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Report No: 83994-ET

# INTERNATIONAL DEVELOPMENT ASSOCIATION

### PROJECT APPRAISAL DOCUMENT

ON A

# PROPOSED CREDIT IN THE AMOUNT OF SDR 114 MILLION (US\$ 176 MILLION EQUIVALENT)

# AND A

# PROPOSED SCF-SREP GRANT IN THE AMOUNT OF US\$24.5 MILLION

# TO THE

#### FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA

FOR A

## GEOTHERMAL SECTOR DEVELOPMENT PROJECT (GSDP)

April 4, 2014

Africa Energy (AFTG1) Africa Region

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# CURRENCY EQUIVALENTS

(Exchange Rate Effective February 28, 2014)

Currency Unit = Ethiopian Birr ETB 19.06 = US\$1 US\$ 1.54 = SDR 1

# FISCAL YEAR

# July 8 – June 7

# ABBREVIATIONS AND ACRONYMS

AETDPD	Alternative Energy Technology Development and Promotion
AfDB	African Development Bank
AFD	French Development Agency
BADEA	Arab Bank for Economic Development in Africa
BSES	Bombai Sub-Urban Electric Supply
CFL	Compact Fluorescent Lamp
CIF	Climate Investment Fund
CPS	Country Partnership Strategy
CRGE	Climate Resilient Green Economy
CSRP	Civil Service Reform Program
DA	Designated Account
EAPP	East Africa Power Pool
EAREP II	Electricity Access and Rural Electrification Project Phase II
EEA	Ethiopia Electric Authority
EELPA	Ethiopia Electric Light and Power Authority
EEPCo	Ethiopian Electric Power Corporation
EEP	Ethiopian Electric Power
EEU	Ethiopia Electric Utility
EFYs	Ethiopia Fiscal Years
EMCP	Expenditure Management and Control Sub-Program
EMPs	Environmental Management Plans
EMU	Environment Management Unit
ENREP	Electricity Network Reinforcement and Expansion Program
EPRDF	Ethiopian People's Revolutionary Democratic Front
ESIA	Environmental and Social Impact Assessment
FITs	Feed-in-tariffs
FM	Financial Management
FY	Fiscal Year
GDP	Gross Domestic Product
GSDP	Geothermal Sector Development Project
GNI	Gross National Income
GoE	Government of Ethiopia
GoI	Government of Iceland

GoJ	Government of Japan
GRM	Grievance Redress Mechanism
GSE	Geological Survey of Ethiopia
GTP	Growth and Transformation Plan
GWh	Giga Watt hours
HPR	House of Peoples' Representatives
ICFIDA	The Icelandic International Development Agency
IDA	International Development Association
IFAC	International Federation of Accountants
IFC	International Finance Corporation
IFRe	Interim Financial Reports
	Information Network Security Agency
	Japan International Cooperation Agency
IIT	Just in Time
JII VWh	Vilowett hour
N WII MC	Mana a serie ant Contractor
MDC	Management Contractor
MDG	Millennium Development Goals
MIGA	Multilateral Investment Guarantee Agency
MofeD	Ministry of Finance and Economic Development
MoU	Memorandum of Understanding
MoWE	Ministry of Water and Energy
MoWIE	Ministry of Water, Irrigation and Energy
MW	Megawatt
NBE	National Bank of Ethiopia
NC	National Committee
NCB	National Competitive Bidding
NDF	Nordic Development Fund
NHPC	National Hydroelectric Power Corporation
OFAG	Office of Federal Audit General
PAPs	Project Affected Persons
PASDEP	Program for Accelerated and Sustainable Development
PC	Project Coordinator
PDO	Project Development Objective
PEFA	Public Expenditure Financial Accountability
PFM	Public Financial Management
PGCIL	Power Grid Corporation of India Limited
PIU	Project Implementation Unit
PPA	Power Purchase Agreement
RAP	Resettlement Action Plan
REES	Rural Electrification Executive Secretariat
REF	Rural Energy Fund
RPF	Resettlement Policy Framework
SBD	Standard Bidding Document
SNNPR	Southern Nations, Nationalities and Peoples
SOE	Statement of Expenses
SREP	Scaling-up Renewable Energy Program
	0 -r 0 -r 0

SSA	Sub Saharan Africa
TEC	Tender Endorsing Committee
TORs	Terms of Reference
UEAP	Universal Electricity Access Program
UN	United Nations
USD	United States Dollars
USG	United States Government
WBG	World Bank Group

Regional Vice President:	Makhtar Diop
Country Director:	Guang Zhe Chen
Sector Director:	Jamal Saghir
Sector Manager:	Lucio Monari
Task Team Leader:	Raihan Elahi

# ETHIOPIA Geothermal Sector Development Project (P133613)

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# PAD DATA SHEET

Ethiopia Ethiopia Geothermal Sector Development Project (P133613) PROJECT APPRAISAL DOCUMENT

# AFRICA

# AFTG1

# Report No.: PAD765

Basic Information						
Project ID	EA Category			Team Leader		
P133613	A - Full Asse	ssment		Raihan Elahi		
Lending Instrument	Fragile and/or	Capacity	Constrair	its [ ]		
Specific Investment Loan	Financial Inte	rmediaries	[]			
	Series of Proj	ects [ ]				
Project Implementation Start Date	Project Imple	mentation	End Date			
01-Oct-2014	29-Jun-2018					
Expected Effectiveness Date	Expected Clos	sing Date				
01-Oct-2014	29-Jun-2018					
Joint IFC						
No						
Sector Manager Sector Dire	ector	Country I	Director	Regional Vice President		
Lucio Monari Jamal Sagh	nir	Guang Zh	ne Chen	Makhtar Diop		
Borrower: Government of Ethiopia						
Responsible Agency: Geological Surv	vey of Ethiopia	l				
Contact: Ato Solomon Keb	ede	Title:	Director	•		
Telephone No.: 251-911-935028		Email:	solo450	354@yahoo.com		
Responsible Agency: Ethiopian Elect	ric Power Corp	ooration				
Contact: Ato Azeb Asneke		Title:	Chief E	xecutive Officer		
Telephone No.:		Email:				
Project	Financing I	Data(in US	SD Milli	on)		
[] Loan [X] Grant	[] Guar	antee				
[X] Credit [] IDA Grant	[] Other	r				

Total Projec	t Cost:	216.	00		Total Bar	nk Finar	ncing	: 176	5.00		
Financing G	ap:	0.00									
Financing S	ource										Amount
BORROWER/RECIPIENT											12.00
International Development Association (IDA)											26.63
Strategic Climate Fund Grant											24.50
ICELAND Icelandic International Development Authority										3.50	
IDA recomm	nitted as a	a credit									149.37
Total											216.00
Expected D	isbursem	nents (in V	USD Milli	on)							
Fiscal Year	2014	2015	2016	2017	2018	2019	-	2020			
Annual	0.00	0.50	9.50	50.00	) 50.00	50.50	4	40.00			
Cumulative	0.00	0.50	10.00	60.00	) 110.00	160.50	)	200.50			
Proposed D	evelonm	ent Obiec	ctive(s)								
The Develop	oment Ob	jective of	Geotherm	nal Sec	tor Developme	ent Proje	ect (C	GSDP) is	to dev	velop	
geothermal i	resource f	for electric	city genera	ation ii	n Ethiopia.						
geothermal i	s	for electric	city genera	ation ir	i Ethiopia.						
Component	s Name		city genera	ation ir	i Ethiopia.				Cost	(USD	Millions)
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Total		100			
✓ I certify that there is no Adaptation applicable to this project	and Mitigation	Climate Change C	Co-ben	efits information	on
Themes	1.4.0.0				
Theme (Maximum 5 and total % must equ	ual 100)			- /	
Major theme	Theme			%	
Financial and private sector development	Infrastructure se development	rvices for private se	ctor	100	
Total				100	
	Compliance	<u>j</u>			
Policy					
Does the project depart from the CAS in or respects?	content or in othe	r significant	Yes	s [ ] No [	X ]
Does the project require any waivers of B	ank policies?		Yes	s [ ] No [	X ]
Have these been approved by Bank mana	gement?		Ye	s [ ] No [	X ]
Is approval for any policy waiver sought	Ye	s [ ] No [	X ]		
Does the project meet the Regional criteri	a for readiness fo	r implementation?	Ye	s [ X ] No [	]
Safeguard Policies Triggered by the Pr	oject		Yes	No	
Environmental Assessment OP/BP 4.01			X		
Environmental Assessment OP/BP 4.01 Natural Habitats OP/BP 4.04			X	X	
Environmental Assessment OP/BP 4.01 Natural Habitats OP/BP 4.04 Forests OP/BP 4.36			X	X X	
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Source Of Fund	Name	Туре
IDA	Submit acceptable EEPCo audit report for the year ended July 7 2013.	Approval
Description of Condit	ion	
Source Of Fund	Name	Туре
IDA	Report on the progress of splitting the accounts.	Approval
Description of Condit	ion	·
Report on the progress transactions since the s action plan or mileston	of splitting the accounts, the accounting systems includ plit and the way forward. This report/update is expected es with expected outputs.	ing the recorded to include time bounded
Source Of Fund	Name	Туре
IDA	Report on the JIT- Report.	Approval
<b>Description of Condit</b>	ion	
Report on the progress collaboration with the forward; In this regard internal auditor as agre	of addressing the findings of the JIT report undertaken former EEPCo and how they are dealt with since the spl specific reporting will be made on the recruitment of fin ed under ENREP.	by the World Bank in it and proposing the way nancial advisor and
Source Of Fund	Name	Туре
IDA	Automation updates	Approval
Description of Condit	ion	•
EEP to provide a prog	ress report on all short and long term automation initiation initiation in the set of th	ves, anticipated changes
with milestones, their l including those being f	inanced by the World Bank, both active and in the pipel	ine.
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EEP will prepare	submit and	agree a	project Audit ToR
LLI will propuio,	Sublint und	ugi ce u	project muant rone.

Source Of Fund	Name	Туре
IDA	Detail costing of the project	Approval

## **Description of Condition**

EEP will submit a detail project costing for the entire life of the project, disaggregated for each FY.

Source Of Fund	Name	Туре
IDA	Updated EEP Finance Procedures and Accounting Manual	Effectiveness

### **Description of Condition**

Submit an updated EEP Finance Procedures and Accounting Manual which incorporates the relevant FM issues including budgeting, accounting and internal control arrangements for the entity clearly indicating that Projects will use the Manual.

Source Of Fund	Name	Туре
IDA	Accountant assigned	Effectiveness

# **Description of Condition**

This project will have one senior accountant and one assistant accountant assigned at the PIU to handle the financial management functions of the project.

Team Composition							
Bank Staff							
Name	Title	Specialization	Unit				
Zoe Kolovou	Lead Counsel	Lead Counsel	LEGAM				
Nikolai Soubbotin	Lead Counsel	Lead Counsel	LEGAM				
Raihan Elahi	Senior Energy Specialist	Team Lead	AFTG1				
Edward Felix Dwumfour	Senior Environmental Specialist	Senior Environmental Specialist	AFTN3				
Chukwudi H. Okafor	Senior Social Development Specialist	Senior Social Development Specialist	AFTCS				
Rolande Simone Pryce	Senior Operations Officer	Senior Operations Officer	AFTG2				
Chita Azuanuka Oje	Program Assistant	Program Assistant	AFTG1				
Lemlem Workalemahu	Program Assistant	Program Assistant	AFCE3				
Abiy Demissie Belay	Sr Financial Management Specialist	Sr Financial Management Specialist	AFTME				
Issa Diaw	Sr Power Engineer	Sr Power Engineer	AFTG1				
Tesfaye Ayele	Senior Procurement Specialist	Senior Procurement Specialist	AFTPE				
Rahul Kitchlu	Energy Specialist	Energy Specialist	AFTG1				
Federico Querio	Energy Specialist	Energy Specialist	SEGEN				

Non Bank Sta	ff					
Name	Name Title			Office Phone		City
Yusuf Haji Ali		Consultant - Power Engineer				
Gordon Bloom	quist	Geotherm	al Specialist			
Locations						
Country	First Administ Division	rative	Location	Planned	Actual	Comments
Ethiopia	Oromia Region		Aluto			Geothermal Site
Ethiopia	Afar Regi	on	Alalobad			Geothermal Site

#### I. STRATEGIC CONTEXT

#### A. Country Context

1. **Ethiopia is a large and diverse country.** It is located in the Horn of Africa and is landlocked with an area of 1.1 million square kilometers—about the size of France and Spain combined. Its bio-physical environment includes a variety of contrasting ecosystems, with significant differences in climate, soil properties, vegetation types, agricultural potential, biodiversity and water resources. Ethiopia is a country of many nations, nationalities and peoples, with a total population of 91.7 million (2012)<sup>1</sup>. Only 17 percent of the population lives in urban centers, the great majority of them in Addis Ababa. At a current annual growth rate of 2.6 percent, Ethiopia's population is estimated to reach 130 million by 2025, and is projected by the United Nations (UN) to be among the world's top ten, by 2050. Ethiopia is vulnerable to terms of trade shocks from international food and fuel prices, and to large domestic weatherrelated shocks as the 2011/12 East Africa drought demonstrated.

2. Ethiopia has experienced strong economic growth over the past decade. Economic growth averaged 10.7 percent per year in 2003/04 to 2011/12 compared to the regional average of 5.4 percent. Growth reflected a mix of factors, including agricultural modernization, the development of new export sectors, strong global commodity demand, and government-led development investments. Private consumption and public investment have driven demand side growth, with the latter assuming an increasingly important role in recent years. On the supply side, growth was driven by an expansion of the services and agricultural sectors, while the role of the industrial sector was relatively modest. More recently annual growth rates have declined slightly, but still remain at high single-digit levels. Growth in the export of goods has also moderated in recent years and a decline was observed in 2012/13 for the first time since 2008/09. There have been bouts of high inflation in recent years and, while inflation is currently much lower, keeping it down remains a major objective for monetary policy.

Ethiopia is one of the world's poorest countries, but has made substantial progress 3. on social and human development over the past decade. The country's per capita income of US\$370 is substantially lower than the regional average of US\$1,257 and among the ten lowest worldwide<sup>2</sup>. Ethiopia is ranked 173 out of 187 countries in the Human Development Index (HDI) of the United Nations Development Program (UNDP). However, high economic growth has helped reduce poverty, in both urban and rural areas. Since 2005, 2.5 million people have been lifted out of poverty, and the share of the population below the poverty line has fallen from 38.7 percent in 2004/05 to 29.6 percent in 2010/11 (using a poverty line of close to US\$1.25/day). However, because of high population growth the absolute number of poor (about 25 million) has remained unchanged over the past fifteen years. Ethiopia is among the countries that have made the fastest progress on the Millennium Development Goals (MDGs) and HDI ranking over the past decade. It is on track to achieve the MDGs related to gender parity in education, child mortality, HIV/AIDS, and malaria. Good progress has been achieved in universal primary education, although the MDG target may not be met. The reduction of maternal mortality remains a challenge.

<sup>&</sup>lt;sup>1</sup> Source: United Nations. According to the Ethiopian Central Statistics Office, the population figure is 82.6 million.

<sup>&</sup>lt;sup>2</sup> Gross National Income, World Bank Atlas Method.

4. The Government of Ethiopia is currently implementing an ambitious Growth and Transformation Plan (GTP) 2010/11-2014/15, which sets a long-term goal of becoming a middle-income country by 2023, with growth rates of at least 11.2 percent per annum during the plan period. To achieve the GTP goals and objectives, the Government of Ethiopia (GoE) has followed a "developmental state" model with a strong role for the government in many aspects of the economy. It has prioritized key sectors such as industry and agriculture, as drivers of sustained economic growth and job creation. The GTP reaffirms the government's commitment to human development. Development partners have programs that are broadly aligned with GTP priorities.

#### **B.** Sectoral and Institutional Context

#### Energy Sector Achievements in the Last Decade

5. Since the implementation of the last five year plan, the electricity sector in Ethiopia has been growing at a rapid pace. More than 41 percent of rural towns and villages were connected to the grid and the number of consumers connected grew from 800,000 in 2005, to more than 2.1 million in 2012. With the increase in access, demand for electricity also increased. Average demand growth rate of electricity was above 15 percent per annum during 2005-2010 (about 25 percent and 32 percent, in FY2010 and FY2011, respectively). This growth in demand has outpaced the increase in electricity generation and transmission capacity expansion.

6. **To address the supply shortfall caused by the rapid increase in access and demand, the GoE undertook several short term measures.** The GoE imposed a moratorium on connecting new consumers from late 2008 to 2010 to manage the rapid increase in electricity demand. Demand side management initiatives including free distribution of about 5 million CFL lamps to replace incandescent lamps were undertaken which reduced the peak demand by 80MW within a short period. Electricity supply to households and industrial consumers was rationed and the sector rented expensive emergency fossil fuel fired thermal plants to bridge the gap between supply and demand.

7. The Ethiopian Electric Power Corporation (EEPCo), the vertically integrated utility commissioned three large hydro power plants in 2010 to augment supply over the long term. The commissioning of Tekeze (300 MW), Gibe II (420 MW) and Beles (460 MW) power plants increased EEPCo's power generation capacity from about 850 MW to above 2,000 MW. In FY2011, EEPCo's peak demand was around 1,100 MW which was well within its increased capacity. The EEPCo further embarked on an aggressive demand side management by replacing existing incandescent lamps with CFLs, a continuation of the initiative undertaken in 2009.

#### Institutional Restructuring to Transform the Sector

8. The steep growth in the electricity sector since 2005 (number of consumers tripled and generation capacity doubled) introduced a significant management constraint in the EEPCO. Further, EEPCO failed to close its books on time and it repeatedly received qualified audits. As EEPCo's accounts lost reliability, it failed to justify tariff revisions. The 2006 tariff revision set the tariff at the equivalent of US\$ 0.06/kWh. Electricity tariffs in Birr/Kwh remained unchanged since then, but as the Birr depreciated significantly over the years the average electricity tariff in Ethiopia is now less than US\$ 0.03/kWh. This tariff level did not allow EEPCo to operate as a sustainable business entity. However, the GoE was reluctant to revise the tariff without getting reliable information on EEPCo's performance efficiency level and without improving EEPCO's management capacity.

9. The GoE restructures EEPCo with a view to transforming the sector. In December 2013, the EEPCo was unbundled, creating two public enterprises, namely Ethiopian Electric Power (EEP) and Ethiopian Electric Utility (EEU). The objective of this restructuring was to create modern entities capable of providing efficient, reliable and quality services. According to the Regulations approved by the Council of Ministers, the EEP will be responsible for construction and operation of the power generation and transmission part of the sector, while the EEU will be responsible for construction and operation of power distribution and sales. The EEPCo's balance sheet will be split and assets and liabilities transferred to each of new entities consistent with the scope of its responsibilities. The newly established entities will start operations with clean balance sheets, as the GOE will ensure that pre-existing qualifications will be resolved or written off before EEPCo's assets are transferred. Both these enterprises will report to the Board that used to control the EEPCo. Both EEP and EEU have finalized their staffing organogram and have filled their respective management positions following a competitive selection process. At present, selection is ongoing to fill the technical positions, which is expected to be completed by June 2014. In the meantime, all EEPCo employees have been requested to continue to work in their respective positions to avoid disruptions to the day to day operations during this transition period.

10. To introduce modern utility practices in these two new entities and to provide needed support in the transition period, the GoE has engaged a Management Contractor. In August of 2013, the GoE signed a management contract with the Power Grid Company of India (PGCI) for period of two and a half years. The scope of management contract includes the generation and transmission operations that fall under the responsibility of EEP, and all aspects of distribution that falls under the responsibility of EEU. While the management contract is in place, EEP management will only be responsible for the generation and transmission projects that are under construction. The GoE provides a direct capital subsidy to the Universal Electricity Access Program (UEAP) which falls under the control of the EEP, therefore EEP will retain the responsibility for constructing the rural distribution network. More detail discussion on the institutional reform is covered in Annex 2.

11. The GoE established Ethiopian Energy Authority (EEA) through Energy Proclamation number 810/2013 published on January 27, 2014 and replaced the former Ethiopian Electric Agency established by the 1997 proclamation. The new EEA covers the electricity as well as energy efficiency activities and is authorized issue and renew license to operators on all segments of electricity operation – generation, transmission, distribution, sales, exports and imports. However, with regard to setting the national grid tariff, its authority extends to making a recommendation to the GoE. Tariff approval is the responsibility of the Council of Ministers. The EEA is governed by a Board of Directors and has specific power to approve the regulatory directives as well as proposals related to the "off-grid national" tariff and the tariff determination guidelines, the national energy efficiency strategy and program, model power purchase agreements (PPAs) and model network agreements.

#### Energy Sector Development in the Next Five Years

12. Within the context of the GTP, the energy sector strategy calls for further expansion of sector and large scale investments in energy infrastructure. To achieve a target of 11 percent GDP growth over the next five years, the GoE intends to promote the rapid development of the industrial and service sectors, expand electricity coverage universally and become a regional power hub. Consequently, the domestic demand for electricity is expected to grow by more than 25 percent per year. To keep up with the anticipated demand, the GoE wants to harness the abundant renewable energy resources available in Ethiopia (about 45,000 MW hydro potential, 5,000+ MW geothermal potential and 5,000 MW wind power potential). The GoE is investing in additional generation capacity with several new large hydropower projects under various stages of construction (target of 8,000 MW of installed capacity by 2015) and plans to exploit other renewable resources such as geothermal and wind.

Description of Target	2009/2010	2014/2015
Hydropower Capacity (MW)	2,000	8,000
Distribution Lines (Km)	126,038	258,000
Transmission Lines (Km)	10,500	18,000
No. of Consumers (Million)	2	4
Coverage (% of Population)	41	75

Table 1: Major GTP Targets for Energy Sector

Source: GTP, Government of Ethiopia (Nov 2011)

13. To address the challenge of low access rates, the GoE plans to scale up grid connectivity as well as expand off-grid energy programs. The target, as set forth in the GTP, is to expand the coverage of electricity services to 75 percent of towns and villages and to increase the number of consumers connected to the grid to 4 million by 2015. The GoE plans to expand the grid through intensification programs. It also plans to increase the adoption of off-grid renewable energy and energy efficiency products for households who are unable to afford the cost of grid connection, or are far from grid connected areas.

14. The anticipated increase in domestic and export demand as well as the associated investment in supply will mean that the energy sector in Ethiopia will continue to grow at a rapid pace in the coming years. The GoE has plans to ramp up electricity exports - the Djibouti interconnector was commissioned in 2011, Sudan started to import electricity from 2012, and Kenya is expected to start importing from 2017. Figure 1 shows the estimated increase in installed capacity and energy produced based on current and expected projects under construction in Ethiopia (FY2006-20).

