasks involved, and the deliverables to be submitted. In summary, the discussion included the following points:

- The two main tasks are:
  - Review current available materials provided by DFID to find out current regulatory positions and donor initiatives
  - Have telephone conversations with key stakeholders from each country, including representatives from other donor organisations to update current regulatory position and donor initiatives
- The main deliverable is the Final Report, which include results from the two main tasks above. It was confirmed that the Final Report is not to be a comprehensive summary of the IFC study in 2011, but rather to provide succinct and clear updates on regulatory position and donor initiatives. Table formats, as adopted in this report, are preferred to lengthy descriptions.

Timing of the assignment somewhat depended on the availability of the key stakeholders and donors to be contacted. To keep track of the progress of the assignment, the first progress update was a telephone conversation with DFID on Thursday 30th August 2012. The second progress update was on Tuesday 4th September 2012.

1.2 Report structure

This Final Report is structured as follows:

- Section 2 provides updates on the status of geothermal sector development
- Section 3 provides updates on the regulatory position of each country
- Section 4 provides updates on donor activities in each country
- Section 5 summarises some of the key conclusions from this assignment.

Contact lists and notes from the telephone conversations with key stakeholders for each country is provided in the Annex A1, and a list of documents received is provided in Annex A2.

2 Updates on Status Geothermal Development

This section provides summaries of the status of geothermal development in Rwanda, Tanzania, Ethiopia and Uganda. The update was based on several telephone and email conversation with key stakeholders, including other donor agencies.

Table 1 gives the overall picture of the geothermal development in each country.

Table 1 – Summary of geothermal development

Geothermal development[1]	Rwanda	Tanzania	Ethiopia	Uganda
Geothermal Resource Exploration (GRE)				
Reconnaissance studies	✓	✓	✓	✓
Surface studies	✓	✗	✓	✓
Exploration and appraisal drilling	✗	✗	✓	✗
Pre-Feasibility Studies and baseline EIA	✗	✗	✓	✗
Geothermal Resource Development (GRD)				
Production drilling	✗	✗	✓	✗
Power plant design and construction	✗	✗	✓	✗
Power line construction	✗	✗	?	✗

The subsequent tables provide summaries of known geothermal fields in each country, the status of their development, who the developers are, and where the funding came from. Note that the tables below do not provide a complete list of all geothermal activities in each country. Rather, they provide summaries of known activities as of the time this report is written.

2.1 Rwanda

Although not yet confirmed, the Government of Rwanda is said to be looking for donor funding for the reconnaissance and surface studies of potential geothermal areas, and also potentially for exploration drilling. The involvement of private investment is foreseen to come after geothermal resources have been confirmed.

[1] Steps of geothermal development taken from a presentation from Prof Stephen Onacha, *Geothermal Exploration and Development in Rwanda*, 2010

Table 2 – Geothermal development status in Rwanda			
Geothermal areas	**Status of development**	**Developer**	**Source of Funding**
Karisimbi	Reconnaissance and surface studies	BGR and KenGen	BGR and Government of Rwanda
Gisenyi	Reconnaissance and surface studies	?	?
Kinigi	Reconnaissance and surface studies	Belgium Technical Cooperation	Belgium Development Agency
Bugarama	Reconnaissance and preliminary surface studies	?	?

2.2 Tanzania

Geothermal development in Tanzania is still in very early stages. Most early reconnaissance studies were conducted under donor funding or funded by the Government of Tanzania. However, in 2003, First Energy Company Ltd (from Ethiopia) was granted a licence for geothermal exploration and development of the geothermal prospect in Luhoi under a concession type agreement. It was noted that no further studies in this area other than that of reconnaissance study was performed. A German company has however apparently also recently obtained a concession area with the Government.

Table 3 – Geothermal development status in Tanzania			
Geothermal areas	**Status of development**	**Developer**	**Source of Funding**
Lake Natron, Manyara, Utete, Musona	Reconnaissance study, no further studies done	SWECO	SIDA and TANESCO
Mbeya	Reconnaissance study	Ministry of Energy and Minerals, Geological Survey Tanzania, and BGR	Partly funded by UNDP in 1983, then further studies by BGR in 2006
Luhoi	Reconnaissance study, no further study due to lack of fund/investment	Concessioned to First Energy Company Ltd (Ethiopia)	First Energy Company Ltd

2.3 Ethiopia

Ethiopia has one pilot geothermal power plant currently in operation in Aluto Langano area, producing 7.3MWe. Further drillings are in progress and the scaling up of this power plant is part of the geothermal component of the Scaling-up of Renewable Energy Program (SREP). Other potential geothermal areas have also been located and funding is needed to conduct further studies on these areas.

