

INTEGRATED SAFEGUARDS DATA SHEET CONCEPT STAGE

Report No.: ISDSC4762

Date ISDS Prepared/Updated: 07-Jan-2014

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I. BASIC INFORMATION

A. Basic Project Data

Country:	Ethiopia	Project ID:	P133613
Project Name:	Ethiopia Geothermal Sector Development Project (P133613)		
Task Team Leader:	Raihan Elahi		
Estimated Appraisal Date:	12-Feb-2014	Estimated Board Date:	14-Apr-2014
Managing Unit:	AFTG1	Lending Instrument:	Specific Investment Loan
Sector(s):	Other Renewable Energy (80%), Transmission and Distribution of Electricity (20%)		
Theme(s):	Infrastructure services for private sector development (100%)		
Financing (In USD Million)			
Total Project Cost:	284.00	Total Bank Financing:	198.00
Financing Gap:	0.00		
Financing Source			Amount
BORROWER/RECIPIENT			3.20
International Development Association (IDA)			198.00
Strategic Climate Fund Grant			24.50
ICELAND Icelandic International Development Authority			3.30
JAPAN Japan Bank for Internaitonal Cooperation (JBIC)			55.00
Total			284.00
Environmental Category:	A - Full Assessment		
Is this a Repeater project?	No		

B. Project Objectives

The Development Objective of Geothermal Sector Development Project (GSDD) is to increase geothermal electricity generation capacity of Ethiopia.

C. Project Description

The geothermal potential within Ethiopia has long been recognized. Assuming a range of power density in the Rift Valley of about 8 MW/km² at 230°C up to 30 MW/km² at 300°C it is plausible to assume the presence of a huge geothermal energy (estimated to be over 10,000 MW). Under a program that began in 1969, geo-scientific studies were conducted in a number of Ethiopian fields and about eighteen were judged to have potential for high-enthalpy resource development, including electricity generation in the Ethiopian Rift Valley. From these areas, deep drilling was undertaken in Aluto Langanu and Tendaho and detailed surface exploration was completed in four other areas. A combined steam and binary pilot plant with a capacity of 7 MW was installed and commenced power generation in 1998, but due to problems with plant, gathering system and production wells (scaling) production was stopped in the years 2002-2007. In 2008 the plant was partially repaired and is now operating at about 3 MW capacity. Some other areas are at initial stages of surface exploration, such as: Abaya, Corbetti, Tulu Moye, Gedemsa, Kone, Fentale, Dofan, Meteka, Amoisia, Ayelu, Teo, etc (Figure 4).

The proposed Geothermal Sector Development Project (GSDP) will include contributions from the Scaling-up Renewable Energy Program (SREP) which is part of the Strategic Climate Fund (part of the larger Climate Investment Fund, CIF) aimed at demonstrating social, economic, and environmental viability of low carbon development pathways in the energy sector. SREP and IDA resources will leverage funds from Government of Japan, Government of Iceland and Government of Ethiopia to support the development of geothermal sector in Ethiopia. The project will support: geothermal test and production drillings, steam gathering system, power plant, electricity evacuation facilities (substation and transmission lines) of Aluto Langanu and Tendaho geothermal sites.

The Aluto Langanu site is at present drilling exploration wells through an existing project co-financed by IDA and Government of Japan. New developments in the Aluto Langanu site under the proposed project is also planned to be co-financed by IDA and Government of Japan. The Aluto Langanu site has an existing geothermal power plant that is generating 3 MW. The project site is well established with transmission network also staff campsite. However, with the new project, the transmission line will have to be upgraded.

The Tendaho site under the proposed project would benefit from the World Bank - Iceland Compact on geothermal. Tendaho site has been selected as several surface studies have been undertaken on this site. Iceland will finance all necessary technical assistance to make this site ready for test drilling. The project will support capacity building through knowledge transfer and specific workshop and training programs that would be identified during the project preparation phase. Most of the technical assistance will be supported by the World Bank - Iceland Compact. The proposed project will only identify the resource base of the Tendaho project site.

The project will incorporate lessons learned from the Bank's substantial engagement in the country, and more generally from the Bank's wide experience with geothermal project development globally

B. Project Description

The proposed GSDP project consists of four components designed to enhance the potential of sites in Aluto Langanu and Tendaho: (i) Aluto Langanu Production Drilling, (ii) Aluto Langanu Power Plant and Associated Facilities, (iii) Tendaho Geothermal Site Development, (iv) Drilling Rig and Associated Accessories, (v) Capacity Building and Technical Assistance.