15. The Bank will continue to support the GoE in its efforts to develop the energy sector to realize its development goals. The Bank has financed or is financing transmission infrastructure to facilitate regional energy trade, specifically, the Ethiopia – Sudan transmission interconnection, which is now operating and the transmission interconnection between Ethiopia and Kenya, which will form the backbone of East Africa Power Pool (EAPP). The latter project is co-financed by African Development Bank (AfDB) and French Development Agency (AFD). The Bank financed projects under implementation include: (i) electricity access for rural people in Ethiopia, through grid based and off grid based solar home systems and modern lighting

initiatives; (ii) renovation of the urban distribution networks in the 8 largest cities in Ethiopia to increase efficiency, reliability and capacity of the network capacity, and (iii) capacity building. Development of the existing geothermal resource potential is the next step in the GoE's energy sector expansion strategy.



Figure 1: Projected Electricity Demand and Supply 2006-20



Source: EEPCo Planning Department and World Bank estimates

16. Diversification of generation resources is an essential part of the expansion strategy.

At present, more than 97 percent of Ethiopia's electricity generation is derived from hydropower resources, and is entirely dependent on rainfall. Rainfall in Ethiopia has wide seasonal variation and is further vulnerable to fluctuations due to climate change. Figure 2 shows that from April to September, Ethiopia gets substantial rainfall with the peak rainfall occurring between July – August. So with drought in any one year, its full hydropower capacity is exposed to substantial production risk. In order to ensure reliability of clean electricity for the expansion of access and regional power trade, the GoE plans to scale-up the exploitation of geothermal resources. This would not only improve energy security and economic development for Ethiopia, but will also enhance climate resilience and development of a green economy. Availability of geothermal generation will change the dispatch mix in Ethiopia, where base load could be supported by

geothermal energy and pick load by hydropower. This will not only increase Ethiopia's ability to reliably export electricity to neighboring countries with similar or different peak demand period compared to Ethiopia, but will also increase its ability to increase access domestically and ensure reliable supply of electricity.



Figure 2: Average Monthly Rainfall in Ethiopia (1901 – 2009, mm)

Source: The World Bank

17. The GoE's Climate Resilient Green Economy (CRGE) Strategy requires Ethiopia to have at least ten percent non-hydro renewable energy to optimize generation mix. This will ensure availability of sufficient energy resources throughout the year for economic growth and access enhancement. To this end, increased exploration and exploitation of geothermal resources, which is the second largest renewable energy resource in Ethiopia, is critical.

18. The risk profile of geothermal projects at the initial stage of development is high and test drilling and well testing is expensive. Even when developing a geothermal project through private sector, initial investment cost to confirm the geothermal resource is usually financed through high cost equity. If the electricity tariff structure of the country is subsidized then that poses additional challenges to the developer. A constrained sector cash flow reduces the comfort level of the developer, who then tends to add a risk premium to the PPA tariff to ensure appropriate return.

19. Given this risk structure, several models for developing geothermal projects have emerged in East Africa. Developing countries usually find it challenging to raise financing for geothermal development. In general, a preferred development model has emerging and is

summarized in Figure 3. Public sector leadership and funding seems to be necessary to bring a geothermal project from pre-feasibility to the post-test drilling phase. A Public Private Partnership may also work well, while a pure private sector initiative would require a Government to agree on a Power Purchase Agreement, before knowing the actual cost of accessing the geothermal resource. After the test and exploration drillings and well testing results are available, the perception of risk is substantially reduced. As such the drilling of production and injection wells and the construction of the power plant could be developed entirely by the public sector, through a public private partnership or entirely by the private sector. Figure 3 illustrates the risk and investment profile of geothermal project development.



Figure 3: Risk and Investment Profile of Geothermal Project Development

Source: The World Bank

20. Geothermal resource development requires public sector support to reach commercial scale success as it is a relatively new technology in the region with relatively higher risk of development. As of now, there has been limited identification of resource potential beyond initial inventory and surface reconnaissance studies. Public funds are required for test and appraisal well drilling and testing for commercial quality (steam) resource identification, including information on geology, geochemistry, geophysics, etc. Moreover, one or more functional geothermal power plants in Ethiopia would demonstrate the resource's potential and encourage private sector participation in the sector in the medium to long term.

21. Ethiopia's experience in developing large scale energy generation projects is generally limited to the hydropower sector. However, when it comes to the geothermal sector, the GoE needs to build capacity by investing in human resources, training, and related initiatives in order to fully develop the resource base and handle the current and forthcoming growth in the sector. Other countries in the Rift Valley region, such as Kenya, have adopted a similar approach and have invested in domestic capacity building efforts.

22. The GoE has adopted a multipronged approach to develop its geothermal sector. It has requested several development partners to support financing development of a geothermal site from surface exploration to electricity generation and transmission and the GoE has also invited the private sector to do the same on a different geothermal site. Both these projects provide an opportunity for the GoE to understand the benefits and constraints of developing geothermal resource in Ethiopia following different financing and investment models. Lessons learned during the implementation of donor financed and private sector financed projects, will feed into the GoE's framework to support the efficient production of electricity from its geothermal resources. This framework is being developed with the support of development partners and it will help to determine the optimal level of private sector participation in the exploration and production phases of geothermal development in Ethiopia and identify the regulatory, institutional, and capacity requirements needed to attract private investment.

#### Partnerships Supporting Geothermal Development

23. The GoE, with support from the WBG raised US\$ 26 million from Scaling-up Renewable Energy Program (SREP) for geothermal development. The SREP is a targeted program of the Strategic Climate Fund (SCF), which is one of two funds within the framework of the Climate Investment Funds (CIF) supporting Low Income Countries. The SREP was established to scale up the deployment of renewable energy solutions and expand renewables markets in the world's poorest countries. It aims to pilot and demonstrate the economic, social, and environmental viability of low carbon development pathways. The GoE will use US\$ 24.5 million from its SREP allocation to finance this proposed project.

24. The International Finance Corporation (IFC) is supporting the GoE in the preparation of a Geothermal Sector Development Strategy to attract private sector investment in energy. The GoE has allocated US\$ 1.5 million from its SREP allocation towards the cost of preparing this strategy paper and the preparation work is underway.

25. Ethiopia will benefit from the 2012 Compact to support geothermal development between the World Bank and Iceland. The World Bank and the Government of Iceland (GoI) formed a partnership to help African Rift Valley countries develop their geothermal sector. This partnership will support Rift Valley countries in carrying out surveys and assessment effectively and attract investments to develop geothermal fields. The Icelandic International Development Agency (ICEIDA) will provide support to Ethiopia based on this partnership arrangement. ICEIDA has jointly raised funds with Nordic Development Fund (NDF) to provide the required technical assistance to Ethiopia to develop its geothermal resources. ICEIDA activities will be coordinated with the implementation of the proposed project.

26. **The Government of Japan (GoJ) will support the proposed project through parallel financing.** The Bank with co-financing from the GoJ, has provided financing through the Additional Financing for Energy Access Project, to support drilling of four exploration wells in Aluto Langano. As a continuation of this partnership, the GoJ is considering extending a soft loan to the GoE of up to US\$ 110 million, in two phases, to finance the power plant at Aluto Langano. However, both parties await the findings of the initial exploratory drilling to advance the discussion on the amount and terms of the loan.

27. The Bank is coordinating with the United States Government (USG) in its Power Africa Initiative (PAI). The PAI, announced in June 2013, aims to leverage U.S. expertise in energy technologies, private sector transactions, and policy and regulatory reform to support Sub-Saharan African (SSA) nations' energy plans. The USG is coordinating closely with the WBG in preparing a regional geothermal development strategy focusing mainly on East African Rift Valley countries. The USG is supporting the development of Corbeti Geothermal Project, sponsored by a U.S. – Icelandic private sector developer, by providing transaction advisory support to EEP. GoE has also requested the Bank to support capacity building activities within EEP to promote private sector participation in geothermal resource development, effective reservoir management, regulation, monitoring, supervision, pricing, etc. It is expected that this joint support to the EEP will help GoE realize private sector investment in its geothermal sector development effectively.

#### C. Higher Level Objectives to which the Project Contributes

28. The World Bank Group's (WBG) Country Partnership Strategy (CPS, FY13-16) builds on the progress achieved by Ethiopia in recent years and aims to help the GoE address structural transformation and assist in the implementation of the GTP. The CPS framework includes two pillars. Pillar One, "Fostering competitiveness and employment", aims to support Ethiopia in achieving: (i) a stable macroeconomic environment; (ii) increased competitiveness and productivity; (iii) increased and improved delivery of infrastructure; and (iv) enhanced regional integration. Pillar Two, "Enhancing resilience and reducing vulnerabilities", aims to support Ethiopia in improving the delivery of social services and developing a comprehensive approach to social protection and risk management. Good governance and state building form the foundation of the CPS. In line with the GTP, gender and climate change have been included as cross-cutting issues to strengthen their mainstreaming across the portfolio. The programs of IFC and MIGA are well aligned with the CPS framework, contributing mainly to the strategic objectives under Pillar One. The proposed project contributes to both pillars of the CPS and helps to further Ethiopia's climate change resilience goals, while supporting broader development objectives for the sector to increase power supply, and to build efficient modern sector institutions.

29. The proposed project is aligned with the World Bank Africa Strategy. The Africa Strategy focuses on competitiveness and employment; and vulnerability and resilience. The Strategy covers all traded goods and service sectors (e.g., light manufacturing, agribusiness, mining, information and communication technology, and tourism) as well as key domestic sectors that support competitiveness (e.g., agriculture, transportation, utilities, education and skills development, construction, and retail). The Africa Strategy puts priority on reforms and public investments in areas of highest growth potential, a healthy and skilled workforce, women's empowerment, and regional integration programs. These include: strategically targeted interventions to address three main investment climate constraints: infrastructure, business environment, and skills. The proposed operation aims to address the infrastructure constraint Ethiopia is facing, and would help the GoE to strengthen its service sectors by ensuring adequacy of electricity supply for economic growth. The proposed program will help Ethiopia develop renewable energy projects, which will reduce carbon emissions and thus help in mitigating risks

associated with climate change.

30. The proposed project will support the Bank's goals of reducing poverty and promoting shared prosperity. The project will help increase job opportunities in project areas during the drilling phase and construction and operation phases of the power plant. The increased electricity supply from the project will support Ethiopia's rural electricity access program and increase reliability of its grid network by diversifying energy resource mix in Ethiopia. The project will therefore promote industrial development, which will generate new employment. The project will promote climate resilient green growth while increasing energy security to support the overall goal of increasing access to electricity and regional power trade.

# **II. PROJECT DEVELOPMENT OBJECTIVES**

# A. PDO

31. The Development Objective of the Geothermal Sector Development Project (GSDP) is to develop geothermal resource for electricity generation in Ethiopia.

### **Project Beneficiaries**

32. **Project beneficiaries will be the population of Ethiopia.** The project will improve the electricity generation mix in Ethiopia as well as provide substantial amounts of stable base load power which will increase reliability of the electricity sector. Hence, existing electricity consumers will benefit from increased reliability of the electricity sector. Development of geothermal resource will increase overall electricity generation potential of Ethiopia, hence strengthening the electricity access agenda of the Government. Ethiopia has started to export electricity generation potential will also benefit its neighboring countries importing electricity from Ethiopia. EEP as the implementing agency of the project will benefit from the capacity building support of the project.

#### **PDO Level Results Indicators**

- 33. PDO Level Results Indicators are :
  - a) Geothermal wells drilled and tested.
  - b) Geothermal wells with potential to generate electricity
  - c) Electricity generation potential confirmed
  - d) Geothermal sites confirmed

34. The PDO and Results Indicators include the scope of the IDA credit and not the whole project co-financed by other development partners. As the power plant will be financed by GOJ, the IDA core indicator of, "Generation Capacity of Renewable Energy Constructed – Geothermal (MW)" is not included.

#### **III. PROJECT DESCRIPTION**

The project has identified two potential geothermal sites, Aluto and Alalobad, from which geothermal resources would be developed and electricity generated. The two sites have been selected based on available investigation reports. In Aluto, the project is expected to drill approximately 22 wells of about 2000 to 2500 meters each in depth to produce geothermal steam, expecting to generate about 70 MW of electricity. In Alalobad, the project will drill approximately 4 wells to explore the site and identify its resource potential. If good potential is found, the project will install well-head generators in Alalobad. In order to support the drilling operations under this program and to allow Ethiopia to build capacity in upstream geothermal development, the project will procure two modern drilling rigs with all accessories and spare parts. The project will support the GoE in developing the legal, institutional and regulatory framework to ensure sustainable geothermal development in Ethiopia.

#### **A. Project Components**

35. The proposed GSDP project consists of four primary components, designed to better define the potential of Aluto and Alalobad geothermal sites and to facilitate overall development of geothermal resources in Ethiopia. These components are: (i) Aluto geothermal site development, (ii) Alalobad geothermal site development, (iii) Drilling rigs, associated accessories and spare parts, and (iv) Legal, institutional and regulatory framework development.

#### **Component 1: Aluto Geothermal Site Development**

(US\$ 126.2 million: IDA US\$ 92.2 million, SREP US\$ 24.5 million, GoI US\$ 1.5 million, GoE US\$ 8.0 million)

36. This component will finance goods and services including drilling consumables and associated materials, the services of drilling contractors and a supervision engineer, to drill and test 22 wells and set up a steam gathering system connecting the producing wells.

37. The Aluto geothermal site is located in Oromia Regional State. The project site is about 200 km South-East of Addis Ababa, and is conveniently located in between the Lake Ziway and Lake Langano. A pilot power plant, established in 1998, has been generating approximately 3 MW of electricity at this project site. Financing from IDA and SREP will be used for production drilling and testing activities in order to establish the economic viability of the geothermal resources at the Aluto geothermal site and help finalize the feasibility and design of the planned 70 MW power plant that is expected to be financed by the Government of Japan.

#### **Component 2: Alalobad Geothermal Site Development**

(US\$ 25.8 million: IDA US\$ 19.8 million, GoI US\$ 2 million, GoE US\$ 4.0 million)

38. This component will finance goods and services including drilling consumables, associated materials, drilling contractors, supervision engineer, etc. to drill and test 4 wells. Financing from IDA will be used for production drilling and testing activities in order to establish the economic viability of the geothermal resources at the Alalobad geothermal site. If

these wells confirm the expected geothermal resource potential, then well-head generators would be financed under this component.

39. The Alalobad geothermal site is located in Doubti Woreda, Afar Regional State. The project site is in the North Eastern part of Ethiopia and is about 600 km from Addis Ababa. The Alalobad project area is situated within the Tendaho Graben which is spread over an approximately 100 square kilometer area, containing potentially several distinct geothermal reservoirs.

### **Component 3: Drilling Rig, Associated Accessories and Spare Parts**

(IDA US\$ 61 million)

40. This component will finance goods in particular two full size modern diesel electric drilling rigs with all associated equipment, accessories for directional drilling and both over pressure and under pressure drilling and a complete inventory of spare parts. The availability of two modern rigs will allow for interchangeability of crews, minimize down time due to equipment failure and provide equipment with capability that far exceeds that which is now available.

#### **Component 4: Legal, Institutional and Regulatory Framework Development** (*IDA US\$ 3 million*)

41. This component will finance consultancy services for the development of the Geothermal Development Policy and related legislation as well as technical assistance and advisory services as well as capacity building support to enhance the geothermal development capacity of stakeholder institutions, including the EEP, the GSE and the MoWIE. This component will help Ethiopia promote private sector participation in geothermal development by building capacity on geothermal technical issues, reservoir management, supervision, monitoring, pricing, licensing and concessions.

#### **B.** Project Financing

42. In addition to IDA, this proposed project will be co-financed by: the SREP, the GOI and the GoE. The total available fund for the project is about US\$ 216 million. The overall project cost including the drilling of wells, steam gathering system, power plant and transmission connection, for the two project sites is estimated to be about US\$ 397.7 million. Thus the project has a financing gap of about US\$ 182 million. However, the current level of financing covers the investment requirement of the first three years of the project. Therefore, the GoE will have adequate time to identify additional financing sources over the next three years to cover the financing gap. In that connection, the GoJ is considering extending a soft loan to the GoE of up to US\$ 110 million, in two phases, to finance the power plant at Aluto Langano. The detail breakdown of financing from each financing source is provided in Table 2.

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Table 2:	Financing	Available	for the	Project
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Financiers	US\$ million
The World Bank (IDA)	176.0
Scaling-up of Renewable Energy Program (SREP)	24.5
Government of Iceland (GoI)	3.5
Government of Ethiopia (GoE)	12.0
Total Financing Available	216.0
Financing Gap*	181.7
Total Financing Required	397.7

\*of which US\$110 million is expected for the GOJ.

43. The IDA's share of financing for each component is provided in Table 3 below.

Project Components	Project cost	IDA	SREP	GoI	GoE	Financing Gap	% IDA Financing
1. Aluto Geothermal Site Development	258.2	92.2	24.5	1.5	8.0	132.0*	35.7%
2. Alalobad Geothermal Site Development	75.5	19.8	0.0	2.0	4.0	49.7	26.2%
3. Drilling Rig, Associated Accessories and Spare Parts	61.0	61.0	0.0	0.0	0.0	0.0	100%
4. Legal, institutional and regulatory framework development	3.0	3.0	0.0	0.0	0.0	0.0	100%
Total Project Costs	397.7	176.0	24.5	3.5	12.0	181.7	44.3%

Table 3: Breakdown of Project Component and Financing Plan in US\$ Million

\*of which US\$110 million is expected for the GOJ.

#### C. Lessons Learned and Reflected in the Project Design

44. The project design incorporates 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. Based on the lessons learned from the drilling of exploration wells, the GoE will appoint qualified and experienced drilling contractors to operate the drill rigs.

45. **Public sector participation is critical to mitigate high upfront costs and risks associated** *with geothermal development*: Costs for exploration and drillings are significantly higher for geothermal energy than other traditional and renewable energy sources. The Bank has been supporting the GoE since 2010 in the development of its geothermal resources, through investments in exploration and test drilling through the Energy Access Project Credit no. 37120. Furthermore, the Bank has also supported the GoE in mobilizing 'risk capital' to support the development of the geothermal sector via the Scaling up Renewable Energy Program (SREP). For the Aluto project site, the GoE plans to develop the site with public sector financing, including constructing the planned 70 MW plant with financing support from GoJ. While for the Alalobad site, the GoE is carrying out the upstream drilling activities with public sector financing, and has left the decision open for now on the source of financing for the development of the the downstream activities, such as the power plant. The GoE is negotiating with private sector the development of the Corbetti Geothermal Site, and experience and lessons learned from this project will help the GoE determine on how to develop the downstream activities in Alalobad.

46. **Institutional and technical capacity is required for successful geothermal development**: The learning curve for geothermal technology is quite steep and successful development of the resource requires a high degree of expertise. Based on the World Bank – Iceland Geothermal Compact, ICEIDA and the Nordic Development Fund (NDF) jointly raised funds to provide appropriate advisory services and technical expertise to help facilitate the development of the geothermal sector.

47. **Reliable and accessible information is necessary for geothermal resource development**: Information and data on geology, volcanology, hydrology, geophysical surveys, geochemical studies, resource temperature, chemistry and pressure, for example, are typically best developed and maintained at a national level. The project will support the development of a national geothermal database that will assist in promoting private sector participation through a licensing/concession process.

48. The location of geothermal fields is an important variable in the cost and development of the project: Typically, many of the East African Rift Valley geothermal resources are located in protected or rural areas and require additional costs and planning not only from a social and environmental standpoint, but also for grid connection for power evacuation. The Project includes detailed plans for environmental and social safeguard assessment, planning, and management, as well as resources earmarked for associated facilities including power station, transmission lines, etc.

# **IV. IMPLEMENTATION**

#### A. Institutional and Implementation Arrangements

49. The EEP will be the Project Implementing Entity and thus will be responsible for the implementation of all components under the project will be implemented by. The EEP is a public enterprise created by Resolution 303/2013 on December 9, 2013. Though EEP is newly formed, it benefits from the well-established rules and regulations of its predecessor, EEPCo. Since December 9<sup>th</sup>, 2013, the structuring of EEP has been progressing, key management positions have been filled through the appointment of qualified personnel and the appointment of technical and administrative positions is well advanced.

50. A project implementation unit (PIU) has been established that will be responsible for the day-to-day management of the project. The EEP has appointed a Project Coordinator who is well

qualified and very familiar with the ongoing exploratory geothermal work that is the forerunner for the GSDP project. The EEP has also appointed key technical and fiduciary staff including Engineers, Financial Management Specialist, Procurement Specialist and a Safeguard Specialist that will comprise the core of the PIU. All these persons have experience working with World Bank Projects within EEPCo prior to its restructuring and they have been appointed in similar positions in EEP. With this single decision, the GoE avoided considerable delays in implementing the GSDP project. This demonstrates the GoE commitment toward the GSDP project. The central corporate fiduciary and environment management units of EEP will provide support to the PIU to ensure that fiduciary and safeguards related activities are implemented properly.

#### **B.** Results Monitoring and Evaluation

51. Monitoring and reporting of the project implementation progress will be the responsibility of EEP's project management team. In EEP, the required data will be furnished by the PIU. EEP will have the responsibility to supply current data on the set of agreed performance indicators (Annex 1) at least on an annual basis for PDO indicators and on a semi-annual basis for the intermediate outcome indicators at the component level.

#### C. Sustainability

52. The GoE (MoFED and MoWIE) and the EEP have demonstrated their full support for this project through their responsive and active support during project preparation and throughout the exploratory drilling activities at Aluto.

#### Development of geothermal sector

53. Promotion of long term growth in the geothermal sector requires sustained commitment and effort on part of the GoE. In order to promote and scale up investment in the sector, two major constraints have been identified: (i) access to risk capital, and (ii) technical support for the development of resources. The design of the project includes support for both these issues (as discussed in the lessons learned section) from Bank sponsored projects in Africa and elsewhere.

#### Financial viability of EEP

54. The EEPCo was not able to provide reliable accounts since 2006 to convincingly justify a tariff increase. The inefficiencies in EEPCo were never properly identified and the GoE was reluctant to revise the tariff without reliable information, risking transfer of EEPCo inefficiencies to the consumers through an increased tariff. The current restructuring of the sector is expected to provide more transparency on this issue and offers an opportunity to the newly established enterprises, EEP and EEU, to reconcile their accounts, identify the sector inefficiencies and assess the cost of supply at different levels. In order to introduce modern utility practices, the GoE has appointed a management contractor for two and half year to operate the generation, transmission and distribution assets of the EEP and the EEU. This management contractor is expected to improve performance of the sector and will assess the cost of supply at different levels of supply. This information will provide the benchmark to the GoE to review the existing tariff and revise it accordingly to reflect the market needs. The GoE plans to introduce Bulk

Supply Tariff (BST), at which EEP will be selling electricity to EEU. The EEP will be responsible to export electricity to the neighboring countries, while EEU will be responsible for domestic sales.