Table 4 – Geothermal development status in Ethiopia

Geothermal areas	Status of development	Developer	Source of Funding
Aluto Langano	Pilot power plant producing 7.3MWe New drillings and feasibility studies in progress	Power plant first installed in 1999 and operated by Israeli-US company ORMAT, but was not fully operational. The plant was rehabilitated in 2006 and operated by EEPCo in 2009. New drillings begun in 2011 by WEST JEC of Japan.	Early investment by ORMAT. Rehabilitation funded by grant from Geothermal Development Associates of Nevada, US. WEST JEC project supported by Japanese Government and World Bank and is part of SREP project.
Tendano	Up to exploration drilling, found productive wells	"Geotherm" project by BGR	BGR and partial funding from USTDA
Corbetti, Abaya, Tulu Moye, Dofan, Fantale	Reconnaissance studies	Geological Survey of Ethiopia	Government of Ethiopia, looking for funding for further studies

2.4 Uganda

In terms of private sector involvement, Uganda is most advanced compared to the other three countries under this assignment. The four main areas where preliminary drilling had occurred have now all been given out as concessions. However, the risk is that the concessionaires will not meet the obligations under their licences i.e. they will not undertake the necessary investment (drilling etc). Only one concessionaire shows signs of being active, which is Cozumel.

Table 5 – Geothermal development status in Uganda			
Geothermal areas	**Status of development**	**Developer**	**Source of Funding**
Katwe	Up to surface studies	Concessioned to Cozumel	Cozumel, looking for further investments to conduct exploratory drilling
Kibiro	Up to surface study	Concessioned to a private developer	Private developer, not much activity reported
Buranga	Up to surface study	Concessioned to GIDS Consult	GIDS, not much activity reported

3 Updates on Regulatory Position

This section provides updates on the regulatory position in Rwanda, Tanzania, Ethiopia and Uganda. The update was based on several telephone and email conversation with key stakeholders, including other donor agencies.

Table 6 gives the overall picture of the regulatory position of each country, while Table 7 and Table 8 provide more detailed summary of the regulatory positions of each country.

Table 6 – Summary of regulatory positions

Regulatory Positions	Rwanda	Tanzania	Ethiopia	Uganda
Geothermal regulations				
Geothermal Law	✓	✗	✗	✗
Geothermal Regulation (secondary legislation, including detailed licencing procedures)	✓	✗	✗	✗
Specialised regulator to monitor geothermal licence compliance	✗	✗	✗	✗
Other regulator monitoring licences for geothermal exploration (eg. Mining regulator)	✗	✗	✓	✓
Tax rules or incentives	?	?	? (no customs tariffs on low carbon equipment)	?
Others, i.e. environmental	✓	✓	?	?

Regulatory Positions	Rwanda	Tanzania	Ethiopia	Uganda

Regulatory Positions	Rwanda	Tanzania	Ethiopia	Uganda
Energy regulations				
Energy strategy includes geothermal in future energy mix	✓	✓	✓	✓
Energy regulator experienced in developing and monitoring PPAs for geothermal	✗	✗	✗	✗
Feed-in-tariff mechanism exists for renewable energy	✓	✓	✗	✓
Feed-in-tariff specific for geothermal	✗	✗	✗	✓
Standard PPA for geothermal	✗	✗	✗	✗
Offtakers trained on PPAs for geothermal	✗	✗	✗	✗

Table 7 below summarises the current positions in the four countries in terms of specific geothermal regulations, and Table 8 summarises current energy regulatory positions in each country.

Table 7 – Current geothermal specific regulatory positions

Regulations	Rwanda	Tanzania	Ethiopia	Uganda
Geothermal law	Draft Geothermal Energy Act and Regulation is currently being discussed by key stakeholders, and will be submitted to parliament in September 2012. Expected to be enacted in early 2013. MININFRA has developed a Geothermal Development Strategy for Rwanda for 2011-2017.	No specific geothermal act or regulatory framework.	No specific geothermal act or regulatory framework but may not be necessary as may fall under the mining law	No specific geothermal act or regulatory framework. Currently geothermal exploration falls under Mining Act 2003, and electricity generation follows the Renewable Energy Policy 2007.
Rules/secondary legislation i.e more detail about issuing and revoking concessions (whether tender, fees, rents/royalties)	Draft Geothermal Resource Regulation 2012 is being considered along with the Geothermal Act 2012. Draft regulation provides details of geothermal licencing procedures. Ministry of Water and Energy is responsible for issuing geothermal exploration licences.	No	No	No specific geothermal regulations. Geothermal exploration licencing falls under The Mining Act 2003. Geological Survey Department has the right to issue licences for geothermal exploration.

