CTCN
CLIMATE TECHNOLOGY CENTRE & NETWORK

CTCN Technical Assistance
Request Submission Form

Guidelines:

- This Request Submission Form should be completed by the organisation requesting technical assistance from the Climate Technology Centre & Network (CTCN) in collaboration with the National Designated Entity (NDE) of the country in question
- The Form must be signed by the NDE. Please see updated contact list of NDEs here: http://unfccc.int/ttclear/support/national-designated-entity.html
- The Form can be submitted as a Word file containing a digital signature or as a signed and scanned PDF file in combination with an un-signed Word file
- For requests submitted by multiple countries, all the NDEs of the respective countries shall sign identical Forms before official submission to the CTCN
- NDEs have the opportunity to submit CTCN requests in collaboration with National Designated Authorities (NDAs) for the Green Climate Fund (GCF) if targeting the GCF Readiness Programme.

Requesting country or countries:	Ethiopia
Request title:	Technical assistance for feasibility study of direct utilization of geothermal resources in pilot project areas in Ethiopia. The objective of the study is to demonstrate the feasibility of direct geothermal uses to the public ,communities and industry owners for their developments and bring about its replication in other areas
NDE	Environment Forest and Climate Change Commission (EFCCC), Ms. Yamelakesira Tamene Bekele , Director, Technology Transfer and Technical Support, E mail: yamelakesira5@yahoo.com
Request Applicant:	Ministry of Mines and Petroleum, Geological Survey of Ethiopia, Geothermal Resources Directorate, Solomon Kebede, Director of the Directorate, e mail: solo450354@yahoo.com

Climate objective:

☐ Adaptation to climate change
☐ Mitigation of climate change
☒ Combination of adaptation and mitigation of climate change

Geographical scope:

☐ Community level
☒ Sub-national Rift Valley Region. Parts of Addis Ababa
☐ National
☐ Multi-country

If the request is at a sub-national or multi-country level, please describe specific geographical areas (provinces, states, countries, regions, etc.).

Problem statement related to climate change (up to one page):

Agriculture and agro-industry are still major economic sectors in most developing countries, where they are the main source of livelihoods for 75 percent of the poor (FAO, 2009). However, the people in these countries face famine and poverty, mainly as a result of post-harvest losses and the lack of affordable energy for aquaculture and food processing. Estimates of post-harvest losses (in weight and quality) in developing and less developed countries, such as Ethiopia may reach up to more than 50 percent.

Effects of global climate change have adverse impacts in Ethiopia including in the project areas of interest. These include: Rising poverty levels due to poor harvesting related to droughts. Local green houses such as CO2 and CO emissions in households and agro industries caused by use of charcoal, fuel wood and fossil fuels, also aggravate the situation. Use of fuel wood and charcoal is also aggravating deforestation.

Past and on-going efforts to address the problem (up to half a page):

Ethiopia has huge geothermal potential, estimated to be over 10,000 MW for electrical production and several thousand MWt in direct uses. These resources are distributed mainly in the Ethiopian Rift valley which covers over 150, 000 sq.km and at several places in the highlands, Various studies have been conducted in the past, to understand the type and nature of these resources, including by drilling. The studies indicated that most of the resources are suitable in chemistry and temperature for both for electrical generation and direct uses. However, so far little has been done in terms of utilization of the resources, except a small power plant installed at Aluto Langano prospect and traditional use of the resources for direct applications. Despite the existence of wide suitable resources, the main reasons for luck of modern direct utilization in Ethiopia so far, is mainly related to absence of local capacity to study the technical and financial feasibility of direct utilizations in specific areas of interest.

Specific technology[1] barriers (up to one page):

Direct or non-electric utilization of geothermal energy refers to the immediate use of the heat energy rather than to its conversion to some other form such as electrical energy (Lund, 2004). The primary forms of direct use include swimming, bathing and balneology (therapeutic use), space heating and cooling including district heating, agriculture (mainly greenhouse heating and some animal husbandry), aquaculture (mainly fishpond and raceway heating), industrial processes, and heat pumps (for both heating and cooling). In general, the geothermal fluid temperatures required for direct heat use are lower than those for economic electric power generation. Most direct use applications use geothermal fluids in the low-to-moderate temperature range between 40 and 150 deg C, There are many countries in the world, using naturally occurring steam and hot water for direct uses. Technologies in direct use include: suitable piping systems, heat exchangers, suitable green houses, protected aquaculture, environment, drying systems, evaporators etc. These technologies have been in use in many countries including, Iceland, Japan, Hungary, USA etc. However the selection of technologies depends on the particular situation of the resource and demand in each country. The Engineering and design of equipments also varies from place to place depending on the actual situation. Technical expertise is crucial for developing geothermal systems for direct uses. A critical team of economic analysis's, engineers and other professionals is required. However, there is a continuing shortage of qualified personnel in Ethiopia to move ahead, creating a major technical barrier for direct uses development.