Component 1: Aluto Langanu Production Drilling (\$76M: SREP \$24.5M, IDA \$48.5M, GOI \$1.0M and GOE \$2.0M): Bank will finance the operating cost of the drilling rig as well as associated consulting engagement. Further geophysical explorations required to locate the best sites for drillings will be carried out by Iceland, as part of the Iceland – World Bank Compact on geothermal for East-Africa. The SREP National Committee (NC) for Ethiopia (hosted by the MoWE) developed an Investment Plan, in consultation with the multilateral development partners (WB, AfDB, IFC) which was approved by the SREP Sub-Committee in May 2012. The plan included support (US\$ 24.5 M. to be channeled through the Bank) for expanded exploration and production drilling activities in order to prove the geothermal resources in the Aluto Langanu Field. With a target power capacity of 70 MW and an average well capacity of 5 MW (electric), 25% dry wells and 50% reinjection wells, this would require a total of around 26 wells. Of the required 26 wells, 20 wells will be drilled under the proposed project. 4 wells are being drilled under the Additional Financing for Energy Access Project (Cr.4795 ET) and the remaining 2 wells are existing wells that can be used for reinjection. With an estimated average cost for consumables of US\$ 3 million per well, this adds up to US\$ 60 million for the consumables for 20 wells. The SREP allocation could therefore cover nearly 40% of these costs. The production wells will be drilled using advanced technology, directionally down to a nominal depth of 2500 meter to maximize the output per well in the range of 5-10 MW.

Component 2: Aluto Langanu Power Plant and Associated Facilities (\$101.5M: GOJ \$55M, IDA \$46.5M): The associated facilities of the Aluto Langanu geothermal power plant, such as, steam gathering system, transmission lines, substations, etc. will be financed by the Bank. The cost of these associated facilities is estimated to be about US\$ 46.5 million. The 70 MW power plant at Aluto Langanu under this proposed project will be funded by the Government of Japan in two phases. At the first phase a 35 MW power plant estimated to cost about US\$ 55 million will be funded by Gov. of Japan for the Aluto Langanu site. Construction for the first unit should start in 2015 (when about 13 wells have been drilled), while the second unit could be constructed about two years later. It is common practice to operate the first unit for some time to better understand the potential and characteristics of the reservoir, before a decision on constructing a second power plant is taken. Japan might also finance the second 35 MW power plant in Aluto Langanu, if the drilling of wells progresses successfully and the first 35 MW power plant operates satisfactorily.

Component 3: Tendaho Geothermal Site Development (\$3.0M: GOI \$1.8M, GOE \$1.2M): Iceland will undertake reconnaissance, surface exploration and associated geophysical and geochemical studies to prepare the Tendaho geothermal site for test drilling. Tendaho is situated in Afar Region near Semera, at the North-Eastern part of Ethiopia. The Tendaho Geothermal Site is within a 100 square kilometre area and contains more than one geothermal field. So far, most exploration has focused on the Dubti geothermal field in Tendaho. In the years between 1993 and 1998, 6 test drillings confirmed the existence of a high temperature, shallow reservoir with good flow rates. The utilization of this reservoir could theoretically be very economical, since drillings down to a depth of 500 meters would require low level of investments, time and heavy machinery. During the preparation of the proposed project, possibilities to raise additional funds to undertake test drillings in Tendaho will be explored.

In the near future and according to information from EEPCo and the GSE, the French (AFD) plans to perform a compilation of historic data to get a basis to decide how and when to further support the project at Dubti, drill several test wells at Dubti and do a feasibility study for the power project. In discussions with the AFD it became clear that AFD and World Bank planned timelines were quite different, and since there are several other extraordinary geothermal fields in the Tendaho site, future

support from Bank's side might be aimed at sites north and south of Dubti, namely Ayrobera and Alalobeda. There, geophysical exploration will have to be done to establish a test drilling program and find the best drilling sites. Again, this could be realized through the Iceland – World Bank Compact on geothermal for East-Africa. Possibly in cooperation with the GSE, Iceland could explore both sites and select the better one for further development. In future, this site could be supported with a set of four test drillings and several production drillings. Well-head power plants could also be installed on production wells at Tendaho, which will provide geophysical data of the reservoir and also produce electricity during the development phase.

Component 4: Drilling Rig and Associated Accessories (IDA \$55M): Bank will finance a full size and modern electric drilling rig with equipment and accessories for directional drilling. This rig will be used at the Aluto Langanu project site along with the drill that is now being used for the exploration drilling. Use of two rigs will increase the implementation pace of the project.

At present, GSE owns two drilling rigs, which were purchased several years ago but was not used for more than a decade. One of these drilling rigs has already been refurbished and is being used at the Aluto Langanu site. The other rig is in storage and GSE should investigate whether it could also be refurbished economically. Given that Ethiopia is planning to expand its geothermal resource base to generate electricity, it should consider ensuring access to several drilling rigs in order to develop several sites in parallel.