Regulations	Rwanda	Tanzania	Ethiopia	Uganda
Compliance /monitoring of regime in existence for concessions e.g if they spend money on drilling and if not revoking the licence etc	No concession or licence for geothermal exploration has been issued so far. But in reality, MININFRA and EWSA have been active in geothermal development and would monitor concessions.	A Task Force for Geothermal Energy Development has been formed, but it has no decision making power, and is only able to provide advice to the Minister. The overall mandate of the Geothermal Energy Task Force is to ensure the expansion of the generation of green/clean energy (for more information on the Task Force, see Section 5.2).	Ministry of Mines issues licence for geothermal exploration. One licence has been issued to Cluff Geothermal. Investment in geothermal resource development is subject to the Mining Proclamation No. 52/1993, as amended, which provides licensing for the duration of "resource life". As per the choice of the licensee, separate licenses can be acquired for Licensing (1 year), exploration (3-5 years), development duration as per feasibility study) and production (25 years and renewable). Alternatively a "cradle to grave" license encompassing all these may be acquired. We are not aware of what the rules are regarding investment commitments in drilling etc	Most likely the Geological Survey Department under Ministry of Energy and Mineral Development will be responsible for compliance/monitoring of geothermal exploration licences. However, has not been effective in revoking licences when concessionaires do not perform obligation under their licences in mineral mining so risk they take a similar attitude to geothermal.
Mineral mining regulator or concessions issuing body established				No specific regulator for geothermal. Geological Survey Department is acting as regulator in terms of issuing licences.

Regulations	Rwanda	Tanzania	Ethiopia	Uganda
Mineral mining regulator or concessions issuing body trained				No – see above
Tax rules/incentives			Incentive for investment in renewable including geothermal include duty free allowance for capital import goods	
Other e.g. environmental	MININFRA is responsible to monitor all geothermal activities, including Environmental Impact Assessments for geothermal development activities.	There is a sectoral checklist for Environmental Impact Assessment, as peer EIA Act 2004 and EIA guidelines 2005, presumably this includes geothermal.		

Table 8 – Current energy and electricity sector regulatory position

Regulation	Rwanda	Tanzania	Ethiopia	Uganda
Energy strategy (including geothermal target)	7 year Electricity Development Strategy – expecting to install up to 310 MWe of geothermal power plant by 2017	25 year Power System Master Plan, last updated 2009 has identified some geothermal sites, next plan said to include plan for 100MW geothermal plant for post 2025	Plans to build up to 120MWe in 5-year term, and up to 10MWe in 10 years.	Energy Policy in 2002 followed by Renewable Energy Policy 2007 mentioned target for renewable energy to reach 61% in 2017, but n**o specific mention for geothermal targets.**

Regulation	Rwanda	Tanzania	Ethiopia	Uganda
Energy ministry training on geothermal – technical and financial	Some staff from the Ministry and EWSA had received training through the UNU-GTP	Low awareness of geothermal potential within the government. Ministry of Energy and Mineral Resources has a Renewable Energy Section, which has a geothermal subsection. Some staff from geothermal department have received training from Iceland, and New Zealand. Staff in Geological Survey department within the Ministry has some competence in geothermal development.	No one in Ministry of Mines and Energy is dealing specifically with geothermal activities. Geological Survey of Ethiopia has been involved in geothermal exploration since 1960s.	Geological Survey Department in Ministry of Energy and Minerals Development responsible for geothermal licencing, exploration and development. Have attended many seminars and workshops on geothermal. Electricity Regulatory Authority (ERA) has more capacity in terms of licencing for electricity generation and dealing with PPAs and feed-in-tariff development.
Feed in tariff generally e.g. FIT law?	Feed-in-tariff regulation for hydropower has recently been enacted in early 2012.. Feed-in-tariff mechanism for geothermal is supposedly being developed, but no update on this so far. Government seems to be concentrating on getting the geothermal act and regulation in place.	Feed-in-tariff for small renewable power producers of up to 10MW. Calculated based on avoided costs, and in 2009, it was set to be US$ 0.066/kWh for grid connected, and US$ 0.26/kWh for rural mini grid areas. No specific FiT for geothermal	No existing feed-in-tariff mechanism, although said to have been developing one since 2009	ERA has developed guidelines for renewable energy feed-in-tariff, which include geothermal feed-in tariff for generation up to 20MW at US$ 0.077/kWh. However, the FIT does not adequately consider the costs for exploration, drilling and steam field management.

Regulation	Rwanda	Tanzania	Ethiopia	Uganda
Feed in tariff for geothermal established e.g. secondary legislation	No – see above	No	No	Yes – see above
Model power purchase agreement for geothermal	Standard PPAs have to be approved by MININFRA and agreed by RURA. Currently no experience in preparing PPA specifically for geothermal.	Have standardized Small Power Purchase Agreement (SPPA) for small renewables, but no specific one for geothermal	No - PPA are negotiated with EEPCo	Standard PPAs have to be approved by ERA. Currently no experience in preparing PPA specifically for geothermal. One is being prepared for hydro, bagasse etc
Offtaker trained on PPAs generally or geothermal specifically	Energy, Water and Sanitation Authority (EWSA) has experience in negotiating PPA with IPPs, but no specific geothermal experience.	Not likely	Not likely	Uganda Electricity Transmission Company Limited (UETCL) has experience in negotiating PPA with IPPs, but no specific geothermal experience.
Energy regulator trained on geothermal tariffs/issues	Rwanda Utilities Regulatory Agency (RURA) mandated to regulate electricity and gas sector, issue licences to operators, regulate tariffs and protect customers. Not sure if there are capabilities in geothermal sector to develop feed-in-tariff specific to geothermal.	Not likely – Energy and Water Utilities Regulatory Authority (EWURA) responsible for licencing and tariff reviews, also for health and safety and environment. Not likely to have any experience in geothermal.	Not likely – Ethiopian Electricity Agency is the energy regulator, established to allow private investment in the sector. But no geothermal experience as yet. EEA responsible for issuing licences for generation, and regulating tariffs.	ERA as regulator has experience in developing feed-in-tariff guidelines, but not specific to geothermal. Technical assistance team will be provided to regulator (ERA) as part of Get Fit project Focus will be on hydro and bagasse but could extend more widely if necessary.