# V. KEY RISKS AND MITIGATION MEASURES

#### A. Risk Ratings Summary Table

Risk Category	Rating
Stakeholder Risk	Moderate
Implementing Agency Risk	High
- Capacity	High
- Governance	Moderate
Project Risk	Substantial
- Design	Substantial
- Social and Environmental	Moderate
- Program and Donor	Substantial
- Delivery Monitoring and Sustainability	High
Overall Implementation Risk	High

#### **B.** Overall Risk Rating Explanation

55. The overall risk of the proposed project is High. A detailed assessment of the risks is provided in Annex 5, critical risks are summarized below.

#### Implementation Capacity Limitations

56. An important project risk to consider is EEP's implementation capacity of geothermal projects as EEP employees had limited experience in geothermal sector exploration, reservoir evaluation and project development. In order to mitigate this risk, technical assistance and global expertise will be provided through ICEIDA, under the World Bank - Iceland Compact on Geothermal Sector, to the implementing agencies to assist with project implementation.

#### Natural Resource Risk

57. There is an inherent risk in geothermal resource exploitation. Some projects may never produce a single electron of electricity due to difficulty in drilling in volcanic rocks, chemistry of the fluids that result in unanticipated corrosion and/or scaling, unpredictability of steam productivity, etc. To mitigate the risk, the project implementation unit (PIU) will be supported by a panel of geothermal experts through the Government of Iceland's support, who will assist the PIU in analyzing the data, conducting periodic reviews, and making strategic decisions during the drilling, well testing, reservoir evaluation and power plant development phases. In addition, EEP will retain the services of experienced drilling managers and supervisors and internationally recognized experts in reservoir engineering.

#### Risk of Cost Overrun and Financing Gap

The goods, works and consulting contracts under the project will be procured following Bank Procurement Guidelines. In any competitive process, there is a risk of bid price to be above the estimated price. In addition, the project currently has a financing gap based on its cost estimate and finance plan. Therefore, either for cost overruns or to bridge the financing gap, the GoE may approach development partners to provide additional financing to complete the planned project scope. In additional resources are not available, then the project scope could be adjusted.

#### Implementation of Safeguards Policies

58. The Project Unit has prepared Environmental and Social Impact Assessments (ESIAs) for Aluto and Alalobad project sites separately and those have been disclosed publicly. The Bank has also disclosed the safeguards documents in its infoshop. As this is an Environment Category A project, the safeguards documents have been disclosed well in advance to meet the requirement of 120 days of disclosure period before Board Presentation. These sites can have unforeseen adverse impact to biota and flora, ground water and increased noise and air pollution, etc. Some of these may be new to sector institutions that are not used to such projects. To mitigate the risks, The GOE could allocate financing under Component 4 for hiring environmental and social safeguards experts. The project will finance activities to help the implementing agencies closely monitor implementation of EMPs and RAPs.

#### **Financial Management**

59. The EEPCo's financial management and accounting system had been affected by chronic problems that led to persistent audit qualification and inordinate delays in conclusion of the audit reports. The EEPCo and the Bank collaborated in the preparation of a *Just in Time (JIT) Study* on EEPCo's accounting and governance system in 2012 which concluded with specific recommendations on how to improve its financial management system. The EEPCo Board delayed implementation of those recommendations, indicating that it would be better to wait for the impending restructuring as it would offers the right opportunity to implement the JIT study recommendations.

The EEP and EEU have decided to engage a suitable firm to support the GOE in the process of dividing EEPCo's assets and liabilities between the EEP and the EEU. The firm will review EEPCo's accounts to identify problem areas and to recommend how these should be resolved.

The goal will be to ensure that both EEP and EEU start their operations with clean balance sheets. The firm will also be asked to support the government in implementing the recommendation form the JIT Study. The Bank has collaborated with the management of EEP in the preparation of terms of reference for the firm that will be hired with resources from an existing Bank project

#### Financial Implications of the Geothermal Resource Generation

60. Against the current overall cost of supply of US\$0.06/kWh, predominantly based on the hydropower resources, EEU's average tariff is about US\$ 0.03/kWh. In 2006, when EEPCo's tariff was last increased, it was set at Birr equivalent of US\$ 0.06/kWh. The long term development cost of the geothermal resource will likely increase the cost of supply. Energy resource diversification (from hydropower to geothermal power) is very important for long term energy security, climate mitigation, and sufficient base-load supply to gain flexibility and reliability in domestic energy supply and for export. EEPCo has started to introduce private capital deployment in geothermal energy generation in one site and with experience gained from this activity; more projects could be expected to follow in future. In the meantime, EEPCo should begin to engage on tariff revision towards a cost reflective structure. Since 2006, the tariff (in Birr) has not been adjusted for devaluation and exchange rate fluctuation, the tariff in real terms, has thus been reduced to half of its value in 2006 (from US\$0.06/kWh to US\$0.03/kWh).

#### VI. APPRAISAL SUMMARY

#### **A. Sector Financial Performance**

61. The EEPCo has been recently unbundled in two enterprises, (i) the EEP and (ii) the EEU. While EEP will be the implementing agency of the proposed GSDP project, the balance sheet of these newly formed entities have not been finalized yet. Furthermore, both these enterprises are now in a transition period as a management contractor has been appointed to operate the total value chain of the sector – from generation to sales. Hence, for the purpose of this project appraisal instead of limiting this assessment to only the EEP, the assessment covered the overall electricity sector.

62. On December 9, 2013, as per the Regulation approved by the Council of Ministers, EEPCo was restructured. Its responsibility was transferred to two newly established public enterprises: (i) Ethiopian Electric Power (EEP) to carry out generation and transmission operation, and (ii) Ethiopian Electric Utility (EEU) to carry out distribution and sales. The objective of this restructuring is to ensure that the sector utilities provide efficient, quality and reliable service. As part of this transformation process, the new entities expect to resolve/write-off all previous qualified audit objections of EEPCo and start operation with clean balance sheets.

63. Moving towards the future, it is expected that demand growth from both domestic and export markets are expected to increase from about 4,500 GWh in FY 2012 to about 9,000 GWh by FY2020. A large part of the future growth is expected to come from energy exports to neighboring countries. The Djibouti and Sudan interconnectors have already started power trading and the Kenya interconnector is expected to begin trading in FY2017/18.

64. On average the sector's operating revenues are expected to be approximately US\$ 400 million annually from domestic and export sources in FY2013-18 (at current tariff rates). In terms of expenses, barring unforeseen circumstances, such as massive reduction in rainfall levels, or the need to rent expensive thermal generation, for example sector expenses should nominally grow at approximately 2% per year during the next decade. It is estimated to approach US\$ 200 million annually in FY2013-18. Major risks for the sector's financial viability stem from two factors:

- a. **Debt service obligations**: the debt service obligation of the sector would be in the order of US\$ 250 million a year in the coming years. With limited operational cash flow, this amounts to a possible shortfall for servicing debt obligations, at least until the export revenues ramp up.
- b. **Outdated tariff structure**: the current average tariff of US\$ 0.03/kWh means that the full potential for revenue growth cannot be realized. Positive operational cash flow would be maintained due to low generation costs. However, the tariff regime should be updated to keep pace with investment program priorities.
- c. **Delay in export revenue**: the sector's ability to repay debt would be challenged in the event of construction delays related to the commissioning of the Ethio-Kenya Interconnector, a major source of anticipated revenue...
- d. **Other factors**: slower than expected local demand and foreign exchange risk (devaluation of the Birr against the Dollar) could also potentially cause financial viability concerns for the sector.

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Year	2013	2014	2015	2016	2017	2018
Energy Sales to						
Domestic, at moderate growth rate (GWh)	4,927	5,441	5,999	6,600	7,214	7,840
Djibouti (GWh)	150	318	788	788	788	788
Sudan (GWh)	788	1,577	1,577	1,577	1,577	1,577
Kenya Forecast (GWh)					2,978	3,723
Total Energy Sold (GWh)	5,865	7,336	8,364	8,965	12,557	13,928
Operating Revenue (\$M)	213	296	346	364	590	661
Operating Expenses (\$M)	114	145	171	209	250	294
Debt Service Obligation (\$M)	119	239	253	264	255	252
<b>Operating Cash Flow (or Shortfall) (\$M)</b>	-20	-88	-79	-109	85	116

#### Figure 7: Financial Performance Projection of Ethiopia Electricity Sector

65. In order to improve performance of the sector, the GoE has entered into a Management Contract with Power Grid Company of India (PGCI) for a transition period of two and a half years. As per the scope of its agreement, the Management Contractor will manage: (i) All assets of EEU, related to both operations and projects under construction; and (ii) Assets of EEP related to operations. TheEEP's management will remain responsible to develop the generation and transmission projects that are under construction. This arrangement will be in place for the transition period. After the transition period, a new management of EEU will take over the full responsibility of managing EEU from the Management Contractor. The EEP's management will also take over the responsibility of managing its assets in operation from the Management Contractor. During this period, in addition to increasing performance efficiency, the GoE plans to review the sector tariff policy to ensure financial sustainability of the sector.

#### **B.** Economic and Financial Analysis

66. Analysis of the rate of return of the project are based on the following broader assumptions:

- a. Capital costs of the components are based on estimates that include costs associated with the Aluto project; including contribution and co-financing from other partners (total US\$ 258 million).
- b. The capital costs are assumed to be invested over 5 years with the following rate: Year 1: 5%, Year 2: 15%, Year 3: 30%, Year 4: 30%, Year 5: 20%.
- c. The capital costs are assumed to be invested at constant USD rate (of 2013).
- d. The net benefit is estimated at 552 GWh/year (70 MW installed capacity with a 90% load factor).
- e. Components 2, 3, and 4 are not included in analysis.

67. The economic viability of the project is considered moderate/high. The estimated Economic Internal Rate of Return (EIRR) of the project is 32 percent and at 8 percent discount rate the Net Present Value (NPV) is about US\$ 606 million. At a 10 percent discount rate, the NPV is about US\$ 446 million.

Figure 8:	Results of Economic Analysis					
	Discount Rate 8% Discount Rate 10%					
NPV (US\$ million)	606	446				
EIRR (%)	32					

68. From an operational standpoint, the project is financially viable with a NPV of US\$ 560 million (at 8 percent discount rate) and US\$ 336 million (at a 10 percent discount rate). The FIRR of 15 percent, which is typical for a public financed project of this type.

Figure 9: Results of Financial Analysis							
	Discount Rate 8%	Discount Rate 10%					
NPV (US\$ million)	560	336					
FIRR (%)	15						

#### C. Technical

69. The proposed project has selected two specific sites for development, Aluto and Alalobad, as deep drilling investigation reports suggest these as high potential sites. The Aluto site has a combined steam and binary pilot power plant which commenced operation in 1998. At

present, this power plant is operating at 3 MW capacity. In addition, through the Energy Access Project (Cr. 4795-ET), the Bank has financed drilling of 4 exploration wells in Aluto, which is now under implementation. Hence, supporting the development of the Aluto site is a logical progression in Ethiopia's geothermal sector development.

70. The GoI as part of World Bank – Iceland Geothermal Compact has selected Alalobad site to carry out required surface exploration and make the site ready for test drilling. Based on the results of Alalobad surface exploration, the project may drill about four to six exploration wells to identify the resource potential of the Alalobad site. Once the resource potential of Alalobad is confirmed, the site could be developed for full-fledged power generation at a latter phase. Usually, feasibility study of geothermal power plants analyze the steam and fluid extracted from the exploration wells for several years before investment decision to construct a power plant in a new site is made. The project design therefore includes setting up of well-head generators at Alalobad if the conditions are satisfactory. This will increase the internal return of the project as electricity will be generated from the installed well-head generators. Once GoE decides to build a power plant in Alalobad, the mobile well-head generator could be transferred to another well.

71. Ethiopia estimates to have 5000 MW of geothermal energy potential and wants to build in-house capacity in geothermal development including capacity in upstream exploration activities. The Bank supports this idea as from experience of several countries that has developed geothermal sector, some sort of support from the public sector were always found helpful in progressing the sector development. The project is therefore financing the procurement of two full size drilling rigs with accessories and spare parts. The project will also help the GoE in developing legal, institutional and regulatory framework for sustainable geothermal development.

#### **D.** Financial Management

72. The Bank assessed the financial management capacity of the newly established Ethiopian Electric Power (EEP) in accordance with the Financial Management Manual issued by the Financial Management Sector Board on March 2010. The objective of the assessment was to determine whether the participating institutions have adequate financial management systems and related capacity in place which satisfies the Bank's Operation Policy/ Bank Procedure (OP/BP) 10.00. The policies and procedures require the implementing agency to maintain, for project implementation, financial management arrangements that are acceptable to the Bank. The implementing agency should also provide reasonable assurance that the proceeds of the Investment Project Financing will be used for the purposes for which they are granted. Financial management arrangements are the planning, budgeting, accounting, internal control, funds flow, financial reporting, and auditing arrangements of the borrower and entity or entities responsible for project implementation. The financial management assessment considers the degree to which (a) the budgeted expenditures are realistic, prepared with due regard to relevant policies, and executed in an orderly and predictable manner, (b) reasonable records are maintained and financial reports produced and disseminated for decision-making, management, and reporting, (c) adequate funds are available to finance the project, (d) there are reasonable controls over project funds, and (e) independent and competent audit arrangements are in place. The assessment also included the identification of key perceived financial management risks that may affect project implementation and proceed to develop mitigation measures against such risks.

73. The Bank has conducted this assessment building on the lessons learnt on the current energy projects implemented by the former EEPCo. The financial management risk for the project is rated as High and is expected to reduce to Substantial when mitigating actions are implemented. The main strength of the project is that the project implementing units of the former EEPCo are substantially maintained by EEP during and after the split and as a result EEP has incorporated staff who have experience in Bank financed projects. The EEP will have updated finance procedures and accounting manual which describe the financial management systems, procedures and related internal control systems. The main risks for the financial management arrangement include delay in finalizing the split of the former EEPCo, i.e. finalizing the opening balance sheet of the newly formed enterprises. The split of the entity and its implications on the accounts and systems has not been finalized which will ultimately have an impact on timely closing of accounts and getting timely audits. In addition, the issues of the past need to be addressed properly. Key issues are the past entity audit issues and findings reported as well as the recommendations of the Just in Time assessment carried out by the Bank on EEPCo financial management system. The lessons learnt from energy projects implemented by EEPCo include challenges in budget monitoring and internal audit as well as internal control issues including long outstanding receivables and payable balances. Action plans that encompass the mitigation measures for the known risks and weaknesses are prepared.

74. The project financial management arrangements will be coordinated and managed by the EEP-PIU. The EEP intended to update EEPCo's former Finance Procedures and Accounting Manual which incorporates the relevant FM issues including budgeting, accounting and internal control arrangements to take on board of the challenges and lessons learnt of the past and also to address new design features and issues. Budget procedures are laid out which are consistent with government budget procedures. Efforts to strengthen budget control/monitoring aspect will be intensified. Internal control strengthening mechanisms will be accorded attention. The Internal Audit unit is expected to review the project expenditures which are subject to internal audit testing. Accounting and audit staffing capacities and numbers will be reviewed and increased as appropriate. Capacity building measures need to be planned and conducted.

75. The project will prepare and submit quarterly unaudited Interim Financial report (IFRs) required. The contents and formats of the IFRs will be agreed before negotiation. The transaction based disbursement method using statements of expenditure will be used when disbursing funds to the Designated Accounts (DA) for the project. Other methods of disbursement that can be used by the project include direct payments, special commitments, and reimbursements. Further details about disbursements to the project will be included in the disbursement letter.

76. The project in coordination with Office of Federal Audit General (OFAG) is required to have the project auditor selected within 3 months of effectiveness and the project will have annual audit conducted. The project will then submit project audited financial statements to IDA in a form and content satisfactory to the Bank. The audit TORs will be agreed before negotiation.

77. FM-related covenants include maintaining satisfactory financial management system throughout the life of the project, recruitment of internal auditor before effectiveness, submission of IFRs of the project for each fiscal quarter within 45 days of the end of the quarter; submission

of annual audited financial statements and audit report including the management letter, within 6 months of the end of each fiscal year.

78. Based on the financial management assessment findings, EEP's financial management arrangements meet the IDA's requirements as per OP/BP 10 and action plans were agreed to address challenges and weaknesses observed.

## E. Procurement

79. Procurement under the projects financed by IDA credit and IDA Administered Trust Funds are carried out in accordance with the World Bank's "Guidelines: Procurement under IBRD Loans and IDA Credits" dated January 2011; and "Guidelines: Selection and Employment of Consultants by World Bank Borrowers" dated January 2011, and the provisions stipulated in the Financing Agreement.

80. The GSDP implementing agency EEP is governed by Public Enterprises Proclamation No. 25/1992 and EEP Regulations No 302/2013. EEP will be supervised by the Ministry of Water, Irrigation and Energy and retains the same board members as of its predecessor. The Board will supervise both EEP and EEU jointly. The Board is responsible for all high value procurement award decisions. As a public enterprise, the EEP is governed by the Public Procurement Proclamation No. 649/2009. The EEP is in its formative stage with most of the systems and process still under development. In the interim however, the EEP has confirmed that it will adopt EEPCo's Procurement Manual as the legal basis to manage its procurement function. The EEPCo Procurement Manual defines four hierarchies for procurement. A procurement unit for everyday processing of procurement requests and as a secretariat, adhoc bid evaluation committee comprised of experts in the subject procurement matter for evaluation of tenders, tender award committee comprised of departmental heads for endorsing the bid evaluation reports and the Board for award decisions

81. The EEP has established a Procurement Unit under the Department of Procurement, Logistics & Warehousing. The manager of the Unit has been appointed and possesses the necessary qualification and experience to manage the unit. Additional staffs have been assigned to the procurement unit and some staffs are still waiting for the formal assignment between the two organizations. To manage procurement under the new and existing Bank financed projects, EEP has already assigned an adequate number of staff in addition to the Manager. The previous Board of EEPCo has been retained, and the EEP has already appointed a Tender Endorsing Committee (TEC). Finalizing the remaining actions will enable the EEP to carry out and continue with its ongoing projects implementation.

82. The staff that comprised the GSDP implementation unit which was formed under EEPCo has been retained and will continue with the same function under EEP. The unit is currently engaged on organizing the project coordination unit. EEP has confirmed that the Project procurement activity will be handled by the EEP Procurement, Logistics and Warehousing directorate at corporate level and there will be a procurement officer in the PIU to link the project team with the procurement department.

83. Though some staff have experience working on Bank financed project procurement, as the EEP is a new formation, capacity strengthening measures to ensure effective implementation of GSDP, particularly related to procurement and contracts management, will be critical. The new EEP is expected to have a strong central procurement unit with clearer career path to its procurement crews and professionalize procurement and contracts management in order to avoid the systemic challenge that its predecessor faced in terms of weak procurement and contracts implementation. The Bank will continue its dialogue and support to the new EEP in improving its institutional efficiencies in procurement and contracts management.

84. Under the World Bank – Iceland compact, ICEIDA is financing a technical assistance to EEP through a project called "Surface Exploration and Capacity Building for Geothermal Development in Ethiopia". Through this project ICEIDA is supporting EEP to conduct advance procurement, finalize the technical specification of drilling consumables, steam gathering system, and two state of the art drilling rigs using both electricity and diesel generator options; and capable of drilling directional wells to about 3500m, under high pressure and low pressure drilling. As these rigs will be used in the project, the procurement process of these rigs will have to start as early as possible, so that the rigs could be procured soon after the project is approved. The Task Team is working closely with EEP to ensure that it follows the Bank Procurement Guidelines properly and get necessary No Objection to the procurement process that these entire contracts can be financed by the IDA fund or become eligible for retrospective financing.

85. Since EEP is a new organization, the established capacity to carry out procurement is low. However as many of the staffs and institutional working systems are transferred from EEPCo, it is considered that adequate institutional arrangements could easily be built for management of procurement. To mitigate the risks from low capacity whilst the organization is forming itself, an action plan has been discussed and agreed with Government.

#### F. Social

86. The main positive social impacts of the proposed GSDP include increase in electricity supply, promotion of economic growth, increase in government revenue and creation of new employment opportunities. The project also has the potential for negative social aspects, including land acquisition, loss of livelihood, and potential changes in socio-cultural and economic activities. To ensure that the project maximizes its positive social impacts and benefits, and avoid potential adverse impacts, special attention will be given to community participation, grievance redress mechanisms, benefit sharing mechanisms, socio-cultural systems/physical characteristics that are specific to the project sites and surroundings. The project will be implemented in two sites, (i) Aluto in Oromia Region and (ii) Alalobad in Afar Region.

87. The project has triggered two social safeguards policies of the World Bank, namely: (1) the involuntary resettlement policy (OP4.12), and (2) (OP4.10) which focuses on the poorest and most socially under-served groups. Both policies will provide the basis for robust social mitigation measures.

88. **OP4.12:** This policy covers not only the physical relocation, but also any loss of land or assets, loss of income sources or means of livelihood as well as restriction of access to legally designated parks and protected areas. Accordingly, the project has prepared, consulted upon and
disclosed a Resettlement Policy Framework (RPF) for sites where the specific project location has not been finalized and possible future sites in accordance with the Bank's Policy on Involuntary Resettlement. A Resettlement Action Plan (RAP) will be implemented during the construction and operation phases of the project, if needed to mitigate the anticipated low social impacts that might arise due to loss of land.

89 **OP4.10:** Though the Alalobad project area in Afar region is not good for agriculture, low in social fertility and not physically inhabited or occupied by vulnerable and underserved groups who meet the requirement of the OP 4.10 policy, this policy is triggered as people who practice transhumance pastoralism, migrate around the project area. The livelihood activities of these people can be characterized by seasonal migration with their livestock. The issues related to OP4.10 were defined in detail through the social assessment as an integral part of the Environment and Social Impact Assessment (ESIA) prepared for Alalobad, which included in addition to the standard vulnerability assessment, a separate section as it relates to vulnerable and underserved groups. The Social Management Plan (SMP) of the ESIA, includes potential social risk, challenges and mitigation measures for providing culturally appropriate economic and social benefits for underserved and vulnerable groups and measures to avoid, minimize, mitigate, or compensate for any impacts. Extensive consultations were carried out during the assessment leading the elaboration of this enhanced ESIA. This process fostered free, prior, and informed consultations and achieved broad community support for the project. The findings of the assessment including on the provision of grievance redress, and benefit sharing issues have been elaborated and included in the table below. Further, during implementation, follow-on consultations are planned that will include extensive engagement with transhumant pastoralists, to refine the details of the Social Management Plan.

90. Gender informed status of the project: Drilling of production and injection wells accounts for approximately 80% of the project investment. Since the project is mainly dealing with construction and drilling, the adoption of gender sensitive analysis or monitoring and evaluation is not necessary at this point. While the project is cognizant of the gender related challenges which persist in Ethiopia, the project's footprint as designed will not have direct impact on the ultimate end users/beneficiaries at the household level, and therefore, disaggregating the project outcomes between men and women will not be appropriate in this instance. However, the project's community development initiatives as recommended in the enhanced ESIAs will mainstream gender issues.