[1] *"**any equipment, techniques, practical knowledge and skills** needed for reducing greenhouse gas emissions and adapting to climate change" (Special Report on Technology Transfer, IPCC, 2000)*

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Sectors:

Please indicate the main sectors related to the request:

☐ Coastal zones	☐ Early Warning and Environmental Assessment	☐ Human Health	☐ Infrastructure and Urban planning
☐ Marine and Fisheries	☐ Water	☒ Agriculture	☐ Carbon fixation
☐ Energy Efficiency	☐ Forestry	☒ Industry	☒ Renewable energy
☐ Transport	☐ Waste management		

Please add other relevant sectors:

Cross-sectoral enablers and approaches:

Please indicate the main cross-sectoral enablers and approaches

☒ Communication and awareness	☐ Economics and financial decision-making	☐ Governance and planning	☒ Community based
☐ Disaster risk reduction	☐ Ecosystems and biodiversity	☒ Gender	

Technical assistance requested (up to one page):

The over all objective of the technical assistance is to economically evaluate, chhose appropriate uses and technologies and make engineering design of direct geothermal uses in specific pilot areas in Ethiopia. This is to be done to create awareness to potential users for the development of the resources. Similar developments will be replicated in other areas, once the feasibility of pilot areas are proven.

A team of expertise on direct use (Economists, Geo scientists, Engineers, Environmentalist etc,) have to study the specific geothermal situation, infrastructure, market etc and select the most suitable potential direct use and make necessary designs interms of piping systems and type, heat exchangers systems and type and make techno economic evaluation of the durect use and propose weather it is feasible or not. On the job training will be given to local professional for sustainable use of the knowledge.

Expected timeframe:

2 months field work

4 months analysis and report writing

TOTAL Six Months

Anticipated gender and other co-benefits from the technical assistance:

The technical assistance would allow subsequent development of the geothermal resources for various direct uses. The activities with gender and other co benefits will include:

Since some of the would be developments will be community based , women could organize in associations and run such business to earn economical benefits and creation of jobs and reduction of poverty

Will reduce the burden of women to travel long distances themselves and carrying their children to look for hot springs for balneological purposes, when such springs are to be developed for same purpose close to their village

Replacement of charcoal and fuel wood by geothermal heat in domestic cooking will minimize the exposure of women to toxic gases and reduce hazards to health.

In some countryside's of Ethiopia women's wait for day long to fetch for Water from thermal steam condensed in a traditional way. The proposed project will facilitate the technology on how to obtain sufficient water from steam condensate and will alleviate women problems, in this regard.

Various species of fish and crocodiles could be raised in warm water aquaculture for maximized production in quantity and quality, which will benefit women as well as the local community.

Direct use in greenhouses will brings about maximized Production rates in heated green houses for cultivating roses and vegetables,

Replacement of furnace oil and fuel wood with cheap geothermal heat, in boilers in industries and agro industries and effective utilization of the geothermal heat in food preservation, in modernizing the traditional use of natural spas etc, will have tremendous economic, social and cultural advantages.

Key stakeholders:

Stakeholders	Role to support the implementation of the technical assistance
EFCCC	Endorses proposal, facilitates the support to be given and Over sight the activities of the project, Monitor and evaluate the technical assistance provided
Request Applicant	Collaborates in implementation, avails existing data, monitors the progress and give administrative and technical support to study team to be assigned
Addis Ababa, University, Technology Faculty	Assigns appropriate professionals as engineering local counterparts to ensure skill transfer for future sustainable use
Ethiopian Electric Power	Avails data on existing or future geothermal power plants to study potential cascaded direct use from waste water after electricity generation
Ministry of water, irrigation and electricity	Works in collaboration in during the study and ultimate implementation of the outcome of the project
Ethiopian Energy Agency	Address regulatory issues for development of the resources and

	create awareness and make promotional act ivies after study is completed
MOFED	Will have an overall support and insight in the implementation of the project
National, regional and international financial institutions	May provide support in implementation and replication of the outcomes of the project
Ethiopian Water Works Design Authority	Avails data on existing hot ground water wells, assigns appropriate professionals as engineering local counterparts to ensure skill transfer for future sustainable use
Regional states of the Federal Democratic Republic of Ethiopia (Southern Nations and Nationalities (SNNP) , Oromia, Afar, Somalia)	Assist in field administrative issues, organize community level participations
Youth associations in Afar, SNNP, Oromia, Somali	Participate in development of the resources after study is completed , as part of job creation and poverty reduction
Green house farmers associations	Participate and invest in developing the resources for green house heating
Fish farming associations	Participate and invest in developing the resources for aqua culture
Tendaho Sugar Factory	Collaborates in implementation of large amount of hot water in the vicinity for sugar processing
National Agro Industries associations	Will implement the results of the study in food processing and preservation
Independent Power Producers and other private sector developers from geothermal	Implement cascaded direct uses of waste water from their future geothermal power plants

Alignment with national priorities (up to 2000 characters including spaces):

Ethiopian has a green development strategy (CRGE, 2011), ensuring of food security to its people and poverty reduction and to be middle income country by 2025, low emission development, reduction of unemployment rates strategies etc.