Regulation	Rwanda	Tanzania	Ethiopia	Uganda
Other e.g. Ministry of Finance, customs regime for drilling/rigs etc, health and safety			Exemption from low carbon imports.	

4 Updates on Donor Activities

This section provides updates on donor activities in each country, as per the subsections below. This update is based on telephone and email conversations with other donor agencies, and on some online news articles or donor websites. References to the online websites are provided.

4.1 Rwanda

Rwanda has received significant donor assistance in the geothermal sector in the last decade. Current donor activities are summarised in Table 9 below.

Table 9 – Current donor activities in Rwanda

Areas/Type of Assistance	Donor Agencies or Banks	Value of Assistance	Contacts and Implementation Status
Explore the potential of geothermal energy in Kinigi, supporting exploration drilling. Assistance in developing feed-in-tariff for renewables	Belgian Development Agency, Belgium Technical Cooperation (BTC)	55 million euros for energy sector, allocated 37 million euros for exploration of Kinigi field	Contact in BTC: Jean-Yves SALIEZ jean-yves.saliez@btcctb.org On-going
Technical assistance and capacity building during exploration drilling including feasibility studies. Currently in discussion with the government to provide assistance in developing a geothermal master plan.	JICA		Contacts in JICA: Satoko Nishigori nishigori.satoko@jica.go.jp On-going, master plan development has not yet commenced
Technical assistance during exploration drilling Karisimbi geothermal project: http://www.ndf.fi/index.php?id=166	Nordic Development Fund (NDF)	For the Karisimbi project: EUR 500,000 – implemented by Reykjavik Geothermal to assist in exploration drilling in Karisimbi and TA.	Contact in NDF: Hannu Eerola Country Program Manager in East Africa Hannu.Eerola@ndf.fi Status unknown, Rykjavik claim commercial in confidence information

Areas/Type of Assistance	Donor Agencies or Banks	Value of Assistance	Contacts and Implementation Status
Small power plant feasibility study as proof of concept if exploration wells are successful.	French Development Bank		Contacts in AFD: Rémi Fritsch fritschr@afd.fr Power plan development not yet commenced

In addition to the donor activities listed above, some Rwandan government officials from the Geothermal Department within the MININFRA have received capacity building in the sector, financed by the Icelandic Government through the United Nation University – Geothermal Training Program.

The Government is also in contact with KfW and has expressed interest in the Geothermal Risk Mitigation Facility. In the future, the Government may be interested in donor assistance in attracting private investments to the geothermal sector, in terms of insurance type arrangements or technical assistance.

4.2 Tanzania

There are currently considerable donor interest in the geothermal sector in Tanzania. An Energy Donor Partner Group has been formed, chaired by the Swedish International Development Agency (SIDA), and is meant to coordinate different donor agencies support to the sector.

In addition, as part of the Scaling-up Renewable Energy Program (SREP) in Tanzania, a geothermal exploration and development component is being proposed.

Table 10 summarises current donor activities in Tanzania.

Table 10 – Current donor activities in Tanzania

Areas/Type of Assistance	Donor Agencies	Value of Assistance	Contacts and Implementation Status
Main components of the project are: • Training of Tanzanian experts in acquisition, analysis and interpretation of exploration data, • Recommendation of potential locations for a geothermal exploration borehole on the basis of modern geothermal exploration methods, • Policy dialogue and awareness raising of decision makers • Enabling MEM, GST and TANESCO to continue with geothermal exploration work, • Dissemination of information about possibilities of geothermal energy use in Tanzania among decision makers, and • Assistance in the search for funding for shallow drilling in the project area.	BGR http://www.bgr.bund.de/EN/Themen/Zusammenarbeit/TechnZusammenarb/Geotherm/Projects/Tanzania/tanzania_node_en.html		The project was initiated in June 2006 and is expected to be finalised in October 2012.