## G. Environment

91. The project has triggered two environmental safeguards policies of the World Bank, namely: (i) Environmental Assessment (OP/BP 4.01), and (ii) Physical Cultural Resources (OP/BP 4.11).

92. **OP 4.01:** The Aluto site of Oromia Region is located within the central-southern part of the main Ethiopian Rift with an impermeable pre-Cambrian basement rock of metamorphic and granitic nature. The Precambrian rocks of the Aluto volcanic complex are however affected by active axial and transverse faults and fractures. These rocks exhibit several surface manifestations including fumaroles, ground water, hot and warm springs, and altered grounds.

Drilling may affect groundwater quantity and quality. The youngest Aluto volcanic eruption characterized by obsidian flow and pumice breccias is reported to have occurred about 2,000 years ago. The biodiversity and floral and faunistic composition of the area is less studied. The entire Aluto area seems to be poorly established with wild animals. Hence, exploration is expected to have no significant impact on fauna. On the contrary, geothermal exploration and drilling may impact on vegetation since sites for the wells and workers' camps may be cleared of vegetation prior to the actual drilling. The Alalobad project area in Afar region is not good for agriculture, low in social fertility and not physically inhabited.

93. **OP 4.11:** This policy has been triggered signaling that a chance find could be expected during geothermal explorations. 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 finding might occur. 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.

94. The project prepared two separate ESIAs for Aluto and Alalobad geothermal project sites and these have been disclosed in the World Bank Infoshop on December 18, 2013. As per the ESIAs, the project sites can experience unforeseen adverse impact to biota and flora, ground water, increased noise, air pollution, etc. To mitigate the risk, support from technical assistance components of existing World Bank financed projects would be sought. The project will finance activities to help the implementing agencies closely monitor implementation of EMPs.

Safeguards Policies triggered by the Project	Yes	No
Environmental Assessment OP/BP 4.01	X	
Natural Habitats OP/BP 4.04		X
Forests OP/BP 4.36		X
Pest Management OP 4.09		X
Physical Cultural Resources OP/BP 4.11	X	
Indigenous Peoples OP/BP 4.10	X	
Involuntary Resettlement OP/BP 4.12	X	
Safety of Dams OP/BP 4.37		X
Projects on International Waterways OP/BP 7.50		X
Projects in Disputed Areas OP/BP 7.60		X

# Annex 1: Results Framework and Monitoring ETHIOPIA: Geothermal Sector Development Project (P133613)

Project Development Objective (PDO): The Development Objective of the Geothermal Sector Development Project (GSDP) is to develop geothermal resource for electricity generation in Ethiopia.											hiopia.	
	re	Unit of			Cumulat	ive Target V	alues**			Data Source/	Responsibility	Description
PDO Level Results Indicators*	Co	Measure	Baseline	YR 1	YR 2	YR3	YR 4	YR5	Frequency	Methodology	for Data Collection	(indicator definition etc.)
Indicator One: Geothermal wells drilled and tested		Number	0	3	6	12	18	26	semiannual	EEP	EEP	
Indicator Two: Geothermal wells with potential to generate electricity		Number	0	0	2	6	9	13	semiannual	EEP	EEP	
Indicator Three: Electricity generation potential confirmed		MW	0	0	10	30	45	70	semiannual	EEP	EEP	
Indicator Four: Geothermal sites confirmed		Number	0	0	1	1	1	2	semiannual	EEP	EEP	
INTERMEDIATE RESULTS												
Intermediate Result (Component	1: Al	uto Geotherr	nal Site Deve	lopment)								
Drilling Contractor Contract Signed		Y/N	Ν	Ν	Y	Y	Y	Y	semiannual	EEP	EEP	Technical
Drilling Consumables Contract Signed		Y/N	Ν	Ν	Y	Y	Y	Y	semiannual	EEP	EEP	Technical
Supervision Engineer Contract Signed		Y/N	Ν	Ν	Ν	Y	Y	Y	semiannual	EEP	EEP	Technical
Intermediate Result (Component	2: Al	alobad Geotl	hermal Site D	evelopment)								
Number of sites tested		Number	0	0	0	2	4	4	semiannual	EEP	EEP	Technical
Number of test wells drilled		Number	0	0	0	0	2	4	semiannual	EEP	EEP	Technical
Intermediate Result (Component	Intermediate Result (Component 3: Drilling Rig, Associated Accessories and Spare Parts)											
Tender floated (Rig and accessories)		Y/N	Ν	Ν	Y	Y	Y	Y	semiannual	EEP	EEP	Technical
Contract signed (Rig and accessories)		Y/N	Ν	N	N	Y	Y	Y	semiannual	EEP	EEP	Technical

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Rig delivered on-site		Y/N	Ν	Ν	Ν	Ν	Y	Y	semiannual	EEP	EEP	Technical
Intermediate Result (Component 4: Legal, Institutional and Regulatory Framework)												
Training/workshops held		Number	0	0	1	2	3	4	semiannual	EEP	EEP	Events
EEP staff trained		Number	0	0	5	10	35	45	semiannual	EEP	EEP	People
GSE staff trained		Number	0	0	10	20	35	45	semiannual	GSE	GSE	People
EEP retained procurement staff		Number	4	4	4	4	4	4	semiannual	EEP	EEP	People

#### **Annex 2: Transformation of the Energy Sector**

#### ETHIOPIA: Geothermal Sector Development Project (P133613)

## **Energy Sector Institutional Arrangements (Pre-Restructuring)**

1. Prior to the 2013 sector restructuring, the Ethiopian energy sector was led by the Ministry of Water, Irrigation and Energy (MoWIE) and comprised of a vertically integrated sector utility, the Ethiopian Electric Power Corporation (EEPCo), as well as a few other departments and agencies responsible for specific functions. The pre-restructuring organization of the sector institutions is described below:

a) **MoWIE:** The Ministry of Water and Energy (MoWE) was a federal organization established in 2010 to undertake the management of water and energy resources of Ethiopia. MoWE had the overall responsibility of policy development and sector planning for the water resources and the energy sectors. This involved planning and management of water and energy resources, development of polices, strategies, and programs, implementation of water and energy sector laws and regulations, conducting study and research activities, providing technical support to regional water and energy bureaus and offices, and signing international agreements. With respect to rural electrification issues, the MoWE, under 'Proclamation Number 317/2003' was also responsible for the Alternative Energy Technology Development and Promotion Directorate (AETDPD). In July 2013, The Parliament decided to add irrigation into the MOWE naming to become the Ministry of Water, Irrigation and Energy (MoWIE) given its increasing mandate in the development of medium and large irrigation dams (Proclamation 803/2013).

b) **<u>AETDPD</u>:** The AETDPD was responsible for off-grid electrification programs including key activities such as: development and oversight of the National Clean Cook Stoves Program, installation of solar home/institutional systems in rural areas, and supporting market-based development of renewable energy products and services, such as solar portable lanterns. AETDPD also operated the Rural Energy Fund (REF), under the Rural Electrification Executive Secretariat (REES), to foster private sector participation in the industry and provide flexible and innovative financing for off-grid rural electrification projects. REF supported projects were initially of a pilot nature, involving a few hundred households. Later, REF also became implementing agency of large scale off grid projects, such as Electricity Access and Rural Electrification Project Phase 2 (EAREP II).

c) **EEPCo:** As the key institution in the Ethiopian power sector, EEPCo was a vertically integrated, government-owned utility with sector-wide responsibility for planning, investing, commissioning, and operating electricity generation, transmission, and distribution infrastructure. EEPCo, a public enterprise, was established by 'Regulation Number 18/1997', and conferred with the powers and duties of the previous Ethiopian Electric Light and Power Authority (EELPA). The overall purpose of the corporation was to engage in the business of producing, transmitting, distributing and selling electrical energy in accordance with economic and social development policies and priorities of the government and to carry out any other related activities that would enable it achieve its purpose. EEPCo was also

responsible for a special grid based access expansion program, the Universal Electricity Access Program (UEAP).

d) **UEAP:** was to provide grid-based electrification in rural towns and villages over a 10year horizon. These rural towns and villages range in size from about 100 to 15,000 inhabitants. The UEAP has been financed mainly by the GoE but has also received support from several donors and financiers, including the World Bank, the African Development Bank (AfDB), the Kuwait Fund, the Arab Bank for Economic Development in Africa (BADEA), and the Indian Government. The UEAP officially commenced in 2005. The target set for the UEAP was to increase grid access by 50 percent over a five-year period (2005 to 2010); the ultimate objective is to connect 6,000 rural towns and villages from about 18,000 localities in a 10-year time frame (2005 to 2015).

e) **Ethiopian Electric Agency (EEA):** the EEA, established as an autonomous federal agency, regulated all energy activities in Ethiopia, including operations in the electricity supply sector, such as licensing, safety, and quality standards.



Figure 2.1: Pre-Restructuring Organization of Sector Institutions

#### **Institutional Restructuring and Transformation Program**

2. Ethiopia's Growth and Transformation Plan (GTP) for FY2011-2015 seeks to accelerate poverty reduction and achieve macroeconomic stability through continued economic growth (at least 11 percent real growth rate), to enhance social development and reach the Millennium Development Goals (MDGs)<sub>3</sub>. Although agriculture remains the engine of growth (amounting to

<sup>&</sup>lt;sup>3</sup> The long-term goal of the GTP is for Ethiopia to become a mid-income country in 20-30 years

nearly 42 percent of FY2011 GDP and growing at 8 percent annually), service sector (growing at 14 percent annually) and the industrial sector are expected to play an increasing role in economic development (expected to grow at over 10 percent annually). Consequently, large public investments in transportation and energy infrastructure are envisaged during the GTP period.

3. As part of the GTP, EEPCo was responsible for implementing the government's two major public policy goals related to the energy sector:

a) **Provide universal access to electricity:** a major focus of the Government of Ethiopia (GoE) is to increase the coverage of population under the electricity grid (under the UEAP). In 2005, there were 800,000 customers connected to the grid covering about 20% of towns and villages in Ethiopia. Thorough strategic investments over the last decade in generation, transmission, distribution and access enhancement projects, EEPCo has been able to increase the number of customers connected to the grid to over 2 million (14 percent of population), connecting 41 percent of towns and villages. In the GTP period, the goal is to increase the number of customers to 4 million and cover 75 percent of towns and villages.

b) <u>Generate export revenues</u>: another major goal for the GoE is to become a regional power hub and generate export revenues by means of exploiting its vast natural (mainly hydropower) resources. In order to achieve this, EEPCo invested in ambitious generation programs and is also participating in the East Africa Power Pool (EAPP) project by constructing transmission lines to Djibouti (commissioned in 2011), Sudan (commissioned in 2012) and Kenya (planned commissioning in 2017).

4. Along with these major goals, GoE also has many short to mid-term goals, such as: to modernize the energy sector by investing in operational efficiency of its systems and organizations, increase reliability and become a modern energy producing and consuming nation. To fulfill these goals, EEPCo has been investing heavily in the sector which has resulted in the ongoing aggressive growth of the energy sector in Ethiopia. In order to support the scaled up investments and growth, the GoE, in December 2013 restructured the sector, as summarized below. Ethiopia is attempting to liberalize the energy sector after ratifying a new 'Energy Proclamation Number 302/2013' that allows private investors to generate, transmit, distribute, sell, import or export electricity. The new proclamation that allows private power companies to operate in the country, together with the state power utility EEPCo is expected to attract more investment in the energy sector where the government has planned to generate 10,000 MW of power from various sources by the end of the GTP period.

a) <u>MoWIE</u>: No changes were outlined in the overall responsibility of the MoWIE including continued focus on off-grid electrification through the AETDPD.

b) **Ethiopian Energy Authority (EEA)** was established by the Energy proclamation 810/2013 published on January 27, 2014 and replaced the former Ethiopian Electric Agency established by the 1997 proclamation. Its powers and duties cover the electricity sub-sector as well as energy efficiency activities.

- (i) In the electricity sub-sector, EEA has powers with regards to licensing and ratification. It has full power to issue and renew license to operators on all segments of the value chain<sup>4</sup> and oversee the licensee operation with capacity to sanction any noncompliance. On the tariff, its mandate is limited in the case of national grid to the review of tariff submitted by the licensee and recommendation to GOE for approval. However, EEA can approve off grid tariff based on guidelines approved by its Board. Finally, EEA is responsible for the regulation on all tariff structures and prices approved either by itself or by GoE.
- (ii) Other major developments of the energy proclamation related to EEA are (i) the power to approve electric power purchase and network service agreements<sup>5</sup>; and (ii) arbitration and settlement of disputes.
- (iii) With regards to Energy efficiency activities, EEA has a broader mandate which covers (i) strategy and program formulation as well as monitoring of their implementation; (ii) issuance of codes and standards related to energy audit, labeling, inspection, quality, etc. and supervision of their implementation; (iii) establishment of energy efficiency testing laboratories and procedures; and (iv) coordination of research development and technology transfer activities.
- (iv) The proclamation introduces a new governance structure with a Board which oversees EEA activities and has the specific power to approve the regulatory directives as well as proposals related to "off-grid national" tariffs determination guidelines, national energy efficiency strategy and program, model PPA and network agreements.

c) **EEPCo:** The primary outcome of the transformation exercise was the restructuring of the vertically integrated utility, EEPCo, into two separate public enterprises:

- i) Ethiopian Electric Power (EEP): will be responsible for large, capital intensive, infrastructure projects for generation, transmission, sub-transmission (above 33 kV levels) expansion. It will be responsible for raising capital (through public, multilateral, and private sources), procurement, implementation, as well as for the operations of the generation power plants and transmission networks. EEP will also implement the UEAP projects, whereas, after completing construction of the rural distribution network, EEP will transfer the assets to the distribution entity for operation and maintenance.
- ii) <u>Ethiopian Electric Utility Company (EEU)</u>: will act as the main operations and maintenance power utility responsible for the retail end of the energy value chain. It will be also responsible for distribution expansion and renovation projects. EEU will be the primary service agency responsible for day to day running and upkeep of the distribution network, billing and collecting, client relationship, and associated functions.

<sup>&</sup>lt;sup>4</sup> Generation, Transmission, Distribution, sales as well as imports exports

<sup>&</sup>lt;sup>5</sup> The proclamation introduces the principle of open access of existing transmission and distribution lines to any licensee based on tariff to be determined by EEA.



Figure 2.2: Restructured Power Sector Arrangement

**Interim Arrangements during the Transition Phase** 

5. In order to assist with the transition from the former EEPCo to the newly established EEP and EEU, the GoE has undertaken certain key measures, designed to be implemented over the coming two to three years. These measures are briefly described below:

a) Management Contractor for EEU: A management contractor (MC) has been retained to assist with the transition to the new EEPCo successor companies. Following an international tender, a consortium of three Indian companies led by the Power Grid Corporation of India Limited (PGCIL) will be spearheading the initiative. PGCIL, one of India's largest transmission utilities, manages nearly half of the total power transmitted in India. The company is also one of the main contractors constructing the 1,045 km long highvoltage transmission line between Ethiopia and Kenya under the Bank financed Eastern Electricity Highway Project. The other two companies in the consortium include: the National Hydroelectric Power Corporation (NHPC), and the Bombay Suburban Electric Supply (BSES). The MC will be mainly responsible for increasing efficiency of operations, distribution, and sale of electric power. The contract, worth \$21 million, was signed last year and lasts for two years with a possibility of a six-month extension. Note: As part of the transition planning in the interim period, under the contract, the MC, (through NHPC) will also assist in supporting increased efficiency and capacity building of EEP's generation operations, (through PGCIL) will support EEP's transmission operations, and (through BSES) will support EEU's distribution operations.



Figure 2.3: Interim Arrangements – Management Contractor

#### Key Issues and the Way Forward

6. <u>Clarity of Institutional Roles and Responsibilities:</u> As the GoE makes progress on strategic and policy level adjustments through the ongoing series of reforms in the energy sector, it would be important to continue the focus on achieving improved clarity on specific roles and responsibilities of new sector institutions, especially for the EEPCo successor companies, EEP and EEU. In the interim transitional period, the GoE hopes to achieve not only improved management and operational efficiency of the new companies, but also to iron out practical details behind roles of internal departments of the two new companies.

- a) **Reorganization of Internal Departments**: As former EEPCo splits into two new institutions, EEP and EEU, the challenge for the sector is not only in creating two parallel internal departments in the new institutions, but also to ensure proper coordination between these departments as well as mapping of respective staff to them. This would include, for instance, organization and coordination of planning functions, managing procurement of goods, works, and services contracts for not only capital intensive projects but also for smaller scale projects, and other associated corporate functions.
- b) Splitting of Assets and Liabilities (Separate Balance Sheets): A key undertaking of the newly established institutions would be to separate out the assets and liabilities of the former EEPCo. The GoE has established an independent committee of relevant experts from various public institutions to carry out this detailed exercise. The clear splitting of these assets and liabilities would establish two respective balance sheets for EEP and EEU, as per the established regulations. However, in the interim period, the MC would not only execute responsibilities related to the balance sheet items for EEU, but would also execute responsibilities related to generation and transmission operations for the EEP balance sheet. Furthermore, the exercise of splitting the assets and liabilities and

establishing new balance sheets also provides a good opportunity to the sector to resolve many outstanding accounting related issues in EEPCo's balance sheet that gave rise to management qualifications in the annual audit reports and restart the sector on a clean footing.

- c) Establishing Common Standards and a Modular Approach: The GoE intends to establish a set of common standards for the two new sector institutions, EEP and EEU, so that key management and technical function would continue to operate smoothly in the future. This is particularly important for fiduciary aspects (such as: accounting and auditing) and compatibility of information and technology systems. The reorganization is taking place on a modular approach, with function areas being grouped so that they can easily be operated in close collaboration of each other with flexibility in organizational design. For example, the planned implementation of the enterprise resource planning (ERP) platform will be based on generation, transmission, and distribution modules ensuring compatibility across EEP and EEU.
- d) Operational Arrangements during the Interim Period: Due to the fact that the MC will operate across both EEP and EEU, it is important that there is a clear framework of agreement (such as: a memorandum of understanding) for sector related responsibilities that would assist the MC in executing its duties. During the interim period, this would relate to joint execution of projects and programs being financed through the EEP (such as: the IDA projects) that have corresponding responsibilities for the MC, operation of revenues and expenses related to assets that are owned by EEP, etc. In the longer term, the two companies would also need to create a framework for executing duties for issues related to asset and liability transfers (upon completion of construction), purchase of power (from EEP to EEU), service level agreements, etc.

7. **Improved Sector Capacity and Performance:** A key area of focus during the interim period must be building sector capacity for improved long-term performance. EEP has to transition from a company managing few hundred MWs to a company managing tens of thousands of MWs, and for EEU from handling a few hundred thousand customers to handling over two million. As a result, currently, the sector's capacity to manage such a large portfolio of projects and clients is severely lacking. It faces challenges related to procurement delays, contract administration, audit and fiduciary management, etc. There is also an urgent need to modernize the sector by upgrading the skills and strengthening the organization which includes all functions carried out in planning, executing and operating the electricity network and services. The GoE hopes to achieve this through the services of a MC as well as by investing in human resources and training in order to become a modern energy sector capable of handling the current and forthcoming growth. Support is also being provided by the Bank and other development partners through current and future projects to support specific technical assistance and capacity building programs.

8. Sector Revenue Flow Management: With two new entities focusing on separate ends of the energy value chain, it would be necessary for GoE to detail the sector revenue flow arrangements. These arrangements should not only focus on 'top-down issues', such as: transfer of assets and liabilities from EEP to EEU, sale of power from EEP to EEU (bulk-supply tariffs

and related service contracts and load dispatch arrangements) and to the EAPP (export tariffs), but also on 'bottom-up issues', such as: setting retail tariffs (EEA), collection of bills (EEU), transfer of revenue upstream (EEU to EEP). Clarity on sector revenue flows would be of critical importance for improved cash flow managements and long term financial viability of the sector.

9. <u>Sound Legal and Regulatory Framework:</u> As part of the ongoing reform and restructuring program, the GoE must also consider incorporation of the necessary legal and regulatory updates that would become pertinent for the sector which is focused on increased investment. With the expressed move towards increased deregulation, there is a need for greater clarity on commercial contracting frameworks, power purchase agreements (PPA), vesting contracts, feed-in tariffs (FITs), investment licensing, and other associated regulations.

10. **Increased Private Sector Participation:** Based on the GoE's desired direction, accelerated implementation of the reform and restructuring, focusing on improved investment climate and ease of doing business, can attract private investment in new power generation capacity as well as distribution company delivery capacity. The scaled-up investment can turn Ethiopia's resource wealth into significant improvements of power supply, assisting with job creation, poverty reduction, and improving the prospects for shared prosperity.

#### **Annex 3: Detail Project Description**

#### **ETHIOPIA:** Geothermal Sector Development Project (P133613)

1. **The geothermal potential within Ethiopia has long been recognized.** Assuming a range of power density in the Rift Valley of about 8 MW/km<sup>2</sup> at 230°C and up to 30 MW/km<sup>2</sup> at 300°C, it is plausible to assume the presence of a substantial geothermal energy potential (estimated to be in excess of 5,000 MW). Under a program that began in 1969, geo-scientific studies were conducted in a number of Ethiopian fields in the Ethiopian Rift Valley and as high as eighteen fields were judged to have potential for high-enthalpy resource development, including electricity generation. From these areas, deep drilling was undertaken in Aluto and Tendaho fields and detailed surface exploration was completed in four other potential resource areas. A combined steam and binary pilot power plant with a capacity of 7 MW, was installed and commenced power generation in 1998, but due to problems with the plant, steam gathering system and production wells (due to scaling) production was stopped during the years 2002-

2007. In 2008 the plant was partially refurbished and is now capable of operating at about 3 MW capacity. Some other areas are at initial stages of surface exploration, including: Abaya, Tulu Moye, Gedemsa, Kone, Fentale, Dofan, Meteka, Amoisa, Ayelu, Teo, etc (Figure 4). Corbetti has seen considerable advanced exploration activity over the past 2-3 years by Reykjavik Geothermal, the present holder of a concession license for the site. Exploration drilling and well testing is expected to begin in 2014 with assistance from а Geothermal Risk Mitigation Facility (GRMF) grant.

2. The drilling and testing of exploration wells at the Aluto site is presently ongoing through an existing project co-financed bv IDA and GoJ. New developments at the Aluto site under the proposed project is also planned to be cofinanced by IDA and GoJ. The Aluto project site is well established with a transmission network and a staff campsite as it has an existing geothermal power plant presently generating 3 MW. However, with the new project, anticipated to

Figure 3.1: Location map of the Ethiopian Rift and geothermal prospect areas



Source: United Nations University

generate upwards of 70 MW, the electrical evacuation facilities will have to be upgraded.