Component 5: Capacity Building and Technical Assistance (GOI \$0.5M): Iceland will provide technical assistance to EEPCO to determine a suitable technical specification for the drilling rig that will be procured under the project. Iceland will also help EEPCO, GSE and the Ministry of Water and Energy in identifying and participating at suitable training programs to enhance their capacity on geothermal development. In addition to the specific technical assistance and capacity building support that Iceland will provide to Ethiopia under this component, it will further ensure that proper technology transfer takes place through its support provided to other components of the project.

D. Project location and salient physical characteristics relevant to the safeguard analysis (if known)

GSDP will be located in the Afar Depression and Ethiopian Rift Valley, specifically the project will support: geothermal test and production drillings, steam gathering system, power plant, electricity evacuation facilities (substation and transmission lines) of Aluto Langanu and Tendaho geothermal sites. Several scientific studies have been undertaken on these sites, indicating minimal and short term impacts on the environment from deep drilling. Potential impacts on the environment might also be physical, chemical, socio-economic and cultural; and a detailed ESIA (emphasizing social assessment) will be undertaken in both sites before the commencement of the proposed project.

E. Borrowers Institutional Capacity for Safeguard Policies

There is staff in place within the EEPCo to manage safeguards issues and this will be further strengthened under GSDP with dedicated staff for safeguards recruited and placed on project sites. If the project determines that OP/BP 4.10 on Indigenous People is triggered, there would be the need to strengthen the capacity of EEPCo to document, report and monitor relevant safeguard instruments.

F. Environmental and Social Safeguards Specialists on the Team

Edward Felix Dwumfour (AFTN3)

Chukwudi H. Okafor (AFTCS)

II. SAFEGUARD POLICIES THAT MIGHT APPLY

Safeguard Policies	Triggered?	Explanation (Optional)
Environmental Assessment OP/ BP 4.01	Yes	GSDP will finance geothermal testing and production drilling, steam gathering system, power plant, electricity evacuation facilities (substation and transmission lines) of Aluto Langano and Tendaho geothermal sites. The civil works are expected to have major environmental impacts. ESIA's for two of the sites (Alalobad-Tendaho and Aluto) will be prepared, consulted upon, and disclosed before appraisal.
Natural Habitats OP/BP 4.04	TBD	The sites are close to some natural habitats. The ESIA's will advise on the impacts and mitigation measures.
Forests OP/BP 4.36	TBD	The sites may affect forests. The ESIA's will advise on the impacts and mitigation measures.
Pest Management OP 4.09	No	The project does not involve pest management measures.
Physical Cultural Resources OP/ BP 4.11	Yes	There are few areas in the Ethiopian lowlands that constitute cultural property in the sense described in OP. 4.11. The project would involve excavation or inundation, where chance finds might occur. Some of geographic sites may also have cultural relevance. However, activities will be carried out only in areas selected by government and local citizens and would give great importance to safeguarding their cultural property. The ESIA's will include mitigation measures or guidance for dealing with physical cultural resources.
Indigenous Peoples OP/BP 4.10	TBD	The GoE recently agreed with the Bank on Terms of Reference for a screening of ethnic groups in five regions, including Afar, against the defining criteria in OP 4.10, and this work is completed and the WB and government are discussing the recommendations. A social assessment will be undertaken. If it is determined that the GSDP involves indigenous peoples, the required due diligence will be undertaken.
Involuntary Resettlement OP/BP 4.12	Yes	GSDP interventions may involve acquisition of land and /or restriction of access to communal natural resources. RPFs for the two sites will be

		developed, consulted upon, and disclosed before appraisal.
Safety of Dams OP/BP 4.37	No	GSDP will not finance any investments aimed at dam construction.
Projects on International Waterways OP/BP 7.50	No	The project does not involve international waterways.
Projects in Disputed Areas OP/BP 7.60	No	The project is not being implemented in any disputed areas.

III. SAFEGUARD PREPARATION PLAN

A. Tentative target date for preparing the PAD Stage ISDS: 29-Nov-2013

B. Time frame for launching and completing the safeguard-related studies that may be needed. The specific studies and their timing¹ should be specified in the PAD-stage ISDS:
TBD.

IV. APPROVALS

Task Team Leader:	Name: Raihan Elahi	
<i>Approved By:</i>		
Regional Safeguards Coordinator:	Name: Alexandra C. Bezeredi (RSA)	Date: 07-Jan-2014
Sector Manager:	Name: Lucio Monari (SM)	Date: 07-Jan-2014

¹ Reminder: The Bank's Disclosure Policy requires that safeguard-related documents be disclosed before appraisal (i) at the InfoShop and (ii) in country, at publicly accessible locations and in a form and language that are accessible to potentially affected persons.