Areas/Type of Assistance	Donor Agencies	Value of Assistance	Contacts and Implementation Status
Currently exploring the potential for coordinated donor assistance. But this is in very initial stages. 5 main areas suggested: 1. Geothermal remapping – to provide further detailed information on potential sites 2. Capacity Training – in all areas relating to geothermal drilling and energy production 3. Legal and institutional framework – technical assistance with policy development 4. Awareness-raising – particularly among decision-makers in MEM, land planning, Dept of Environment, Ministry of Finance etc 5. High cost of exploration of geothermal sites – funding to support test and exploratory drilling	Energy Donor Partner Group, chaired by SIDA	Depends on each donor's contributions. A matrix is being developed to match donors' assistance with what the government needs. Could include value of the assistance by each donor…	Contact person: Stella Mandago at AFDB – s.mandago@afdb.org Matrix currently under preparation
Objective. The project will support scale-up of the on-going program for developing geothermal energy for power generation in the country. one of the proposed project under SREP will accelerate development of lake Ngozi – Songwe field through detailed surface exploration, infrastructural development, drilling of shallow, exploratory and appraisal wells. More detailed scope will be developed after the SREP mission in mid-September.	SREP	SREP funding will help to fund Ngozi – Songwe field site preparion and shallow well drilling which might pave way for private sector to come in at subsequent stages of development although the private sector role is not clear.	Investment proposal will be presented in the SREP mission to Tanzania in mid-September 2012

4.3 Ethiopia

The biggest donor assistance in the geothermal sector is currently in the form of the SREP project, jointly implemented by the World Bank, IFC and African Development Bank.

Table 11 summarises current donor activities in Ethiopia.

Table 11 – Current donor activities in Ethiopia

Areas/Type of Assistance	Donor Agencies	Value of Assistance	Contacts and Implementation Status
The project 'Geo-scientific Exploration for Development of the Tendaho Geothermal System' started at the end of 2006 and its 1st phase was finalised in summer 2009. The new project phase 2 started in April 2010 and will terminate in September 2012. Its objective is to enable the Ministry of Mines and Energy to submit a funding application to financing partners. In phase 2 of the GEOTHERM Programme project activities focus on further geoscientific support of the Tendaho geothermal field as well as advisory on regulatory issues and capacity building.	BGR http://www.bgr.bund.de/EN/Themen/Zusammenarbeit/TechnZusammenarb/Geotherm/Projects/Ethiopia/ethiopia_node_en.html		Phase 2 will end in September 2012, current status not known.

Areas/Type of Assistance	Donor Agencies	Value of Assistance	Contacts and Implementation Status
Component I: Aluto Langano Geothermal Power Generation Project, which include: - Appraisal and production drilling - Project preparation grant - Power plant and transmission line construction Component II: Design of a Long-Term Strategy for the Geothermal Sector	SREP AfDB – project preparation stage for the geothermal component I WB – Aluto Langano Geothermal Power Generation Project IFC – Component II: Design of a Long-Term Strategy for the Geothermal Sector	Component I: US$ 24.5 million Component II: US$ 1.5 million (these are SREP's contribution, not total project costs)	Contact person: Mr. Zhihong Zhang – Programme Coordinator (CTF and SREP), The World Bank Tel: +1 202 473 9852 Email: zzhang2@worldbank.org As at Sept 2012, the strategy had not been started.
Exploration wells drilling for pilot project around the Aluto Langano area	Japanese government and World Bank, done by WEST JEC	US$ 20 million	Started beginning of 2011, 2 year term On-going

4.4 Uganda

Uganda has received numerous donor support for geothermal development over the past 20 years. Four potential fields were identified (JICA study), but no material drilling has been done so far. The Government, while not objecting to geothermal, has many other areas of focus e.g. oil and sho has not shown strong commitment in geothermal development. It might be possible to get greater government commitment if the responsibility were more in the energy sector.

Table 12 summarises current donor activities in Uganda.

Table 12 – Current donor activities in Uganda			
Areas/Type of Assistance	**Donor Agencies**	**Value of Assistance**	**Contacts and Implementation Status**
Study on the legal and regulatory framework for geothermal energy in Uganda	Financed by KfW and USAID, conducted by Nexant		On-going (?). Contact person: Jan Martin Witte from KfW: janmartin.witte@kfw.de
Assessment of areas of potential. JICA to select a consultant for the development studies and design (scheduled for 2011). Construction 2013-2018.	JICA		Preliminary studies completed.

4.5 Regional or Multi-country Activities

In addition to country specific donor initiatives, there are several regional activities, as summarised in Table 13. Inputs from DFID are also included in the tables below.

Table 13 – Current donor activities in the African region			
Areas/Type of Assistance	**Donor Agencies**	**Value of Assistance**	**Contacts and Implementation Status**
Geothermal Risk Mitigation Facility (GRMF) The facility can support site specific surface studies exploration drilling to prove resources, leading to site specific investment plans. Countries: Kenya, Uganda, Tanzania, Rwanda and Ethiopia. Details: http://www.skmconsulting.com/Knowledge-and-Insights/Achieve-Magazine/Issue3-2011/article5.aspx	KfW and African Union Commission http://www.southafrica.diplo.de/Vertretung/suedafrika/en/__pr/1__GIC/2011/12/12__East__Africa__geoth__KfW.html	KfW – 30 million euro EU Infrastructure Trust Fund – 20 million euro Total available fund is 50 million euro	Consultant to establish and operate the RMF was selected in May 2012: Pöyry Deutschland http://www.poyry.com/news-events/news/poyry-helps-eastern-africa-search-geothermal-resources Pre-qualification proposals invited from 17 October 2012. Full proposals will be invited after 4 weeks evaluation. An event in Addis on 11 October 2012 will launch the Facility.