Direct utilization of geothermal resources is one-way to Ethiopia to meet its greenhouse gases reduction quotas since it will displace the use of biomass and fossil fuels. It is also great for fighting hunger and poverty by enhancing the livelihoods of communities living in geothermal-rich localities.

Reference document (please include date of document)	**Extract** (please include chapter, page number, etc.).
Nationally Determined Contribution (NDC)	Direct alignment and contribution to NDC implementation is required for all CTCN technical assistances. Please include a direct reference to the INDC/NDC document (chapter, page number, etc.).

Technology Needs Assessment	
National Adaptation Plans	
Nationally Appropriate Mitigation Actions	
Add others here as relevant	

Development of the request (up to 2000 characters including spaces):

The Geological Survey of Ethiopia has been engaged in Geothermal Resources Exploration and Assessment. The survey also participates in promoting the results of the study, for development by the public and the private sector. So far, on the bases of the promotion, some investments to develop the resources for power generation have been made. However due to technical limitations no feasibility studies for direct utilizations have been conducted so far.

In a side-event held during the ARGeo-C7 conference in Rwanda organized by UN environment CTCN gave details of this technical assistance for countries. It is said that CTCN is looking to providing technical assistance projects that will use climate-related technology for non-conventional direct use applications of geothermal resources. Specifically, CTCN is keen to provide technical assistance on resource assessment, financing of appropriate technology and assessment of markets for crop drying, chilling of agricultural produce and fish farming, among a host of other applications.

Accordingly, this request is prepared using the CTCN template.

Background documents and other information relevant for the request:

- Ethiopia's Climate-Resilient Green Economy (CRGE) Strategy (2011), Web Site: http://www.undp.org/content/dam/ethiopia/docs/Ethiopia%20CRGE.pdf
- NAMAs Ethiopia, in reference to Ethiopian Green Energy NAMA, Web site: http://www.nama-database.org/index.php/Ethiopia
- John. W Lund (2004): Geothermal Direct Heat Utilization, International Summer School on direct application of geothermal energy in Poland. (Paper is attached)
- Food and Agriculture Organization of the United Nations (FAO) 2015: Uses of geothermal energy in food and agriculture Opportunities for developing countries (paper is attached)

OPTIONAL: Linkages to Green Climate Fund Readiness and Preparatory Support

The CTCN is collaborating with the GCF in order to facilitate access to environmentally sound technologies that address climate change and its effects, including through the provision of readiness and preparatory support delivered directly to countries through their GCF NDA. These actions are in line with the guidance of the GCF Board (Decision B.14/02) and the UNFCCC, particularly paragraphs 4 and 7 of 14/CP.22 that addresses Linkages between the Technology and the Financial Mechanisms[2].

[2] Please see:
https://unfccc.int/files/meetings/marrakech_nov_2016/application/pdf/auv_cop22_i8b_tm_fm.pdf

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The CTCN is therefore implementing some of its technical assistance using GCF readiness funds accessed via the country's NDA. Any application for GCF support, including the amount of support provided, is subject to the terms and conditions of the GCF and should be developed in conjunction with the NDA.

Please indicate whether this request has been identified as preliminarily eligible by the NDA to be considered for readiness support from the GCF.

☐ Initial engagement: The GCF NDA of the requesting country has been engaged in the design of this request and the NDA will be involved in the further process leading to an official agreement for accessing GCF readiness support.

☐ Advanced engagement (preferred): The GCF NDA of the requesting country has been directly involved in the design of this request and is a co-signer of this request, the signature indicating provisional agreement to use readiness national funds to support the implementation of the technical assistance.

NDA name:

Date:

Signature:

Monitoring and impact of the assistance:

By signing this request, I affirm that processes are in place in the country to monitor and evaluate the technical assistance provided by the CTCN. I understand that these processes will be explicitly identified in the CTCN Response Plan and that they will be used in the country to monitor the implementation of the technical assistance following standard CTCN procedures.
I understand that, after the completion of the requested assistance, I shall support CTCN efforts to measure the success and effects of the support provided, including its short, medium and long-term impacts in the country.

Signature:

NDE name:

Date:

Signature:

Yamelakesira Tamene Bekele
Technology Transfer and Technical Support Directorate Director

THE COMPLETED FORM SHALL BE SENT TO THE CTCN@UNEP.ORG

The CTCN is available to answer all questions and provide guidance on the application process.