7. The Alalobad site under the proposed project would benefit from the World Bank - Iceland Compact on geothermal development. The Alalobad site has been selected as several surface studies have been undertaken at this site. Iceland will finance all necessary exploration, including geologic, geochemical and geophysical surveys required as well technical assistance to make this site ready for test drilling and well testing. The project will support capacity building through knowledge transfer and specific workshops and training programs that would be identified during the project preparation phase. Most of the technical assistance will be supported through the World Bank - Iceland Compact. The proposed project is expected to confirm the existence of an economically viable resource base at the Alalobad project site, and if successful to provide limited generation capability through the installation of well head generation.

8. The proposed GSDP project consists of four primary components, designed to better define the potential of Aluto and Alalobad geothermal sites and to facilitate overall development in Ethiopia geothermal sector. These components are: (i) Aluto geothermal site development, (ii) Alalobad geothermal site development, (iii) purchase of 2 drilling rigs, associated accessories and spare parts, and (iv) Legal, institutional and regulatory framework development.

## **Component 1: Aluto Geothermal Site Development**

(US\$ 258.2 million: IDA US\$ 92.2 million, SREP US\$ 24.5 million, GOI US\$ 1.5 million, GOJ US\$ 110 million, GoE US\$ 8.0 million, and To Be Decided US\$ 22 million):

9. The Aluto geothermal site is administratively located in Adami Tulu – Jido - kombolcha in Oromia Regional State. The project site is within the central-southern part of the main Ethiopian Rift Valley, about 200 km South-East of Addis Ababa, and is conveniently located in between the Lake Ziway and Lake Langano. A pilot power plant, established in 1998, has been generating approximately 3 MW of electricity at this project site.

10. In 2009, with financing from Japan International Cooperation Agency (JICA), West Jec carried out a detailed surface exploration in Aluto, which showed, that the site has the potential to generate more than 150 MW of electricity. Following this encouraging study, the World Bank and the GoJ, co-financed an appraisal drilling project to drill 4 wells to confirm the potential of the Aluto geothermal resource. EEPCo started the first appraisal well drilling on November 18, 2013 and soon after EEPCo was restructured and EEP continued with the drilling operation.

11. EEP faced severe challenges during the drilling of the first well. Due to the soft geological formation (pumice sediment), EEP had to carry out more than forty cementing jobs. This has caused inordinate delay as EEP had to wait for the cement curing period. To speed up the drilling process, West Jec Drilling Advisors suggested drilling with only water circulation. EEP also failed to continue water circulation drilling as their existing water pumps, which is pumping water from Lake Zewei, about 10 km away and 400 meter below the project site could only pump 80 Gallons/Minute, while for water circulation drilling, EEP would require about 100 Gallons/Minute water pump. The Steering Committee of this exploration project, Chaired by the Minister of Ministry of Water, Irrigation and Energy (MoWIE) is now discussing on how to

resolve the current challenges and ensure that the four wells are drilled as planned. It is expected that once these technical problems are resolved, the drilling will continue at an expected pace.

12. Under the GSDP Project, GoE plans to achieve the following implementation targets at the Aluto geothermal project site:

- a) Update the 3D conceptual model of the underground structure based on the appraisal drilling;
- b) Identify drilling sites for the production and injection wells;
- c) Form qualified drilling teams including drilling contractors to implement the project;
- d) Appoint technical design and supervision engineers;
- e) Procurement of drilling rigs and consumables;
- f) Conduct well tests and reservoir engineering studies to assess the capacity of the field;
- g) Install a steam gathering system;
- h) Conduct feasibility studies relative to a 35 MW Aluto Geothermal Power Plant;
- i) Install power plant as per the feasibility study recommendation;
- j) Install power evacuation facilities; and
- k) Install a second power plant if reservoir potential is confirmed.

13. Based on surface exploration information, the GSDP project is conservatively planning to install 70 MW power plant in two phases. The size and type of the power plant would be confirmed during the feasibility study based upon production, injection and interference testing.

14. EEP with financing and technical support from GoI will carry out geophysical explorations in Aluto to locate the best sites for drilling and well testing. Financing from IDA and SREP will be used for production drilling and testing activities in order to establish the economic viability of the geothermal resources at the Aluto geothermal site. For a target power capacity of 70 MW and assuming an average well capacity of 5 MW (electric), 25% dry wells and 50% reinjection wells, the Aluto component would require a total of approximately 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 2 existing wells would be used for reinjection. The production wells will be drilled using advanced technology, directionally down to a nominal depth of 2,500 meter to maximize the output per well in the range of 5-10 MW.

15. After approximately 60% of the wells are drilled, EEP with support from GoJ will carry out a feasibility study to design the steam gathering system, power plant and transmission evacuation system. Construction of the steam gathering system will be financed from the proposed IDA Credit. GoJ plans to finance the power plant in two phases. At the first phase a 35 MW power plant, financed by GoJ would be constructed at Aluto. Construction for the first unit could start in 2016-2017 (when approximately 13 wells have been completed), while the second unit could be constructed approximately two years later or upon confirmation of adequate steam. It is a common practice to operate the first unit for some time in order to better understand the reservoir production potential and characteristics of the reservoir, before a decision on constructing a second power plant is taken. GoJ is interested to finance the second 35 MW power plant in Aluto, if the drilling of wells progresses successfully and the first 35 MW power plant

operates satisfactorily. The transmission evacuation system would be constructed for 70 MW prior to the completion of the first 35 MW plant. The financing source of this facility is not yet identified. Both GoJ and IDA are agreeable to financing this facility provided funds are available.



Figure 3.2: Aluto Project Site: Existing 3 MW Power Plant

16. This component will finance drilling consumables, associated materials, drilling contractors, supervision engineer, etc. to drill and test 22 wells set up a steam gathering system connecting the producing wells.

ALUTO	Qt	Qt	Ot	Qtr.	Qtr	Qt	QT	Qtr	Q8	Qtr	Qtr.	QT.	Qt	Qt	Qt.	Qtr	Qtr.	Út.	Ot	Qtr	Otr	Qtr
Tasks:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	18	17	18	19	20	21	22
Four Test Well Drilling and Testing					120	- 90				251	28	281		P1	2	PT						
Exploration and Siting			Î			- 190								91	21	21						
Drill Rig Procurament									1			1							0			
Drilling Support, Supervisor Procurement			Î														÷	×				
Resource Evaluation	T	-				Ĩ		Ĩ					Ĩ									
Reservoir Engineer Procurement					Ĩ	Ĩ		Ĩ	Ĩ	Ĩ	Ĩ	Ĩ	Ĩ									
Drilling Consumables Procurement								Î	Î		Î	Î										
Power Plant Preliminary Design																						
Production and Injection Well Drilling	Ĭ																					
Well Testing	Ĩ	Ĵ	Ĵ	Ĩ																		
Reservoir Engineering																						
EIA of Power Project																						
Power Plant Final Design and Procurement																						
Construct Power Plant #1																				<u>.</u>		
Procurement of Power Plant #2																						
Construct Power Plant #2																						

Figure 3.3: Simplified time schedule for Aluto Geothermal Project

#### **Component 2: Alalobad Geothermal Site Development**

(US\$ 75.5 million: IDA US\$ 69.5 million with financing gap of US\$ XX million, GoI US\$ 2 million, GoE US\$ 4 million):

17. The Alalobad geothermal site is located in Doubti Woreda, Afar Regional State. The project site is in the North Eastern part of Ethiopia and is about 600 km from Addis Ababa. The Alalobad project area is situated within the Tendaho Graben and spread over an approximately 100 square kilometer area, containing potentially several distinct geothermal reservoirs. So far, most exploration has focused on the Dubti geothermal field in Tendaho. In the years between 1993 and 1998, six 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 to a depth of 500 meters would require a low level of investment, minimal time per well and the use of much smaller drilling rigs than those proposed for Aluto.

18. The GSDP project will support initial reconnaissance and test drilling in the Alalobad geothermal site. Based on the result of well testing, a feasibility study would be conducted to determine the future development of the Alalobad site. Once production is confirmed and while data for the feasibility study is gathered and preparation for future development is undertaken, well- head generators will be installed that will generate electricity instead of simply releasing steam. The well-head generators will increase significantly the financial and economic benefit of the project, as they will facilitate power generation during the possibly 4 to 6 years that it may take to construct a large power plant at Alalobad after the appraisal wells are drilled.

19. Iceland will undertake reconnaissance, surface exploration and associated geophysical and geochemical studies to prepare the Alalobad geothermal site for test drilling and well testing. During the preparation of the proposed project, possibilities to raise additional funds to undertake well field development and purchase and install well-head generators will be explored.

ALALOBAD	Qtr	Ctr	Qtr	Otr	d b	Qtr 6	Qt	Qtr	Qtr	Qtr	Qtr.	Otr C		Qtr	Otr	Qtr Qtr	Qtr	Qtr
Tasks:	1	2	3	4			7	8	9	10	11	12	13	14	15	16	17	18
Reconnaissance and Exploration																	1	
Site Preparation and Drill Rig Mobilization				1										8 - 13 2 - 23	100			
Drilling Support, Supervisor Procurement										100				6 3 2 2	1 10		2 - 2 - 2	
Drilling Consumables Procurement										100		89 - 2 89 - 2		8 3 2 5	1 10		8 - 15 	
Reservoir Engineer Service Procurement									5 20 2 - 20	1 1 L		81 - 5 81 - 5						
Test Well Drilling		2 3 9 3															8	
Well Testing and Reservoir Engineering	84 - S																8 - K	
Environmental Impact Assessment Study																	6 8	
Well Head Power Plant Design and Procurement															2 22		6	
Well Head Power Plant Construction*				- X-			2 - 2		3-39	- 01								
Conduct Feasibly Study to Determine Potential														2 2				

Figure 3.4: Simplified time schedule for Alalobad Geothermal Project

20. The French Development Agency (AFD) is preparing a project to support geothermal development in Dubti. At present, AFD is supporting the feasibility study for the Dubti site. Based on discussions with AFD and GoE, it was decided that Bank's support to Tandaho Graben would be at Alalobad, south of Dubti.

21. This component will finance drilling consumables, associated materials, drilling contractors, supervision engineer, etc. to drill and test 4 wells. If these wells confirm the expected geothermal resource potential, then well-head generators would be financed under this component.

## **Component 3: Drilling Rig, Associated Accessories and Spare Parts**

(IDA US\$ 61 million):

22. Bank will finance two full size modern diesel electric drilling rigs with all associated equipment, accessories for directional drilling and both over pressure and under pressure drilling and a complete inventory of spare parts. These rigs will be used at the Aluto project site once available and will at that time replace the refurbished drilling rig that is now being used for the exploration drilling. Use of two rigs will increase the implementation pace of the project by as much as two years and allow for the initiation of an income stream as early as possible. The availability of two modern rigs will allow for interchangeability of crews, minimize down time due to equipment failure and provide equipment with capability that far exceeds that which is now available. The existing refurbished drilling rig would then be available for drilling at other sites such as Alalobad.

23. Iceland is supporting EEP to determine a suitable technical specification for the drilling rigs that will be procured under the project.

24. At present, GSE owns two drilling rigs, which were purchased several years ago but were not used for more than a decade. One of these drilling rigs has already been refurbished and is being used at the Aluto site. The other rig is in storage and GSE should investigate whether it meets the needs of exploration drilling and could 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.

# 25. Component 4: Legal, institutional and regulatory framework development (IDA US\$ 3 million):

26. GoE plans to develop its Geothermal Development Policy and Geothermal Development Law and Regulatory Framework. GoI is working with EEP, GSE and the Ministry of Water, Irrigation and Energy in identifying suitable training programs to enhance their geothermal development capacity. IDA plans to support such development under this component. In addition to these specific technical assistance and capacity building support IDA will finance the drilling management contracts, supervision consultant contracts and services related to reservoir engineering and management. 27. A detail breakdown of the project components and their financing source is provided below in Table 3.

	Project Scope	Amount (US\$ M)	Proposed Financing (US\$ M)
	Exploration, Well Siting	1.5	Iceland
	Drilling Support, Supervision	20.2	WB
	Reservoir Engineering	2.5	WB
	Drilling Consumables	24.5	SREP
2		35.5	WB
վա	Well Testing	5.0	WB
V	Steam Gathering System	29.0	WB
	Power Plant I, 35 MW	55.0	Japan
	Substation and Transmission	22.0	To Be Confirmed
	Power Plant II, 35 MW	55.0	Japan
	Project Management	8.0	GoE
_	Total for Aluto	258.2	
	Reconnaissance and Exploration	2.0	Iceland
-	Drill Rig Mobilization, Site Prep	0.5	WB
bad	Drilling Support, Supervisor	3.0	WB
lol	Drilling Consumables	12.0	WB
Al	Well Testing and Reservoir Engineering	1.5	WB
	3 x 5MW Well Head Generators	52.5*	To Be Confirmed
	Project Management	4.0	GoE
	Total for Alalobad	75.5	
igs	Drilling Rigs with Accessories and	61.0	WB
R	Spare Parts Inventory	01.0	
	Total for Drilling Rig and Accessories	61.0	
ist			
SS	Capacity Building	1.0	WB
μA	Legal, Institutional and Regulatory	2.0	WB
lec	Framework Development		
Ľ	Total for Technical Assistance	3.0	
	Total Project Cost	397.7	

 Table 3.1: Detail Project Cost and Financing Breakdown (US\$ M)

\* Includes site preparation, engineering design, equipment, on-site construction, including steam gathering system and evacuation facilities.

#### **Annex 4: Implementation Arrangements**

#### ETHIOPIA: Geothermal Sector Development Project (P133613)

## **Project Institutional and Implementation Arrangements**

1. All components under the project will be implemented by EEP. Though EEP is a new enterprise, it has benefited from the transfer of qualified employees of EEPCo in EEP. It has also adopted the operational manual of EEPCo to start its operation. EEP will implement this project through its institutional systems.

#### Project administration mechanisms

2. EEP has created a Project Implementation Unit (PIU), under its Generation Project Portfolio Management Unit. The Project Coordinator is a Geothermal Specialist and is supported by one Engineer. The Project Coordinator (PC) will be responsible for all of the components implemented by EEP. This project unit will be supported by Financial Management and Procurement Officers. Appointment of these personnel in the PIU will have to be completed before Appraisal. On safeguard related issues, the Project Coordinator will be supported by EEP Environment and Management Unit (EMU).

#### **Financial Management, Disbursements and Procurement**

#### Financial Management

3. A financial management assessment was conducted at the main implementing entity of the project, Ethiopia Electric Power (EEP) in accordance with the Financial Management Manual issued by the Financial Management Sector Board on March 2010. The objective of the assessment was to determine whether the participating institutions have adequate financial management systems and related capacity in place which satisfies the Bank's Operation Policy/ Bank Procedure (OP/BP) 10.00. The policies and procedures requires borrower maintain, or causes to be maintain, for Project implementation, financial management arrangements that are acceptable to the Bank and that, as part of the overall arrangements in place for implementing the Project, provide reasonable assurance that the proceeds of the Investment Project Financing are used for the purposes for which they are granted. Financial management arrangements are the planning, budgeting, accounting, internal control, funds flow, financial reporting, and auditing arrangements of the borrower and entity or entities responsible for Project implementation. The financial management assessment considers the degree to which (a) the budgeted expenditures are realistic, prepared with due regard to relevant policies, and executed in an orderly and predictable manner, (b) reasonable records are maintained and financial reports produced and disseminated for decision-making, management, and reporting, (c) adequate funds are available to finance the Project, (d) there are reasonable controls over Project funds, and (e) independent and competent audit arrangements are in place. The assessment also included the identification of key perceived financial management risks that may affect program implementation and proceeded to develop mitigation measures against such risks.

4. The Bank has conducted the assessment building on the lessons learnt on the current energy projects implemented by the former EEPCo. The FM risk for the project is rated as High and is expected to reduce to Substantial when mitigating actions are implemented. The main strength of the Project is that the project implementing units of the former EEPCo are substantially maintained at EEP during the split and as a result EEP has incorporated staffs who has experience in Bank financed projects and it will have an updated finance procedures and accounting manual which describe the financial management systems, procedures and related internal control systems. The main risks for the FM arrangement include delay in finalizing the split of the former EEPCo. The Split of the entity and its implications on the accounts and systems has not been finalized which will ultimately have an impact on timely closing of accounts and getting timely audits. In addition, the issues of the past need to be addressed properly. Key issues are the past entity audit issues and findings reported as well as the JIT reported findings and recommendations thereof. The lessons learnt from energy projects implemented by EEPCo notes challenges in budget monitoring and internal audit challenges, internal control issues including long outstanding receivables and payable balances. Action plans that encompass the mitigation measures for the risks and weaknesses are prepared.

5. The project financial management arrangements will be coordinated and managed by the EEP-PIU. EEP intended to update and use the former EEPCo's Finance Procedures and Accounting Manual which incorporates the relevant FM issues including budgeting, accounting and internal control arrangements to take on board of the challenges and lessons learnt of the past and also to address new design features and issues. Budget procedures are laid out which are consistent with government budget procedures. Efforts to strengthen budget control/monitoring aspect will be intensified. Internal control strengthening mechanisms will be accorded attention. The Internal Audit unit is expected to review the project expenditures which are subject to internal audit testing. Accounting and audit staffing capacities and numbers will be reviewed and increased as appropriate. Capacity building measures need to be planned and conducted.

6. The project will prepare and submit quarterly unaudited Interim Financial report (IFRs) required. The contents and formats of the IFRs will be agreed before negotiation. The transaction based disbursement method using statements of expenditure will be used when disbursing funds to the Designated Accounts (DA) for the project. Other methods of disbursement that can be used by the project include direct payments, special commitments, and reimbursements. Further details about disbursements to the project will be included in the disbursement letter.

7. The project in coordination with Office of Federal Audit General (OFAG) is required to have the project auditor selected within 3 months of effectiveness and the project will have annual audit conducted. The project will then submit project audited financial statements to IDA in a form and content satisfactory to the Bank. The audit TORs will be agreed before negotiation.

8. FM-related covenants include maintaining satisfactory financial management system throughout the life of the project, recruitment of internal auditor before effectiveness, submission of IFRs of the project for each fiscal quarter within 45 days of the end of the quarter; submission of annual audited financial statements and audit report including the management letter, within 6 months of the end of each fiscal year.

9. Based on the assessment conducted, it is the conclusion of the Bank's FM assessment that the FM arrangements meet the IDA's requirements as per OP/BP 10. However, the action plans were agreed to address challenges and weaknesses observed.

## **Country Issues**

10. The GoE has been implementing a comprehensive public financial management (PFM), with support from development partners, including the Bank. The main instrument used for effecting Ethiopia's PFM reforms has been the Expenditure Management and Control subprogram (EMCP) of the government's civil service reform program (CSRP). This is being supported by the IDA financed PSCAP, PBS and other donors financing as well as Government own financing. These programmes have focused on strengthening the basics of PFM systems: budget preparation, revenue administration, budget execution, internal controls, cash management, accounting, reporting and auditing. The reforms are still on-going. However, with the basics increasingly in place, the Government is beginning to increase its focus on strengthening the linkages between public policy objectives and expenditure. In this context a programming/performance budgeting framework has been developed by MOFED.

11. The latest PFM study for Ethiopia was completed in 2011 using the Public Expenditure and Financial Accountability (PEFA) PFM performance measurement framework for the year 2010. This 2010 PFM assessment only covered the federal government in form of Ministries and Agencies as well as five regions. The PFM study notes that Ethiopia has made significant progress in strengthening PFM at both federal and regional levels. Improvements have been noted in budgeting and accounting reform. The credibility of the budget improved during 2006/07-2008/09 (EFYs 1999-2001) relative to the three years covered by the first PEFA assessment (2002/03-2004/05; EFYs 1995-97). The predictability in the composition of expenditure improved sharply, the variance in excess of the aggregate deviation falling to 5.7 percent. The main reason for the improvement appears to be strengthened in-year predictability in the availability of funds for the commitment of expenditures. Improved predictability meant that budget institutions could more confidently plan ahead for execution of their budgets, thereby increasing the likelihood that their actual expenditures would reasonably closely match their originally approved budgets. The budget is reasonably realistic and is reasonably implemented as intended, and performance in this regard has improved marginally since the period covered by the first PEFA assessment.

12. Comprehensiveness and transparency improved somewhat during the period covered by the 2010 PEFA assessment. Notable areas of improvement are: Increase in the amount of budgetary documentation submitted to House of Peoples' Representatives (HPR), strengthened reporting on donor projects and programs, improved transparency in inter-governmental fiscal relations, through greater timeliness in the provision of information to regional governments on the size of the budget subsidies that they will receive, and improved access by the public to key fiscal information through audit reports. A key challenge remaining to be addressed is for the Government to make available to the public information on the incomes and expenditures of extra-budgetary operations. The quality of debt management improved relative to the 2007 PEFA assessment, but the periodicity of reconciliation remains annual.

13. Due to the increased coverage of the internal audit function in terms of numbers of budget institutions, the additional experience gained by internal auditors since the previous assessment, increasing focus on systems audit, and increasing management response to audit findings. Further strengthening of the internal audit function is a key challenge for the future. Overall controls in public procurement are satisfactory with a fair degree of justification for the use of less competitive procurement methods and the existence and functioning of a good procurement complaints mechanism. A key issue remains the insufficiency of reporting on procurement according to the numbers of contracts and the type of procurement method. Bank reconciliations continued to be carried out in a timely fashion for all Treasury-controlled accounts, as were reconciliation and clearance of suspense accounts and advances. The full rollout of IBEX has helped to strengthen the quality of in-year budget execution reports, Annual financial statements prepared for 2006/07-2008/09 (EFYs 1999-2001) included information on revenue and expenditures, financial assets and liabilities, but excluded information on donorfinanced projects and programs. A limiting factor continued to be the use of non-IPSAS compliant accounting standards; compliance with IPSAS would require disclosure of information on donor-financed projects and programs.

14. Overall performance of external audit has improved due to increased coverage (to 51 percent of 2008/09 budgetary expenditures from 23 percent of 2006/07 budgetary expenditures) and a lessening of the time needed to audit annual financial statements. Audits conducted by OFAG generally adhere to INTOSAI auditing standards and focus on significant issues. Developments being planned at the time of the 2010 PEFA assessment indicated further strengthening of external audit in terms of both dimensions and a plan to strengthen follow-up.

15. The PFM study also notes that regional performance of PFM reform varies from region to region. There are plans to undertake PEFA in 2013/2014 and the outcome of the PEFA will change the above diagnosis.