Areas/Type of Assistance	Donor Agencies	Value of Assistance	Contacts and Implementation Status
UNEP hosted **Africa Rift geothermal Programme (ARGeo)** Regional information network/database, including events, workshops, training) Possible support for survey and surface exploration.	Donor support not clear – (UNEP, Iceland, Germany, possibly GEF)	Not clear.	Reformulating its focus around regional networking, and possible TA linked to GRMF. Gives out finance for drilling? Original intentions for a drilling risk mitigation facility dropped.
Survey and surface exploration	Iceland International Development Agency (ICEIDA)	$12 million over 5 years, start Jan. 2013	Past support for some countries. Now consolidating into a more coherent package as part of a 'Compact' with the World Bank. Cover 4-7 countries to be identified. Responding to request from countries. Includes preparatory work for test drilling. Also includes some policy and regulatory assistance.
ICEAID has signed an MOU with World Bank for geothermal assessment for all East African countries plus Comoros Island (total of 13 countries), and have identified 9 steps in geothermal development, from reconnaissance stage to electricity generation. ICEAID will be involved mostly in the first few steps, including exploration. Three East African countries have signed up for this study: Burundi, Uganda, and Ethiopia.	ICEIDA and World Bank		Contact person from ICEIDA: Gísli Pálsson, Country Director gisli@iceida.is
Survey and surface exploration	German Federal Institute for Geosciences and Natural Resources (BGR)	Not known Current phase 2009-2015	Surface studies for individual sites in Rwanda, Kenya, and Tanzania. Some training and capacity building insurance exploration.

Areas/Type of Assistance	Donor Agencies	Value of Assistance	Contacts and Implementation Status
Technical assistance for policy and regulatory development -	USAID Africa Infrastructure Programme	Infrastructure programme $35 million over 5 years. Within that, geothermal component $ unknown.	Would like to provide support. Plans being developed. Would cooperate with GRMF.
Technical assistance for policy and regulatory development – Rwanda and Uganda	Africa-EU Renewable Energy Cooperation Programme (RECP) (under the EU-Africa Energy Partnerhsip)	Not known – but relatively small scale.	Intends to place one an adviser in Rwanda or Uganda to advice on policy/regulations development, and provide assistance. Probable start early 2013.
Road map for geothermal development in Africa	ESMAP - WB http://www.esmap.org/esmap/sites/esmap.org/files/geaesmappresentation.pdf		ESMAP geothermal "Guidebook" published September 2012
Assessment of potential geothermal areas	JICA		Not much information, but JICA seems to be actively involved in the geothermal sector in East Africa
IFC insurance mechanism being piloted in Turkey. May extend to E Africa fater pilot (approx. end 2012)	IFC		
IFC detailed market assessments of geothermal concluded in May 2011	IFC		Available via Tom Harding Newman

5 Conclusion

One of the main conclusions from this assignment is that there are a number of donor activities in the geothermal sector in all four countries. But the scale and significance of activity varies by country. None of the countries currently feature donor assistance that appears to holistically address geothermal development. However some countries, Tanzania for example, appear now to be starting to consider a more coordinated and strategic approach to potential donor assistance. There does not appear to be much regional cooperation, for example to share experience, approaches and models for practical geothermal development and power investment between countries.

The status of geothermal policy and regulations in the four countries is variable, as identified in the tables in this report. In addition, the commitment of the government themselves varies. The Government of Rwanda seems to be most committed to the development of the geothermal sector. The Government of Tanzania is now more committed to geothermal, after the speech from the new Minister of Energy and Mines that Tanzania has to start diversifying its energy mix, and that geothermal is one of the priorities. While the Government of Ethiopia and Uganda have shown interest in the geothermal sector, their power sector focus at present is mainly on the development of hydro generation and in the case of Uganda responsibility for licensing and development is with the Ministry of Energy and Mining that is more focussed on oil

Conclusions for each country reviewed are as follow.

5.1 Rwanda

The specific Geothermal Resource Act and Regulation have been prepared and are currently under review by stakeholders. A Geothermal Development Strategy has also been prepared.

The Government of Rwanda is planning to fund the first few exploration drillings, but is looking for further donor assistance in this area.

In discussion with one of the key stakeholders, it was mentioned that the Government is interested in having private investment in the later stages of geothermal development, such as in steam field management and at the power generation stage. There is room for further assistance in these areas, as the business model has not yet been developed.

There is an interest in applying for the KfW's Geothermal Risk Mitigation Facility to provide incentives for private investment. Hence, the Government may be open to other forms of insurance or risk mitigation that will help attract private investment in geothermal development.

5.2 Tanzania

There are several donor agencies currently exploring potential assistance in the geothermal sector in Tanzania. Currently, the Government has submitted its request for assistance in the geothermal sector, and is included in the SREP investment proposal. A draft SREP investment proposal has been prepared, and it includes a

geothermal component. A SREP mission to Tanzania is scheduled for the week of the 17th of September 2012.

An Energy Donor Partner Group has been formed to explore coordinated donor assistance in the geothermal sector. A matrix is being developed to record the types of assistance required by the Government, and help identify how which donor agencies might provide a type of assistance. This is an opportunity for DFID to explore possibilities to be involved in the geothermal sector in Tanzania. The Swedish International Development Agency (SIDA) is currently chairing the Group, and the African Development Bank (AfDB) is very active in coordinating the meetings and developing the matrix. The next meeting for this donor group is scheduled in the week of 17th September 2012, to coincide with a SREP mission scheduled for that week.

German company claims it has JV with Tanzanian government for a geothermal concession area. Not clear how awarded. This would suggest however there is scope for development. Also Iceland Company Corbetti.

For the preparation and implementation of SREP-funded activities, the Government has established a Task Force, consisting of key institutions in the energy sector. It is expected that this Task Force, which has been functioning effectively during the preparation of this Investment Plan, will continue to play an overall coordination role during the project implementation. The organizational arrangements for the SREP will be as follows:

- Overall Responsible Agency: MEM
- Focal Point Person: Assistant Commissioner Renewable Energy
- Task force: MEM,REA,TANESCO and MoFEA
- Implementing Agency for the projects:
- Geothermal Development: MEM, TANESCO
- Biofuel Development: MEM
- Small Hydropower: REA and TANESCO
- Consultative Group: NEMC

This Task Force is to attend the SREP mission during the week of the 17th of September.

5.3 Ethiopia

The main activity in the geothermal sector in Ethiopia is being led by the SREP project, which has a geothermal component. One geothermal power plant is being operated by EEPCo currently. Further development will expand the existing pilot plant of 7.3MW to up to 75MW by the end of 2016 and is being planned using SREP funding. Based on brief email exchanges with people who are involved in the SREP project, not much has been done on this project. The IFC team responsible for Component II, the development of long term geothermal strategy, has just begun

drafting the preliminary strategy. In total the SREP investment plan notes 6 Geothermal schemes which the GoE hopes will be complete by end 2018 to total 450MW, with the first 2 listed above and the third at Corbetti being developed by a private Iceland-based company which is in discussions regarding a Power Purchase Agreement (PPA) with EEPCo PLUS. In the Ethiopia reserve request (to be decided later) was a request for $10m in SREP funds as part of a total $319.6m to develop the new Tendaho field targeting a 100MW.

In terms of regulatory position, currently there is no specific regulatory framework in place for geothermal, and our contact in Ethiopia is not aware of any donor assistance in being provided in this area. Licence for geothermal exploration is issued under the Mining Proclamation and currently one licence has been issued to Cluff Geothermal. Further investigation is needed to find out the current situation and the government's plans in the geothermal sector in Ethiopia.

5.4 Uganda

The Government of Uganda has received various donor assistance in the geothermal sector over the last few years. However, the development of the sector has been rather slow, and practical government commitment to geothermal development at present is unclear. A specific geothermal regulatory framework has been discussed within the government, and KfW has offered to provide assistance in this area. However, there has been no response from the Government.

There are about 3-4 licences issued for geothermal development under the Mining Act. However, only one consortium seems to be making progress.

A1 Bibliography

A1.1 Documents received from DFID

ADB, *Developing Contingent Liability Control System of Geothermal Projects [in Indonesia],* May 2011

ADB, *Geothermal Fund Report*, 2011

Application for Geothermal Resource Licence, Rwanda

Cluff Geothermal, *Proposal for an Insurance Scheme for Geothermal Energy*, March 2012

DFID, *Supporting geothermal how best to do it – financial mechanisms*

Draft Letter Government of Tanzania, 2012

Draft Rwanda Geothermal Resource Exploration, Development and Management Act 2011

EIB, *Notes of Telephone Discussion with EIB*, 13 July 2012

IFC, *East Africa Geothermal Market Assessment – Ethiopia*

IFC, *East Africa Geothermal Market Assessment – Rwanda*

IFC, *East Africa Geothermal Market Assessment – Tanzania*

IFC, *East Africa Geothermal Market Assessment – Uganda*

IFC, *Geothermal Energy Scoping Study for East Africa – Summary of Findings*, July 2011

IFC, *Notes of Discussion with IFC GeoFund*, Tuesday 10 July 2012

KfW, *Geothermal Power for Eastern Africa*, EAPIC, September 5th – 9th 2011

KfW, *Geothermal Risk Mitigation Facility for Eastern Africa (GRMF),* Submission to Executive Committee, EU – Africa Infrastructure Trust Fund, 2011

LCEDN Rapid Response Reviews: What are the key issues regarding the role of geothermal energy in meeting energy needs in the global south?