## **Risk Assessment and Mitigation**

16. The FM risk for the project is rated as High and is expected to reduce to Substantial when mitigating actions are implemented. The main strength of the Project is that the project implementing units in the former EEPCo are substantially maintained at EEP during the split and as a result EEP has incorporated staffs who has experience in Bank financed projects and it will have an updated finance procedures and accounting manual which describe the financial management systems and related internal control systems and other set procedures. The main weakness risks for the FM arrangement include delay in finalizing the split of the former EEPCo. The Split of the entity and its implications on the accounts and systems has not been finalized in the assignment of staff that may create a backlog of transactions which will ultimately have an impact on timely closing of accounts and getting timely audits. In addition, the issues of the past need to be addressed properly. Key issues are the past entity audit issues and findings reported as well as the JIT reported findings and recommendations thereof. The lessons learnt from energy projects implemented by EEPCo notes challenges in budget monitoring, and internal audit challenges, internal control issues including long outstanding receivables and payable balances.

17. Action plans that encompass the mitigation measures for the risks and weaknesses are prepared, agreed and documented below:

Ac	ction		Da	te Due By	Responsible
1	Audit i	ssues		2	
	a. b. c. d. e. f.	EEP to submit the outstanding entity audit report of the former EEPCo along with the management letter for the year ended July 7, 2013. EEP to submit Progress report on the status of the implementation of the former EEPCo entity audit findings action plan on the issues that are applicable to EEP on a quarterly basis along with IFRs Agree on the Audit ToR Recruitment of external Auditors at early stages of the project Submission of annual audited financial statements and audit report including the management letter Disclosure-In accordance with Bank Policy- EEP will disclose the audited financial statements in a manner acceptable to the Bank. The Bank will also disclose the report following formal receipt.	<ul> <li>a.</li> <li>b.</li> <li>c.</li> <li>d.</li> <li>e.</li> <li>f.</li> </ul>	Before Negotiation Quarterly along with IFRs During Negotiation Within 3 months of effectiveness s within 6 months after the end of each FY Annually	a.,b.,d. & e. EEP c. & F. EEP & WB
2	Issues a. b. c. d. e. f.	arising from the split of EEPCo to EEP and EEU Share the progress of the split including the established committee's duties and responsibilities including a time bounded action plan and expected outputs that will assist to guide action in a timely manner EEP should establish its own sets of account in the Agresso to process transaction, record and extract financial statement directly from the system to avoid risk of incomplete or inadequate data Provide the envisaged short and long term changes in financial management and accounting systems EEP to follow on the JIT report: Submit comprehensive progress report including status update on the JIT action plan including the effect of the split on the issues raised Finalize account closing for the period from July 8, 2013 up to the split as soon as possible and get the accounts audited since it affects the completion of the split transaction and opening balances for both entities Finalize TOR for hiring of consultant firm to help the splitting process	a. b. c. d. e. f.	Before Negotiation As soon as possible Before Negotiation As soon as possible Before Negotiation	EEP
3	Improv a. b.	Provide the EEP budget prepared and submitted/approved by the Board for the period from the split up to July 7, 2014 Link the budget utilization reports submitted to the management with the project components and	a. b. c.	By Negotiation Regularly Quarterly	EEP

Ac	tion		Da	te Due By	Res	sponsible
	c.	categories Include a narrative in the executive summary of the quarterly IFR on the reasons for the significant variance if any and the corrective actions taken or planned to be taken by management				
4	Improv a. b. c.	ve accounting arrangement: Update the former EEPCo's Finance Procedures and Accounting Manual which incorporates the relevant FM issues including budgeting, accounting and internal control arrangements EEP to assign an accountant and assistant accountant to the project PIU to manage the project funds. Provide training on World Bank Financial Management and Disbursement guidelines	a. b. c.	End of April 2014 3 months after Effectivenes s Within 4 months of effectivenes s	a. & c. V	& b. EEP WB
5	Interna a. b. c.	I Control & Audit Review the internal control system in place so as to identify areas with gaps and take corrective action while updating the EEPCo manual for EEP purpose EEPCo to assign a qualified and experienced internal auditor for the project to strengthen the monitoring of internal control systems for the project. Training will be provided to the internal auditors	a. b. c.	End of April 2014 Before effectivenes s Within 4 months of effectivenes s	a. b. c.	EEP EEP WB
6	IFR/Re a. b. c. d.	Agree on IFR formats Agree on IFR formats IFRs will be submitted to the Bank within 45 days from the quarter Improve the quality of IFRs Trainings will be provided by the Bank	a. b. c. d.	During Negotiation Ongoing on a quarterly basis Ongoing Within 4 months of effectivenes s	a. b. c. d.	EEP & WB EEP EEP WB

## **Financial Management Implementing Entities**

18. All components under the project will be implemented by EEP (with collaboration with GSE, as needed). EEP will implement this project through its institutional systems coordinated in the Project Implementation Unit (PIU). Based on the MOU will be signed between Ministry of Mines and Ministry of Water and Energy. EEPCo will house the Project Implementation Unit (PIU). The PIU will report to EEP management, while a Steering Committee comprising of the Ministers of both the Ministries will oversee the project implementation and progress. The finance unit of the PIU, apart from assuming overall financial management responsibility for

project funds, will at least ensure that: (i) the project financial management activities are carried out efficiently and in accordance with acceptable accounting standards; (ii) the project financial affairs and administration are carried out as per the Financing Agreement; (iii) qualified accountants are recruited and assigned to handle the project funds; (iv) adequate internal controls are in place and internal auditors provide regular support to the project; and (v) the project financial transactions are audited by independent external auditor in accordance with international standards on auditing.

## Issues arising from the split of EEPCo to EEP and EEU

19. The EEPCo has spitted to Ethiopian Electric Power (EEP) and Ethiopian Electric Utility (EEU) as of December 9, 2013. In accordance to the Regulation No. 302/2013 of the Council of Ministers, Ethiopian Electric Power (EEP) is established to undertake duties, responsibilities and obligation of the former Ethiopian Electric Power Corporation (EEPCo) with respect to power generation, transmission, substation, universal electric access and other related programs including those funded by the World Bank. Thus, this split has implications on Bank financed projects in general and on financial management arrangements/issues in particular. During the assessment closure to most of the issues has not been reached and as such are agreed to resolve and update by project negotiation. The key financial management issues that arises due to the split includes the following:

a. Finalizing the Split of the Accounts and systems: Although, the two entities are formed legally, the accounts are not yet split up particularly for the opening balance and for the transactions since the split. We understand that the audit of the EEPCo's audit for the year ended July 7 2013 has not been finalized. Moreover, the accounts of the EEPCo from July 7 2013 onwards up to December 9 2013 was not been finalized and financial statements were not produced for audits to commence. We envisage that this will complicate the accounts splitting up process and setting up of opening balances. For the transactions since December 9 2013, we were informed that EEP will continue to use Agresso accounting system and the legacy system for Payroll and inventory management. However, we observed that the Agresso accounting system, as well as the legacy systems, are not yet segregated for the newly established legal entities (EEP & EEU) so as to have their own sets of accounts and be able to produce financial statements and that transactions are being processed and recorded in the former EEPCo sets of accounts. We were informed that this will continue until the completion of the split of balance sheet items at time of the split (so as to obtain opening balances) and until the EEP IT unit comes up with the solution. The EEP IT is also considering the issue and discussing with the relevant parties including the Agresso representatives to propose the way forward. It is important to understand how the system issues of the split will be finalized. It is our expectation that the EEP will establish its own sets of accounts in Agresso as soon as possible to migrate, process/record current FY transaction. On the other hand, we noted that a committee was established to undertake the split of the accounts/the balance sheet of EEPCo to EEP and EEU. This committee comprises of staffs from relevant units of EEP, staff from entities who had undergone a split such as Ethiopian Roads Authority (ERA), and staff from other stakeholders like Ministry of Finance and Economic Development (MoFED) and National Bank of Ethiopia  $(NBE)^6$ . We were informed that the committee has met and started its assignment. However, we were not provided with any documentation that shows the detail responsibilities, minutes, the outputs expected and the timeline. As a result, we are unable to assess whether the committee has considered the relevant issues and has a clear timeline. Therefore, we request that EEP report to the World Bank, by Project negotiation, on the progress of the splitting the accounts, the accounting systems including the fate of transactions since the split and the way forward. This report/update is expected to include time bounded action plan or milestones with expected outputs.

- b. We recommend EEP to establish its own sets of accounts in Agresso as soon as possible to process and record current transaction and later on update the opening balances instead of waiting for the opening balances to have its own sets of account.
- c. *Outstanding audit issues and follow up there of the former EEPCo*: The EEPCo audit for the year ended July 7, 2013 was due on January 7, 2014 but has not been submitted to date. It was noted at the time of the assessment that the auditors have not finalized their field work. The entity account closing of EEPCo for the period from July 8, 2013 to December 9, 2013 was started and expected to be finalized by January 8, 2014 but not yet completed. The audit is expected to commence as soon as the account closing is finalized. We were informed that this entity audit is being coordinated mainly by the EEU finance and will be followed by the committee established to do the split transaction. We recommend the outstanding audit for the year ended July 7, 2013 to be finalized as soon as possible and to submit the report Before Negotiation. The account closing and audit for the period ended December 9, 2013 should also be given due attention and the audit be finalized as soon as possible since it affects the completion of the split transactions and the opening balances for both entities.
- d. *Follow up on the implementation of audit recommendations*: Time bounded action plan was prepared and submitted to the Bank to implement the audit recommendation given on the audit findings for the year ended July 7, 2012. We were informed by the EEP finance that the status of this action plan can only be updated after the completion of the balance sheet split of EEPCo and at which time it will be clear which findings belongs to which entity. The audit of July 7, 2012 was qualified and the management letter included a number of significant weaknesses. We recommend the management to update us the progress of the implementation of the action plans and to continue the implementation of the outstanding actions as soon as possible.
- e. **JIT report**: During the former EEPCo, the Agresso system had continuous problems of software interface and mapping with the billing system software which resulted in a backlog of un-updated information, un-reconciled balances,

<sup>&</sup>lt;sup>6</sup> Letter from Ministry of Water and Energy dated 20/5/2006 EFY

suspense accounts, incomplete records, etc. The Bank in collaboration with EEPCo commissioned a Just in Time (JIT) study to understand such issues as well as overall accountability issues at EEPCo. The study report (Report on Accountability issues) was issued to EEPCo in January 2013. The study identifies a number of issues and proposed recommendations. We recommend EEP to submit a detail progress update on the implementation JIT recommendations-i.e. a report on the progress of addressing the findings of the JIT report undertaken by the World Bank in collaboration with the former EEPCo and how they are dealt with since the split and proposing the way forward; In this regard specific reporting will be made on the recruitment of financial advisor and internal auditor as agreed under ENREP;

f. The Bank will support through ongoing project by financing the hiring of consultants to help in the split process and also to address the above issues. TORs will be finalized for this endeavor.

#### Budgeting

20 The budgeting process follows the Ethiopian's government budget procedures and calendar. The budgeting arrangement of the EEP will largely be similar to the former EEPCo but the budget guidelines of the former EEPCo will be updated for EEP as part of the revision Finance Procedures and Accounting Manual which will be submitted by project effectiveness. The EEP's processes (core and support processes including Projects financed by the World Bank) will prepare individual budget which they will submit to the corporate planning and control process team for consolidation of the annual budget. The consolidated budget after reviewed by the top management will be submitted to Board and MoFED to review and comment. MoFED will give its recommendation and the Board of Directors of EEP will approve the annual budget. The approved budget will then be shared to the processes to update their plan according to the approved budget. The updated budget along with the expected monthly disbursements in a year will be submitted to the planning and control process team. EEP has not yet gone through this annual budgeting process since it was established in the middle of Ethiopian fiscal year (EFY) 2006 (FY 2013/14). We were informed that the EEP budget from establishment to the end of the current EFY has been prepared and submitted to the Board of Directors for approval. This budget has been prepared on the basis of the former EEPCo's approved budget for FY 2013/14 and by considering the activity and staffing changes since the split which are applicable to EEP. Furthermore, the budgeting process has started for EFY 2007 (FY 2014/15)7. Adequate and capable staffs8 are assigned to the EEP corporate planning and control process team for strengthening the budget preparation and monitoring roles.

21. Project cost is being worked out which will be delivered to the Bank by project negotiation. Derived from this project costing and annual work plans, specific annual budget forming part of the annual budget of EEP will be submitted to the World Bank annually. This budget comprising necessary details will be broken down in quarters for budget monitoring.

<sup>&</sup>lt;sup>7</sup> The EFY 2007 Budget process was initiated on February 14, 2014 through letter no. 68.4/8/06 where all the processes are requested to prepare and submit their annual physical and financial plan and budget to planning and control process team by March 24, 2014

<sup>8</sup> Nine staff with BA degrees and adequate experience

22 Budget monitoring arrangements will also remain largely similar to the former EEPCo's arrangements and will be documented in the manual to be revised. This project will follow the EEP budgeting monitoring framework and the project specific budget monitoring aspects will include (a) transaction level checking as to availability of budgets which appears to have been implemented at Bank financed projects under the former EEPCo which will continue for this project (b) the use of reports to managements and (c) the use quarterly Interim Financial Reports (IFRs) to the World Bank that comprises variance analysis by the project's component and categories including a narrative or notes to the quarterly IFR on the reasons for significant variance if any and the corrective actions taken or planned to be taken by management. However, lesson learnt from Bank financed projects implemented by the former EEPCo indicates challenges in budget monitoring especially in regards to projects. Budgets are not entered in the system, AGRESSO, and as such there appears to be weak monitoring using the system through inbuilt system internal checks. Transactions (payments) undergo budget check at before they were authorized but these are performed off the system using excel spreadsheets9 which were used to prepare monthly, quarterly and annual budget utilization reports to the management. . Such reports did not link budgets and expenditures with the project's components and categories. Moreover, the budget utilization report (Use of Funds by Project Activity) as per the quarterly IFRs, were not supported with adequate explanation of reasons leading to variances.

## Accounting

23. **FM manual:** We were informed that EEP plan to update and use the former EEPCo's Finance Procedures and Accounting Manual which incorporates the relevant FM issues including budgeting, accounting and internal control arrangements. The update is planned to be done in two months and will be completed by end of April 2014 which will be a condition of effectiveness. This project will use the updated version.

24. Accounting staff: The EEP corporate admin, finance and control process team structure requires 81 BA degree holders and we were informed that staffs are assigned to all positions and will soon commence on the assigned posts. We were also informed that the relevant project implementing units staffs of the former EEPCo are substantially maintained. This project will have one senior accountant and one assistant accountant recruited or assigned at the PIU to handle the financial management functions of the project. These financial management staffs will be on board before project effectiveness. They will be trained in World Bank Financial Management and Disbursement guidelines within 4 months of effectiveness.

25. Accounting software: We were informed that EEP continued to use the former EEPCo's Agresso accounting software in the short term to process accounting transactions and for financial reporting. During the former EEPCo, there existed continuous system problems of software interface and mapping with the billing system software as discussed above which were

<sup>&</sup>lt;sup>9</sup> The staff who was responsible for the budget check, maintained the approved budget in the excel spread sheet and register all disbursements so as to track the available budget and to report the utilization. The spread sheet also summarizes the budgets and corresponding expenditures according to the Ethiopian government codes not on the basis of Project components and categories.

documented in the Just in Time (JIT) study and as discussed above the EEP shall submit a progress update on the system issues as part of JIT report progress update. During our assessment we learnt that there are some initiatives on system updates. There are intentions to use the ERP in the long term but as well as intentions to go for automation which was agreed to be done by the Information Network Security Agency (INSA) of Ethiopia. We were informed that INSA provided amendments in light of the newly formed EEP requirements which included Billing Management System, Finance & Control Management System, Human Resource Management System, Procurement Management System, Materials Management System, Project Management System and Web Portal. However, we were not provided with proposals or any documents of the arrangements made between EEPCo and INSA. As a result, we are not able to assess the extent of the envisaged change or its impact using INSA. Moreover, we were not provided with clear information whether the planned automation by INSA was intended to replace the ERP solution which the former EEPCo was in the process of acquiring. Hence, we request EEP to provide us the written details before Project negotiation of all short and long term automation initiatives, anticipated changes with milestones, their linkages with one another and most importantly how this will affect projects including those being financed by the World Bank, be it active and in the pipeline.

#### **Internal Control and Internal Auditing**

26. **EEP internal control system:** As stated above, EEP has a plan to update and use the former EEPCo's Finance Procedures and Accounting Manual which incorporates the detailed internal control arrangements. The updated version will be used for this project.

27. The former EEPCo internal control system described in the manual was adequate. However, the compliance or practical application of the controls by the Entity was inadequate and as a result the management letters for the entity audit for the fiscal years ended July 7, 2010, 2011 and 2012, noted significant weaknesses in the internal control system and raises compliance issues. The findings include issues such as un-reconciling balances on suspense accounts, poor property (stock and fixed asset) management issues, long outstanding balances in receivables and payable, long outstanding assets in transit, inconsistent treatment of work in progress, cash management issues, abnormal balances, weakness in control in personal files, etc. We recommend a review of the internal control system in place so as to identify areas with gaps and take corrective action while updating the EEPCo manual for EEP purpose. For Bank financed projects while there are strength in most areas, there appeared to be weaknesses in some areas including controls of advances, property management and budget controls as described above.

28. **Internal audit:** EEP has an internal audit department that will report directly to the Board of Directors. We were informed that the corporate internal audit has a technical audit and a financial audit teams. The total number of audit professionals required is thirteen including the head. The intention is to include electrical and civil engineers in the technical audit team. Assignment of staff to the internal audit is in process and is expected to be completed by end of February 2014.

29. Past experience in dealing with the former EEPCo audit unit indicates that the internal audit department has capacity gaps, and mainly concentrates on case based audits rather than

systematically following the annual audit plan. The annual audit plans were not risk based. For purposes of this project and all World Bank financed projects and to further strengthen the financial management of the PIUs, EEP will assign an internal auditor. Regular internal audit reviews for the World bank financed Projects will be planned for integrated into EEP's internal audit plans as part of annual risk-based audit plan to help management identify, inter alia, key risks and weaknesses in the operations and internal control systems of the entity and projects. Internal audits shall be conducted in compliance with the annual risk-based audit plan. The former EEPCo initiated the process of recruiting a qualified and experienced auditor for this function under ENREP but this was not finalized. This being the case the assignment of a Project internal auditor will be a condition for effectiveness. The internal auditor will have to be trained in World Bank Financial Management guidelines. In addition, the internal auditor will assist the unit to develop an internal audit strategy and internal audit manual tailored and specific to EEP.

#### **Funds Flow and Disbursement Arrangements**

30. **Disbursements arrangements:** The transaction based disbursement method using statements of expenditure will be used when disbursing funds to the Designated Account (DA) for the project implemented by EEP. Other methods of disbursement that can be used by the project include direct payments, special commitments, and reimbursements. Further details about disbursements to the project will be included in the disbursement letter. If ineligible expenditures are found to have been made from the Designated Account, the Borrower will be obligated to refund the same. If the Designated Accounts remain inactive for more than six months, the Borrower may be requested to refund to IDA amounts advanced to DA.

31. **Banking arrangements for EEP:** EEP/PIU will open a segregated Designated Account denominated in United States Dollars (USD) at the National Bank of Ethiopia, and a local Account in Birr will also be opened to receive transfers from the USD account and for counterpart funding. Both the special and project accounts need to be opened and the details including the account signatories communicated to the Bank within one month after effectiveness.

32. **Flow of funds arrangements:** Funds flow arrangements for the project (through the designated and project bank accounts above) are as follows:

(a) IDA will make an initial advance disbursement into the segregated designated account for the project being implemented by EEP in US Dollars upon receiving a withdrawal application from the respective institution.

(b) Replenishment of funds from IDA to the Special Account will be made upon evidence of satisfactory utilization of the advance, reflected in SOEs and/or on full documentation for payments above SOE thresholds. Replenishment applications would be required to be submitted regularly on a monthly basis.

(c) Funds will be transferred from the Special Account to the project account and payments in relation to project eligible expenditure can be made from both accounts.

(d) Counterpart funds (if any) from the Federal Government of Ethiopia will be deposited in the Project Account to pay for all local currency project transactions.



#### **Figure 4.1Fund Flow chart**

33. Lessons from current projects notes that disbursement rate is low in most of the projects and there is also a delay in submission of withdrawal application leading to inactive DA. The reasons for this are largely related to project implementation issues and capacities. As such it is important to ensure that there is adequate capacity at the beginning.

#### **Financial Reporting**

34. EEP will prepare quarterly un-audited Interim Financial Reports (IFRs) for the project in form and content satisfactory to the Bank, which will be submitted to the Bank within 45 days after the end of the quarter to which they relate. The format and content of the IFR has to be agreed between the Bank and EEP during the Project Negotiation.

35. The contents of the IFR will include Statement of Sources and Uses of Funds, Statement of Uses of Funds by Project Activity/Component or categories, Statement of Designated Account, Notes on the IFR on financial performances, schedule and supporting documents.

36. The project will also prepare the projects annual accounts/financial statements within three months after the end of the accounting year in accordance with accounting standards acceptable to the World Bank. The audited financial statements should be submitted to the World Bank within six months after the end of the accounting year.

37. Current lessons indicate a mixed result in that while some of the World Bank financed projects under the former EEPCo submit their IFRs on time, other projects submit reports with considerable delay. The quality of the IFR is however concerning and it varies from quarter to quarter. The observed weakness includes wrong presentation of balances (e.g. advances and payables), inadequate explanation of financial performances, repeatedly observed cumulative balance and opening balance differences, unrecorded disbursements from the Bank and including adjustments in the report without any explanations. Therefore these challenges will have to be addressed as follows:

- a. As discussed above, one senior and one assistant capable/qualified project accountant and assistant accountant that devotes 100% of his/her time on the project will be assigned or recruited before effectiveness;
- b. As discussed above Reporting formats will be agreed during project negotiation;
- c. Training will be provided IFR preparation by the World Bank within 4 months of effectiveness.

## Auditing

38. Annual audited financial statements and audit report (including Management Letter) of the project will be submitted to Bank within 6 months from the end of the fiscal year using auditors acceptable to the Bank. The auditor will be appointed within 3 months of Effectiveness.

39. In accordance with the Bank's policies, the Bank requires that the borrower disclose the audited financial statements in a manner acceptable to the Bank; following the Bank's formal receipt of these statements from the borrower, the Bank makes them available to the public in accordance with The World Bank Policy on Access to Information.

40. The annual financial statements prepared in accordance with acceptable standards will be prepared within 3 months of the end of fiscal year and provided to the auditors to enable them to carry out and complete their audit on time. The auditor would express an opinion on the project financial statements. The audit will be carried out in accordance with the International Standards of Auditing (ISA) issued by the International Federation of Accountants (IFAC). The auditor will also provide a Management Letter which will outline deficiencies or weakness in systems and controls, recommendations for their improvement, and report on compliance with key financial covenants. The audit ToR for the project prepared by EEP will be agreed with the Bank during Project Negotiations.