Meseret Teklemariam Zemedkum, *Overview of Geothermal Resource Exploration and Development in The East African Rift System*

Onacha, S., *Geothermal Exploration and Development in Rwanda – Strategy for accelerated development,* 2010

SREP, *Investment Plan for Tanzania*, 2012

The Rwanda Geothermal Resources Regulations, 2012

USAID, *Recommendations for Uganda Geothermal Resource Development*, 2011

A1.2 Documents received from other stakeholders

Cozumel, *Project Development Plan – Katwe Geothermal*, May 2011

Cozumel, *Summary of Project Development and Exploration Activities for Katwe for the Period of June 2011 – May 2012*, May 2012

Godfrey Bahati (MEMD), *Status of Geothermal Exploration and Development in Uganda 2011*, November 2011

ICEIDA, *A Summary Report on a Pre-Feasibility Study of the Kibiro and Katwe-Kikorongo Geothermal Prospect in Uganda – Conclusions and Recommendations*, December 2009

ICEIDA, *The Kibiro Goethermal Prospect – A Report on a Temperature Gradient Survey*, 2009

ICEIDA, *Uganda Kibiro – Katwe Geology of Thermal Gradient Wells*, March 2008

JICA, *Situation Analysis Study on Geothermal Development in Africa*, October 2010

KfW and USAID, *Letter to Permanent Secretary of Uganda*, 19 April 2012

KfW, *Letter to Cozumel Re: Geothermal Risk Mitigation Facility*, 14 May 2012

SREP, *Investment Plan for Ethiopia*, March 2012

A1.3 Documents obtained from other sources

Department of Geological Survey and Mines (MEMD), *Requirements for Geothermal Energy Exploration and Development in Uganda*, March 2010, available from: http://www.bgr.bund.de/EN/Themen/Zusammenarbeit/TechnZusammenarb/Geotherm/Downloads/events_Uganda.pdf?__blob=publicationFile&v=2

Edward Isabirye Mugadu*, Geothermal Energy in the Development of Uganda*, June 2010, available from: www.geothermal-energy.org/files-28.html

ESMAP Magnus Gehringer and Victor Loksha *Geothermal Handbook: Planning and Financing Power*

EWSA – Geothermal Development Unit, *Geothermal Exploration and Development in Rwanda*, 29 February 2012, available from: http://www.ewsa.rw/Docs/Geothermal_%2520Breakout_session.pdf

Generation Technical Report 002/12 September 2012 http://www.google.co.uk/search?hl=en&q=ESMAP+geothermal+handbook&meta=

Godfrey Bahati, *Cooperation between the International Atomic Energy Agency (IAEA) and the African Rift System Countries*, March 2010, available from: http://www.bgr.bund.de/EN/Themen/Zusammenarbeit/TechnZusammenarb/Geotherm/Downloads/events_IAEA.pdf?__blob=publicationFile&v=2

Isaiah Tumwikirize, *Five Year Strategic Plan for Geothermal Resources of Uganda*, November 2011, available from: http://www.gak.co.ke/nibs/web_resources/FIVE%20YEAR%20STRATEGIC%20PLAN%20FOR%20GEOTHERMAL%20RESOURCES%20OF%20UGANDA.pdf

Jacob Mayalla et al, *Geothermal Development in Tanzania, November 2011*, available from: http://www.gak.co.ke/nibs/web_resources/GEOTHERMAL%20DEVELOPMENT%20IN%20TANZANIA.pdf

PIDA, *Africa Energy Outlook 2040*, 2011, available from: http://www.pidafrica.org/PIDA-Sector-speccific%20Terms%20of%20Reference%20for%20Energy%20Sector.pdf

Regional Geothermal Working Group Meeting, *The Role of AUC in Development of Geothermal Energy in East African Countries*, September 2011, available from: http://www.area-net.org/fileadmin/user_upload/AREA/AREA_downloads/AREA_Conference_12/presentatios/Session_4/ROLE_OF_AUC_FOR_DEVELOPMENT_OF_RENEWABLE_ENERGY_IN_AFRICA.pdf

Rwanda Utility Regulatory Agency (RURA), *Rwanda Renewable Energy Feed-in Tariffs*, 2012, available from: http://www.rura.gov.rw/docs/REGULATIONS_ON_FEED_TARIFFS_HYDRO_POWER_PLANTS.pdf

Stephen Onacha, *Rwanda Geothermal Resources Development Country Update*, November 2011, available from: http://www.gak.co.ke/nibs/web_resources/RWANDA%20GEOTHERMAL%20RESOURCES%20DEVELOPMENT%20COUNTRY%20UPDATE.pdf