41. A review of the former EEPCo's audit status reveals that audit reports particularly the Entity audit reports are received with long delays. The entity audit for the year ended July 7, 2013 was due on January 7, 2014 but has not been submitted to date. It was noted that the auditors has not finalized their field work at the time of the assessment. We recommend this be given due attention and the audit be finalized as soon as possible and the reports to be submitted Before Negotiation.

42. The recent entity audit report for EEPCo for the financial year ended July 7, 2012 was submitted belatedly with a qualified opinion together with a management letter that included a number of significant weaknesses. The issues of qualification are similar to the previous years. Management letter findings as described above show a number of internal control and compliance issues. The Bank requested for an action plan from EEPCo to address the issues raised in the audit report and EEPCo submitted its action plan on November 8, 2013. The follow up on the implementation of audit recommendations has been inadequate. Therefore it is required that:

- d. the EEP in collaboration with the EEU reports on the progress of implementation of the action plans before this project negotiation clearly identifying actions that has been implemented and action in progress and actions not undertaken; with justifications for the delay and failure to address the issues and clearly indicating actions taken or to be taken since the split in particular and the way forward in general;
- e. take actions on an ongoing basis to rectify issues and follow up with responsible stakeholders; and
- f. regularly report on the progress on all outstanding audit recommendations submitted on a quarterly basis together with the IFR for reference and follow up on progress.

43. The audit reports that will be required to be submitted by EEP together with due dates for submission are:

Audit Report	Due Date										
1) <i>Project Specific Financial Statements and management letter</i> to be submitted by EEP.	Submitted within <b>six</b> months after the end of each financial year.										
2) <i>Entity audit report and management letter</i> to be submitted by EEP											

#### Figure 4.2: Audit Reports

#### **Financial Covenants and Conditions**

44. FM-related covenants are the standard ones included in financing agreements which include (i) maintenance of a satisfactory financial management system for the project; (ii) submission of interim financial reports for each quarter within 45 days of the end of the quarter;

and (iii) submission of annual audited financial statements and audit report within 6 months of the end of each fiscal year.

45. FM Conditions: the following are required to be taken into consideration:

## a) Condition of Negotiation:

- i. Submit acceptable EEPCo audit report for the year ended July 7 2013.
- ii. Report on the progress of Splitting of accounts and systems- EEP report to the World Bank, by Project negotiation, on the progress of the splitting the accounts, the accounting systems including the recorded transactions since the split and the way forward. This report/update is expected to include time bounded action plan or milestones with expected outputs.
- iii. Report on the JIT- Report on the progress of addressing the findings of the JIT report undertaken by the World Bank in collaboration with the former EEPCo and how they are dealt with since the split and proposing the way forward; In this regard specific reporting will be made on the recruitment of financial advisor and internal auditor as agreed under ENREP;
- iv. Automation updates-EEP to provide a progress report on all short and long term automation initiatives, anticipated changes with milestones, their linkages with one another and most importantly how this will affect projects including those being financed by the World Bank, both active and in the pipeline;
- v. Report on past Entity Audit issues- Report on the progress of addressing the findings of the former EEPCo entity audit issues clearly identifying actions that has been implemented, action in progress and actions that are not undertaken with justifications on delays to address the issues as well as clearly indicating actions taken or to be taken since the split in particular and the way forward in general;
- vi. Reporting Formats- EEP will prepare and submit IFR format of the project;
- vii. Audit Term of Reference- EEP will prepare, submit and agree a project Audit ToR;
- viii. Detail costing of the project- EEP will submit a detail project costing for the entire life of the project, disaggregated for each FY.

## b) Condition of Effectiveness:

- ix. Submit an updated EEP Finance Procedures and Accounting Manual which incorporates the relevant FM issues including budgeting, accounting and internal control arrangements for the entity clearly indicating that Projects will use the Manual;
- x. This project will have one senior accountant and one assistant accountant assigned at the PIU to handle the financial management functions of the project
- xi. Assign a Project internal auditor;
#### **Supervision Plan**

46. The project will be subject to full on site supervision, at least twice per year on the basis that the current FM risk assessment after mitigation measures. After each supervision, the risk will be measured and recalibrated accordingly. Supervision activities will include: the compliance with the agreed up on FM arrangements, review of quarterly IFRs; review of annual audited financial statements as well as timely follow-up of issues arising; transaction review; participation in project supervision missions as appropriate; and updating the FM rating in the Implementation Status Report (ISR).

#### Procurement

## **EEP's Procurement Capacity Assessment**

#### **Legal Aspects and Procurement Practices:**

47. Adequacy of Procurement Procedures of the Recipient: Ethiopia has a satisfactory public procurement law (proclamation no. 649/2009) that was revised in July 2009, and enabling Directives. The regional states have been provided with prototypes of the procurement law and directives based on which to enact similar procurement legislation. The procurement law establishes the Public Procurement and Property Administration Agency (PPA), the regulator, with the mandate to set national public procurement standards and build procurement capacity nationally. The Ethiopian FY 2010 CPAR has identified number of areas to be improved in Ethiopian public procurement system, among which the need for Public Enterprises procurement being governed by Public procurement law, is one. EEP is Government owned enterprise and according to its regulation of establishment, it is not clear whether EEP's procurement is governed by the Federal Public Procurement proclamation and directives. EEP's top management has confirmed that it will adopt the procurement manual of its predecessor, EEPCo, which will be approved by its board of Directors. The detail procurement procedures and contracts implementation decision making framework is defined in the manual. The Geothermal Sector Development Project (GSDP) procurement is therefore to follow the said manual. The EEP will use the Bank's standard Bidding Documents, for all ICBs and that of the FPPA SB for NCB contracts procurement. The Government's SBD has been reviewed by the Bank for its acceptability for NCB and the SBD is generally acceptable with some modifications required. The exceptions in the NCB SBD are summarized as below:

48. **International and National Competitive Bidding.** Except as otherwise provided below, goods, works and non-consulting services shall be procured under contracts awarded on the basis of International and National Competitive Bidding. National Competitive Bidding (NCB) shall follow the Recipient's procurement procedures subject to the following additional procedures:

a) The Recipient's standard bidding documents for procurement of goods and works acceptable to the Association shall be used. At the request of the Recipient, the introduction of requirements for bidders to sign an Anti-Bribery pledge and/or statement of undertaking to observe Ethiopian Law against fraud and corruption and other forms that ought to be completed and signed by him/her may be included in bidding documents if the arrangements governing such undertakings are acceptable to the Association.

- b) If pre-qualification is used, the Association's standard prequalification document shall be used.
- c) No margin of preference shall be granted in bid evaluation on the basis of bidder's nationality, origin of goods or services, and/or preferential programs such as but not limited to small and medium enterprises.
- d) Mandatory registration in a supplier list shall not be used to assess bidders' qualifications. A foreign bidder shall not be required to register as a condition for submitting its bid and if recommended for contract award shall be given a reasonable opportunity to register with the reasonable cooperation of the Recipient, prior to contract signing. Invitations to bids shall be advertised in at least one newspaper of national circulation or the official gazette or on a widely used website or electronic portal with free national and international access.
- e) Bidders shall be given a minimum of thirty (30) days to submit bids from the date of availability of the bidding documents.
- f) All bidding for goods shall be carried out through a one-envelope procedure.
- g) Evaluation of bids shall be made in strict adherence to the evaluation criteria specified in the bidding documents. Evaluation criteria other than price shall be quantified in monetary terms. Merit points shall not be used, and no minimum point or percentage value shall be assigned to the significance of price, in bid evaluation.
- h) The results of evaluation and award of contract shall be made public. All bids shall not be rejected and the procurement process shall not be cancelled, a failure of bidding declared, or new bids shall not be solicited, without the Bank's prior written concurrence. No bids shall be rejected on the basis of comparison with the cost estimates without the Bank's prior written concurrence
- i) In accordance with para.1.16(e) of the Procurement Guidelines, each bidding document and contract financed out of the proceeds of the Financing shall provide that: (1) the bidders, suppliers, contractors and subcontractors, agents, personnel, consultants, service providers, or suppliers shall permit the Association, at its request, to inspect all accounts, records and documents relating to the bid submission and performance of the contract, and to have them audited by auditors appointed by the Association; and (2) Acts intended to materially impede the exercise of the Association's audit and inspection rights constitutes an obstructive practice as defined in para. 1.16 a (v) of the Procurement Guidelines.

49. **EEP's Procurement legal framework:** EEP is a Government owned enterprise and is an entity whose procurement is supposed to be regulated under the public enterprises law, However, during meetings with the EEP top management, it is confirmed that the EEP procurement will be governed by Ethiopian Federal Government Public Procurement Proclamation no. 649/ 2009. EEP will prepare its own procurement manual as per the public enterprise's proclamation, which would be approved by its Board of Directors and use it as a legal basis for its procurement functions (as interim arrangement, it has decided to adopt its predecessor, EEPCo's, manual). Procurement oversight for EEP is provided by its Board of Directors.

#### **Scope of Project Procurement**

50. The proposed financing arrangement for the project involves different Development Partners in the form of co-financing and parallel financing (IDA, GoJ, GoI and GoE). The financing will cover the cost of contracts for works, goods supply, supply and installation, consultancy services and different capacity building activities (the financing modality is parallel). Under the World Bank - Iceland compact, ICEIDA will finance technical assistance to EEP through an activity called "Surface Exploration and Capacity Building for Geothermal Development in Ethiopia". This activity is expected to commence earlier and ICEIDA will provide support to EEP to conduct advance procurement and prepare the bidding documents to procure two state of the art drilling rigs operating both on electricity and diesel fuel; and capable of drilling directional wells to about 3500m. As these rigs will be used in the project, the procurement process of these rigs has started, so that the rigs could be procured soon after the project is approved. ICEIDA has also advanced the procurement process of drilling consumables and steam gathering systems. The Task Team is working closely with EEP to ensure that they follow the Bank Procurement Guidelines properly, so that these entire contracts can be financed by the IDA fund or become eligible for retrospective financing.

## **Procurement Cycle Management:**

51. According to the new oorganizational set up of EEP, its corporate procurement function falls under the Finance and Supply Chain Process. The corporate procurement department conducts actual operational procurement activities of projects. The project units remain accountable to their respective processes (executive offices). Experiences from ongoing projects by the predecessor of EEP, EEPCo, show that major procurement bottleneck had been due to inefficient procurement cycle management in terms of the quality of procurement submissions and the lengthy time it sometimes takes to make procurement decisions, including evaluations and contract awards. The weakness records of EEPCo in delaying procurement processing will be used as lesson learnt and the new EEP has to monitor its procurement process and improve timely implementation of development programs/projects. The weakness that stems from either lack of procurement skills or over-regulation of the procurement process or both should be addressed to achieve quick results. In this regards, EEP needs to have defined business delivery standard and its Board of Directors' delegate more responsibilities to the EEP management and focus on monitoring of delivery of results. It is expected that the new EEP's management may better realize the critical role of procurement in project implementation and takes necessary actions towards institutionalizing procurement activities. Based on the lesson learnt from ongoing projects implementation (by the old EEPCo), procurement process monitoring, inefficiency and lack of quality assurance in terms of procurement cycle management has been real challenge.

52. EEP new management has confirmed that: (i) EEP has adopted the existing Procurement manual (that of EEEPCo) until it updates and gets its own procurement manual approved by the Board of Directors; (ii) EEP has already assigned the Procurement manager and additional procurement officers to the procurement department of EEP; (iii) EEP has established a Tender Endorsing Committee (TEC); and (iv) EEP has already assigned key project staffs include:

Project manager, FM staff of the project, Procurement staff, Technical staffs, M&E staffs and organized its internal structure to implement projects better.

53. Once the institutional and staff arrangements are in place, the project needs to embark on the following advance works: (a) defining its decision making matrix together with agreed business delivery standards; (b) drafting of Procurement planning (PP); (c) Preparation of ToRs, RFPs, BDs, drafting pre-qualification documents; etc.

#### **Organization and Functions:**

54. It is yet early to comment on EEP's procurement organizational structure, in terms of how responsibilities are allocated, its reporting relationships, its decision-making authority and its business performance standard. The expectation is that EEP learns from weakness of EEPCo and will have effective procurement functional unit to handle Bank financed projects procurement. Organization of procurement unit and allocation of functions and internal procedural manuals and instructions and historical compliance of EEP's predecessor were not satisfactory. Therefore the new EEP needs to learn from past experiences of EEPCo. Since the new EEP has not yet conducted major procurement and contract management, it is premature to rate the risk level of EEP in terms of its procurement organization and function. The recommendation from the assessor is that it would be reasonable to rate the risk as high and reassess the EEP, after a year, and revise the implementation risk rating, as necessary.

#### Support and Control Systems:

55. The EEP's internal Services and control mechanisms that provide checks and balances in the system and the independence and credibility of procurement audits and the quality of internal controls are yet to be known. But based on Public Enterprises Law, EEP will have its own internal technical and administrative control systems in the areas of performance audit, quality control and the oversight role of its Board of Directors. As this is yet to be established and become functional, the risk related to procurement support and control system is again rated (for prudence) as high.

#### **Record-keeping:**

56. As EEP is a new organization and currently under formation, its procurement records availability, quality, security and completeness of procurement records and files are not yet known. Overall data quality on numbers, types, values and dates of contracts awarded and names of awardees, records of plan and actual times taken to complete key steps in the procurement process are aspects that are to be given emphasis. The predecessor's performance in this area has been fair.

## **Staffing:**

57. EEP is finalizing assignment of staff to its new organizational structure. Procurement manager and some key staffs are already assigned. Their qualifications and experience is generally acceptable, but need specific training on Bank financed contracts procurement and

management. Staff turnover has been major problem in all public organizations and EEP may not be different. But it is also expected that the EEP will learn from its predecessor and motivate its staffs that otherwise used to leave their jobs due to non-attractiveness of the salary scales and lack of career path and adequate incentives to attract and retain a procurement cadre. The issue of a Procurement structure and staff with the procurement skills needed to implement project procurement efficiently remains high risk area and needs practical steps/mitigation measures by the new EEP.

#### **Private Sector Viewpoint:**

58. The assessment has included the views of few private firms dealing with the old EEPCo on how the written regulations and procedures are applied in practice. The Private Sector has less information on the split of EEPCo and has no idea about the new EEP. The view of most of the private firms contacted, regarding the old EEPCo, is mixed and positive to the general predictability of the system when it comes to Bank financed contracts. They are also positive to the transparency of the procurement process in general, but have a lot of reservations on the efficiency and quality of procurement and contract management processing in EEPCo, the predecessor of EEP. The private sector complains on the lack of clarity of some procurement decisions used to be taken by EEPCo and also carps the inordinate delays taken to finalize Bids Evaluations and award of contracts, which they mention sometimes taking over a year period of time. There are a lot of complaints from private sector on frequent cancellation of procurement by processes (EEPCo) without even informing bidders. The new EEP is expected to learn from these weak records of its predecessor and change its image in terms of building confidence of the private sector stakeholders/business community.

#### **Risk Assessment:**

59. Based on the information collected and considering the fact that the new entity is under formation and without track record, EEP's procurement risk seems **high**. This rating will be revised after a year when EEP's procurement and contracts management efficiency is tested on practice. The risk to procurement under the project and risk mitigation measures may be summarized as here below.

60. **Inherent Risk:** The EEP Board of directors supervises the Enterprise's procurement and also approves high value contract awards and therefore would be in a conflict of interest situation if it is to act as EEP's procurement oversight body or act as regulatory body. The Ethiopia 2010 CPAR recommends the procurement procedures of all State Owned Enterprises (SOEs), like EEP, should be under the federal public procurement law. Procurement Legislative and regulatory framework is fundamental to a well-functioning procurement system whose inadequacy makes the procurement risk rating HIGH. There is a risk that the lack of procurement legal framework will not allow compliance monitoring and procurement audits that are needed to enforce the creation and maintenance of the structures required to implement transparent, fair, efficient, accountable and value for money procurement. Further, the oversight arrangements wouldn't satisfactorily address bidders' complaints. The possible mitigation measure for this risk is to develop and enact a procurement law that covers all public enterprises in Ethiopia (SOEs).

This is a long term action that would involve GoE actors other than EEP. The lead agency for implementing this measure is MOFED.

61. **Procurement Governance and Capacity Risk (project risk):** Procurement Governance and Capacity Risk of EEP is high. Though some key staffs are retained from the old EEPCo, the Implementing entity (EEP) is a new organization. Establishing effectively functioning organization; updating and operationalizing systems and manuals; establishing different working committees; and getting performing team etc is a process that needs some time. Therefore; there will be risks expected related to: (i) timely procurement decisions making; (ii) less culture of meeting defined business delivery standards for each actor; (iii) ineffectiveness of procurement process quality assurance and accountability system; and (v) lack of strategies for procurement capacity building and clear career development path; (vi) low salary structure of procurement staff, etc.

62. **Procurement Risk mitigation measures:** Since EEP is a new organization, the established capacity to carry out procurement is low. However as many of the staffs and institutional working systems are transferred from EEPCo, it is considered that adequate institutional arrangements could easily be built for management of procurement. To mitigate the risks from low capacity whilst the organization is establishing itself, the following action plans are agreed with Government:

	-		
	Issues	Actions to be taken	Responsibility
I/no.			and time frame
1	As a new organization,	The Bank team to provide close support and	Bank (continues
	creating a performing team	provide more frequent implementation support	support)
	will take some time	missions	•• •
2	Some of the staffs and the new Tender endorsing committee lacks experience and may delay the process	EEP procurement and project managers to attend Procurement and contracts management training organized by joint EMI and the World Bank; The Bank team needs to organize procurement and contracts management clinics to the selected target group	By end of May, 2014
3	Multiple layers of decision making coupled with lack of defined business delivery standard will impact the progress	The EEP Board/top management may wish to consider revision of the EEP manual to increase delegation and award decision thresholds	Before end of Dec. 2014
4	The generic challenge in contracts administration will also affect delivery of contracts	EEP management and project managers need to get contracts management training and a contract administration manual should be prepared by the support of a consultant	Before end of Dec. 2014

## Action Plan to Build Agency's Capacity

Table 4.1: Procurement Risk Mitigation Action Plan

5	Lack of clarity in EEP's	As public spender, the EEP may need to be	Before end	of
	procurement legal basis will	strictly governed by the Federal Public	June, 2014	
	limit the monitoring and	Procurement Agencies law or should have its	,	
	auditing of EEP's	own procurement administrative manual. Its		
	performance	Board of directors is expected to provide clear		
	-	guidance on this legal issue.		

## Setting of Prior Review Thresholds, preparation of the initial PP and Supervision Plan:

63. With High Risk rating, the following thresholds for prior-review are suggested. Not exceeding \$0.5 million for goods, \$5 million for works, \$0.2 million for consulting services with firms and \$100,000 with individual consultants, but all ToRs need to be cleared by the Task team. The initial procurement plan will be prepared by the Borrower and will be reviewed and agreed during negotiation. Procurement supervision and post-reviews and audits will be conducted annually.

## Simplified Procurement Plan:

64. This is only an initial Procurement Plan (PP) with the minimum content that is required for disclosure on the Bank's website in accordance with the guidelines. The client will prepare the detail PP before negotiation, using the comprehensive PP template, and that will be reviewed and cleared by the Bank before it is put in use. The initial procurement plan will cover the first 18 months of the project and then updated annually or earlier as necessary.

## A. Initial Procurement Plan:

65. The major procurement activities, currently identified, to be financed from this financing proceeds are twelve in number; 8 Goods, 1 Works and 3 Consultancy Services. The major procurement activities are summarized in the table below:

**Project information**: Country: Ethiopia, Borrower: GoE, Project Name: P133613: Geothermal Sector Development Project (GSDP), Loan/Credit No.:..., Project Implementing Agency: Ethiopian Electric Power (EEP)

**Bank's approval Date of the procurement Plan** : Not yet approved **Date of General Procurement Notice**: Not yet posted. **Period covered by this procurement plan**: the first 18 months

## B. Goods and Works and non-consulting services

66. **Prior Review Threshold**: Based on the capacity assessment and considering that the IA is a new establishment, Procurement Decisions subject to Prior Review by the Bank as stated in Appendix 1 to the Guidelines for Procurement, is as follows:

	Procurement	Estimated	Prior	Comment
	Method	contract	Review	
		amount/	arrangement	
		Threshold		
1.	ICB and LIB	=>\$0.5 million	All	Bank's SBD to be used
	(Goods & Non-			
	Consultancy			
	Services)			
2.	NCB (Goods)	<\$0.5 million	The first one	FPPA's SBD may be used with the
			contract only	necessary qualifications & any
				eligible foreign bidder can
				participate
3.	ICB (Works)	=>\$5.0 million	All	Bank's SBD to be used
4.	NCB (Works)	<\$5.0 million	The first any	FPPA's SBD may be used with the
			contract	necessary qualifications & any
				eligible foreign bidder can
				participate.
6	Shopping	<\$0.05 million	No prior	FPPA's Shopping procedure may
			review	be used with the necessary
				qualification. Any local or foreign
				supplier/contractor can be invited
7	Direct	any	All contracts	This is noncompetitive method and
	Contracting			only accepted under special
				circumstances.

67. **Pre-qualification**. Bidders for works contract, plant design, supply and installation estimated to cost equivalent or above \$10 million shall be prequalified in accordance with the provisions of paragraphs 2.9 and 2.10 of the Guidelines, unless specifically agreed otherwise. But in this project case, it is agreed that the post qualification procedure will apply unless otherwise the government recommends for Pre-qualification process.

## Reference to (if any) Project Operational/Procurement Manual: N/A

Any Other Special Procurement Arrangements: N/A

## C. Selection of Consultants

68. **Prior Review Threshold**: Selection decisions subject to Prior Review by Bank as stated in Appendix 1 to the Guidelines Selection and Employment of Consultants:

	Selection Method	Prior Review	Comments
		Threshold	
1.	Competitive	=>\$0.2million	Bank's SRFP to be used
	Methods (Firms)		
2.	Single Source (Firms &	All contracts	This is noncompetitive method and only
	ICs)		accepted under special circumstances.
3.	Individual consultants	=>\$0.1million	
	(Competitive Method)		

69. Short list comprising entirely of national consultants: Short list of consultants for services, estimated to cost less than \$0.2 million equivalent per contract, may comprise entirely of national consultants in accordance with the provisions of paragraph 2.7 of the Consultant Guidelines.

## Simplified Procurement Plan for the first 18 months

Goods and Works and non-consulting services

1	2	3	4	5	6	7	8	9	10
Ref. No.	Contract	Estimated	Procureme	Prequal	Domestic	Review	Expected	Expecte	Comments
	(Description)	Cost in	nt	ification	Preferen	by Bank	Bid-	d bid	
		US\$	Method	(yes/no)	ce	(Prior /	Opening	opening	
		million			(yes/no)	Post)	Date	date	
EGSDP/G	Supply of Drilling Consumables	50	ICB	No	No	Prior	June 28,	August	IDA financed
-01	for Aluto Geothermal Power						2014	28, 2014	
	Development scheme.								
EGSDP/G	Design, Supply and Installation	16	ICB	No	No	Prior	July 24,	Sep. 25,	TBD
-02	of switchgears and transformers						2014	2014	(Possibly
	and construction of substations								IDA)
	at Aluto and Tendaho sites.								
EGSDP/G	Supply of drilling equipment set (2	58	ICB	No	No	Prior	July 28,	Sep.	IDA
-03	rigs, 1 Crane, 1 Bull Dozer, 1 Load						2014	30,2014	
	Trucks and 2 forklifts, electric app								
	with all accessories)								
EGSDP/G	Design, Supply, Installation,	55	Special	N/A	N/A	N/A	TBD by	TBD by	Special
-06	testing and commissioning of		Turnkey				Japan	Japan	agreement
	Aluto 35 MW Geothermal		agreement						between GoE
	Power Plant and Steam		With JICA						& GoJ
	Gathering System (First unit)								
EGSDP/G	Design, Supply, Installation,	55	Special	N/A	N/A	N/A	TBD by	TBD by	Special
-07	testing and commissioning of		Turnkey				Japan	Japan	agreement
	Aluto 35 MW Geothermal		agreement						between GoE
	Power Plant and Steam		With JICA						& GoJ
	Gathering System (Second unit)								
EGSDP/G	Drilling Technical Support (well	3.0	Force	No	N/A	Prior	April 28,	N/A	GoE
-08	testing and productivity		account				2014		
	monitoring for both Aluto and		(EEP+GSE				1		
	Tendaho)		)	70					
				/0					

EGSDP/G	Supply of Drilling Consumables	25	ICB	No	No	Prior	April 28,	June 30,	IDA
-04	for Tendaho Geothermal Power						2014	2014	
	Development Drilling								
	operations.								
EGSDP/G	Design, Supply, Installation,	45	ICB	No	No	Prior	December	Feb. 20,	TBD
-05	testing and commissioning of						15, 2014	2015	(Possibly
	Tendaho 25 MW Power Plant								IDA)
	and Steam Gathering System.								
EGSDP/N	Procurement of Drilling Service	10	ICB	No	No	Prior	April	June 17,	IDA
C-01	Contractor (non-consultancy						15,2014	2014	
	Services)								
EGSDP/W	Construction of Power	40	ICB	Yes	No	Prior	June 10,	August	TBD
-01	Transmission Lines and						2015	12, 2014	(Possibly
	connections at Aluto (13km) and								IDA)
	at Tendaho (28)Km (works)								-

# Consultancy Assignments with Selection Methods and Time Schedule

1	2	3	4	5	6	7
Ref. No.	Description of Assignment	Estimated Cost in US\$ million	Selection Method	Review by Bank (Prior / Post)	Expected Proposals Submission Date	Comments
EGTSDP/CS- 01	Drilling Technology consultancy and Drilling rigs operations technical support for both Aluto-Langano and Tendaho drilling schemes	15	QCBS	prior	December 15, 2013	ICEIDA
EGTSDP/CS- 02	Design and supervision Consultancy services for both Aluto and Tendaho Geothermal Power Development	5	QCBS	Prior	Several stages, July 2014	ICEIDA
EGTSDP/CS- 03	Reconnaissance, Exploration and well location/siting for Aluto and Tendaho Geothermal Power Development sites	3	Special arrangement from Iceida, Iceland	N/A	November 30, 2013	ICEIDA

#### Environmental and Social (including safeguards)

70. **Social Assessment:** The social assessment portion of the enhanced ESIA for Alalobad concluded that: there is no community living permanently in the proposed project area; the economic livelihood of the region's population is mostly based on pastoralism; the Afar people have a portable house known as "Ari", a movable tukul that the community carries with them as they move with their cattle. The region is undergoing social change in agricultural production with vast sugar cane plantations and irrigated farming for food crops getting more importance. The communities are now becoming agro- pastoralists, practicing agriculture and animal rearing. There is no known site of culturally, historically, archeologically, geologically or topographically important features within the project area.

71. However, there are a few hot springs and some areas of boiling mud around the proposed project site which pastoralists use as medicine for their cattle and the project might affect the path to the hot springs. Due to scarcity of water in the area and lack of awareness, individuals may utilize the waste water from the project, the byproduct of the drilling process, which is not safe for human use. There are no infrastructures or facilities such as churches, mosques, schools, health institutions and other major community services to be affected by the project. Most of the constraints in the project area relate to cultural, social, economic, legal, and environmental factors and the constraints critically affect women. The non-availability of basic social services within a reasonable walking distance is of particular concern to women. The assessment recommended that special assistance be provided to vulnerable and underserved groups, in particular priority should be given to providing potable water supply within a reasonable distance; easy and sustainable access to electric power supply in villages and towns; and more importantly, a well-developed plan that will allow both communities and institutions to co-exist with the geothermal resource development project in harmony, for example, the project should make the road to the hot springs accessible for the pastoralist community.

72. **Public Consultation with key stakeholders:** An extensive and participatory consultative process with stakeholders including under-served groups at the regional, woreda and kebele levels, informed the key design features of the project. The result of public consultations showed that community members have a positive attitude towards the project and believe that the project will positively impact job opportunities, income generation and electricity supply to the local community. Community members expressed concerns that the project would lead to: a loss of individual and communal properties; and the introduction of HIV and AIDS as well as other reproductive health infections. Above all, community members and their leadership understood the importance of the project and agreed to give support and other necessary cooperation for success of the project. They also agreed that the culture and tradition of the local people and community norms and values must be respected by project workers.

73. The Alalobad natural hot springs was one of the most important issues raised during the consultation. The negative impact and mitigation measures were highlighted and discussed with stakeholders. Community members noted that the pastoralist community brings cattle to the natural hot spring once in a week, because of the hot springs medicinal properties for both the cattle and the people. With support from GoI, EEP plans to conduct a study to harmonize the geothermal project plan with the Alalobad hot spring development plan to incorporate unrestricted access to the pastoral communities.

74. It was also highlighted that the direct project affected area, particularly in Alalobad village, in Gure Mudale and Gayiru rural kebeles, has no market for buying and selling food and water supply services. To this end, community members recommended that the project should facilitate the food production, water supply and marketing services as well as employment opportunities. It was noted that there are no communities living permanently in the project area and therefore land acquisition should not be a problem as land is owned by the Afar Region not by clan elders and thus no disputes are anticipated. The steam released from the geothermal wells at the time of maintenance will have negative impacts on trees and human health. The drilling of geothermal wells could pose a risk to individuals traveling through the geothermal fields, if not fenced. The geothermal field should be fenced and individuals passing around the project area shall be informed about the risk and people shall be kept away from the geothermal project site.

75. Malaria is one of the top ten diseases in the area and ponds created for project activity can exacerbate the spread of the disease. As ponds will be constructed to hold sludge and waste water for drilling purposes, it will create a favorable ground for the spread of malaria. Prevention of the spread of malaria will be an additional burden for the administration. The project office will support the woreda health bureau in preventing spread of malaria. The project office shall plant indigenous trees around the sensitive areas and camp sites to replace trees that will be damaged due to project activities.

76. **Benefit Sharing:** In Ethiopia, there is no law on benefit sharing mechanism for geothermal activities and the communities might not benefit directly from the development objectives of the project. However, the Constitution of Ethiopia recognizes the participation of the communities in the development agenda and consistent with that, consultations with communities and other stakeholders addressed the issue of benefit sharing. The communities requested installation of a water pipe, water distribution center and a cattle trough. The project will continue to consult with the communities and will provide these utilities. The project will also partner with other projects in the area to provide other basic services to these communities.

77. Grievance Redress Mechanism (GRM): A register of resettlement/compensation related grievances and disputes will be established, with well-defined conditions of access to this register (where, when, how), and it shall be widely disseminated within the interested area of the town as part of the consultation undertaken for the sub-program in general. The GoE has agreed that land acquisition related grievances and disputes that arise during the course of implementation of a resettlement and compensation program related to the project will be resolved in a manner that will be cost efficient to the Project Affected Persons (PAPs) as stated in the RPF. The GRM will include a "first instance" mechanism, on the model of traditional dispute-resolution mechanisms, in the form of a locally selected Mediation Committee consisting of the representative of the implementation agency; representatives from local administration (Woreda); local representatives of Program Affected Persons (2 to 5) selected from the affected area. The existence of and procedural details for this first instance mechanism will be widely disseminated to the interested population as part of the consultation undertaken for the subprogram in general. Courts of law shall be considered as a "last resort" option, which in principle should only be triggered when the "first instance" mechanisms fail to settle the grievance/dispute. However the Constitution allows any aggrieved person the right of access to a

court of law. For other project related grievances, the project will provide affordable and accessible procedure for grievance redress, including third party settlement of dispute which should take into account the availability of judicial resources and community traditional dispute resolution mechanisms.

78. The table below briefly summarizes the potential implementation risks and challenges, and mitigation actions to address them.

Potential risks and Challenges	Mitigation Measures
The Social Assessment undertaken might have missed important information given no community is living in Alalobad. Community consultation might not recognize the mobile nature of pastoralist community and might exclude women and poorest households.	The GSDP will continue follow-on consultation process and repeated Social Assessment for social mapping and to identify resource use patterns around the project site and the types of vulnerable groups. These follow on consultations and assessment will inform and refine the Social Management Plan. GSDP will provide technical assistance and culturally appropriate capacity building for the women groups and support community groups so that they can participate in consultative meetings and include specific measures to encourage and facilitate community awareness of the project and participation in project benefits.
GSDP will be implemented by Federally hired staff, who might not be culturally sensitive to community economic institutions and cultural organization.	GSDP will provide culturally appropriate capacity building for its project staff and will involve during implementation, relevant regional, woreda and kebeles governments institutions as well as community organizations.
Pastoralist Community uses the hot spring at the project site as medicine for their cattle and the project might restrict access to them and their animals. The project might impact the tourism potential of the boiling mud in the project site.	The project will harmonize the geothermal resource development plan with the Region's culture and tourism plan. The project will develop a plan that will enable communities and institutions co-exist with the geothermal resource development project in harmony, including constructing access paths to the hot spring to allow pastoralists gain access. This plan will be developed during the design phase of the Alalobad - Tendaho geothermal Power Development Project with the consultation of all stakeholders, including impacted communities
The proposed drilling of geothermal wells will have an impact on the existing land use both temporarily (for access roads, etc) and permanently (for camp	In order to avoid future land use problem, the geothermal project site shall be demarcated and geothermal wells shall be fenced and The GSDP will engage in continuous consultation with local people as well as regional offices on land uses. Tree planting will be done in the camp site

Table XX: Potential Risks, Challenges Mitigation Measures to Social Assessment

	the second
site, substation and Geothermal	to replace any damaged local tree during project implementation. No agricultural land will be occupied nor crops affected and in order to avoid land use dispute, Resettlement Policy Framework (RPF) will be used for any land acquisition, and consultation with communities and local administration will be mandatory.
The major community health and safety impacts include: exposure to hydrogen sulphide /H <sub>2</sub> S/, and infrastructure safety.	The mitigation measures actions for "geothermal gases" are: Installation of $H_2S$ monitoring and warning system; Development of contingency plan for $H_2S$ release events; Provision of facility for emergency response team and workers in locations with high risk of exposure, with personal $H_2S$ monitors, self-containing breathing apparatus; Provision of adequate ventilation; Development and implementation of a confined space entry program for areas designated as confined spaces; and Provision of liquid and gases. These measures will be discussed with the stakeholders, including relevant communities. There will be continuous community awareness activities on the health and safety impacts of the project.
The project activities will be noisy. Drilling rig; well testing and vibration are the potential noise sources of the project. Noise will arise from the geothermal fluid escaping from the pressurized wells.	During the construction period workers will wear ear mufflers and other safety equipment /PPE/. Noise level will be kept low and monitored according to the government approved standards. Machines and vehicles will be maintained regularly to keep noise at acceptable level.
Communities may be exposed to physical hazards associated with the geothermal wells and related pipeline networks. Hazards may result from contact with hot components, equipment failure or the presence of active and abandoned well infrastructure which may generate confined space or falling hazards, transporting of machinery, installation of the drilling machine may cause accidents /incidents	During transportation and construction activities, the contractor will: comply with safe handling and storage of hazardous materials, seek direction from the supervising engineer for disposal of hazardous material, clean up spills of hazardous materials immediately, suppress fires on or adjacent to construction or ancillary sites, and in case of any spill, inform relevant departments at once and deal with it in accordance with the spill contingency plan. Penalties for negligence will be stipulated in the contract agreement.
The influx of project workers from	The project will embark on aggressive approach to

other areas may cause short term social concerns in the area that may need to be addressed. Such concerns include spread of HIV/AIDS, Sexually Transmitted Diseases and substance abuse Workers in the drilling of the geothermal wells return home in an inebriated state and can abuse and injure family members and generally cause a good deal of domestic upheaval.	fighting STIs and HIV/AIDS. Health education will be provided and awareness be created to workers and surrounding communities during construction. The local administration will play vital role in controlling informal sector activities near the project camp and the contractor is expected to provide free condoms to construction workers. Health education especially on HIV/AIDS and STIs should be given regularly. The project will give preference to work forces from the project area in order to avoid any new cases coming with migratory workforce. The problem of alcohol abuse will be explained to workers as part of health education program. Recreational facilities will be made available at the camp and additional activities will be a normal part of camp living. Severe penalties will be instituted for drunkenness and disorderly behavior along with the provisions of counseling services for substance abuse.
Changing patterns in resource use and access by the project will reduce access to resources and might result in conflict.	The project will provide affordable and accessible procedure for grievance redress, including third party settlement of dispute arising from relocation such as grievance mechanisms which should take into account the availability of judicial resources and community traditional dispute resolution mechanisms.
In Ethiopia, there is no law on benefit sharing mechanism for geothermal activities and the communities might not benefit directly from the development objectives of the project.	While there is no law on benefit sharing arrangement, the Constitution of Ethiopia recognizes the participation of the communities in the development agenda and consistent with that, consultations with communities and other stakeholders addressed the issue of benefit sharing. The communities requested installation of a water pipe, water distribution center and a cattle trough. The project will continue to consult with the communities and will provide these utilities. The project will also partner with other projects in the area to provide other basic services to these communities

## Monitoring & Evaluation

79. The proposed GSDP implementing agency, EEP, will remain responsible to monitor and evaluate project progress. In addition to monitoring and evaluating the PDO level results indicators and intermediate results indicators reflected in Annex 1, the project unit will also maintain (i) drilling logs, mud logs, wire line logs, (ii) record casing and cementing program including a sketch of each well, (iii) results of all well tests (production, injection and interference), (iv) conceptual and numeric reservoir model, (v) results of all geochemical

sampling, analyses and calculation of geothermometers, scaling, corrosion potential, etc. To ensure that EEP has adequate capacity to reliable monitor and evaluate these critical information, the project will appoint qualified drilling contractors, drilling supervision engineers and geothermal specialists under the project.

## Role of Partners

80. The proposed GSDP design showcases the benefits of effective coordination and partnership among several development partners in helping the GoE realize its geothermal potential in an efficient manner. The development partners and programs supporting this project are: IDA, GoJ, GoI and SREP.

81. IDA helped the GoE to prepare and submit an investment plan to SREP subcommittee with US\$ 26 million allocated for its geothermal energy development. GoE assigned US\$ 1.5 million to prepare a geothermal development strategy note with technical support from IFC Investment Advisory and kept US\$ 24.5 million to finance the high risk investment capital of upstream drilling of wells. Furthermore, GoE leveraged financing from IDA, GoJ and GoI with this initial allocation from SREP.

82. IDA and GoJ co-financed the drilling of four exploration wells in Aluto. As a continuation of this initiative, IDA and SREP will finance drilling of 22 new wells and the steam gathering system in Aluto. GoJ will finance a 70 MW geothermal power plant in two phases.

83. GoI as part of the WB – Iceland Geothermal Compact will provide technical assistance in Aluto and Alalobad. In Aluto, Iceland supported technical assistance will help GoE identify the 22 drilling sites, prepare the drilling plan and update the 3D conceptual reservoir model and numeric reservoir model. In Alalobad, GoI will finance surface exploration to assess the geothermal potential of the area and identify 4 drillings sites with drilling plan. IDA will finance the drilling of 4 wells and based on the information obtained from the drilling, GoI will finance the preparation of the 3d conceptual reservoir model and numeric reservoir model.

## Annex 5: Operational Risk Assessment Framework (ORAF)

## ETHIOPIA: Geothermal Sector Development Project (P133613) Stage: Appraisal

1. Project Stakeholder Risks	Rating	Moderate			
<b>Description :</b> This would be the first large scale geothermal project in Ethiopia. Hence, stakeholder expectation on the project outcome and	<b>Risk Management:</b> EEP needs to inform its stakeholders on the expected outcome of the project and manage their expectation by informing the project design, structure, timeline, expected				
performance could be different from the reality.	outcome, etc.				
	Resp: EEP	Stage:	Due Date :	Status:	
2. OPERATING ENVIRONMENT RISKS (Note for information: t	this section is not discl	osed at negotiation and Bo	oard presentation stages)		
<b>2.1. Country</b> (Note for information: this section is not disclosed at negotiation and Board presentation stages)	Rating:	Moderate to Substantia	վ		
Description:	<b>Risk Management:</b>				
<b>Economy:</b> The Government of Ethiopia is pursuing a heterodox 'developmental state' strategy partly inspired by East Asian experience. The strategy has delivered impressive results over the past decade in terms of high economic growth and substantial poverty reduction and social progress. The key characteristic of this model is very high public investment (3 <sup>rd</sup> highest globally). To achieve this, however, policies have been put in place that have important negative side effects on long term growth: (1) a low nominal interest rate (negative, in real terms) reduces the cost of financing, but undermines savings mobilization, (2) an overvalued exchange rate reduces capital import costs, but impedes external competitiveness, (3) domestic credit and foreign exchange is primarily directed towards public investment at the expense of the private sector, (4) recurrent spending (including the public sector wage bill) is kept low to finance capital spending. (5) foreign exchange reserves are kept low to finance public investment and manage inflation, but this increases external vulnerabilities. In addition, the economy is facing a series of specific domestic and external risks as detailed below: <b>Domestic risks factors:</b> <u>Arising from current policy stance:</u> (a) A rapid rise in domestic debt of major state owned enterprises if	The Government doe maintain economic p The Bank has an acti This dialogue takes p Economic Update Ree discussions on inflati (4) High Level Retre concessional Borrow While the policy dial owing to the indepen resistance to advice f In the case of an eco seek financial assista	es not currently have a prog olicy independence and vi ve economic policy dialog place in various contexts, in eport (bi-annual); (2) Prote ion (quarterly); (3) GTP Pr at (annual); (5) Debt Susta Policy (quarterly). ogue has strengthened und dent-mindedness of GoE p from the International Fina onomic shock, the Govern nce from the IMF and the	gram with the IMF, as it pre ews the current quota too lo que with the Government of neluding but not limited to: weting Basic Services (PBS) ogress Report consultations inability Analysis (annual); ler the new CPS, it has limit poolicy makers and their natu neial Institutions. ment would nonetheless be World Bank.	fers to w. Ethiopia. (1) macro (annual); (6) Non- tations ral expected to	

domestic financing of public investment is continued. (b) Strain on the state-owned Commercial Bank of Ethiopia (CBE)				
resulting from increased domestic financing of public investment.				
(c) The realization of contingent liabilities by Federal Government in				
the event of substantial losses of State Owned Enterprises, CBE, and				
Development Bank of Ethiopia potentially arising from failed public				
investment projects.				
(d) Increased incidence of corruption as a result of high levels of				
public investment.				
(e) Domestic weather related shocks (induced by insufficient rain fall)				
could induce a humanitarian crisis and macroeconomic imbalances				
such as lower growth, high inflation, and balance of payments				
difficulties.				
(f) Financial sector risks are not well understood giving the				
authorities' resistance to conducting an FSAP. That said, the 27				
percent rule is one possible source of financial sector risk as it				
negatively impacts the lending ability of private banks, and in turn				
their profitability as well as generating maturity mismatches.				
(g) Balance of payments pressures from substantial import needs of				
public investment and an appreciated exchange rate.				
Arising from potential policy decisions: (h) Decisions to revert to a high inflationary environment (inflation tax) in response to the realization of contingent fiscal liabilities				
(i) Given an overvalued real effective exchange rate, the authorities				
may decide to devalue the birr, which would induce a spike in				
inflation and increase the cost of public investment.				
(k) A loosening of the fiscal or monetary policy stance aimed at				
sustaining high growth, which would induce inflation.				
(1) A further deterioration of the restrictive business environment,				
including in the area of trade logistics.				
External risk factors:				
(m) Strong intensification of the Euro Area crisis, which could				
prompt falling commodity prices and higher risk aversion. This				
would reduce demand for Ethiopian exports and lower coffee prices,				
and also result in shortfalls of aid flows, lower remittances, and				
limited financing for public investment.				
(n) A global economic slowdown would lead to a sharper commodity				
price decline with a sharper negative impact on Ethiopian exports. It				
would result in severe shortfalls of aid flows, and a drastic decline in				
remittances. GTP financing would be jeopardized with significantly				
lower growth.	Resp: Government	Stage: All	Due Date: Continuous	Status: In
(o) A sharp slowdown in China would decrease Chinese FDI and	and Bank			progress

slow the development of newly emerging export sectors, like textile and leather manufacturing. Major infrastructure investments, particularly in power, telecom, and roads, may not be fully financed. (p) International commodity price increases or fluctuations affect both export price (coffee) and import price (fuel and wheat) in Ethiopia. It is likely that the negative impact from import price increases outweighs the benefit from export price increases.					
	Rating :	Moderate			
<b>Regional context:</b> Instability remains a permanent feature in the volatile Horn of Africa. Tensions with Eritrea, instability in Somalia and domestic strains in the Ogaden region will remain. Water politics shape Ethiopia's relationship with Egypt, which has shown recent deterioration. The dangers of all these potential hotspots present challenges to Ethiopia on at least two counts: (a) they represent a significant distraction and make the delivery of services in certain parts of the country more difficult; and (b) through the spill-over of localized conflict, they carry risks for Ethiopia's internal security. The Ethiopian government will closely monitor the situation in Sudan and South Sudan, as the latter seeks to establish itself following secession in July 2011. The two countries are key trading partners, and Ethiopia relies on them for much of its oil needs.	Risk Management: Liaise closely with the government and development partners ensure our program is resilient to regional shocks.         Growth and diversification of the Ethiopian economy (supported under CPS Pillar together with a range of interventions supported under Pillar 2 will help to increase resilience and decrease the vulnerability of Ethiopian people and thus help mitigate manage this risk. Ongoing projects (especially PSNP and PCDP) can respond to drought-affected (around 8m people receive assistance through PSNP each year) as well as to strengthen the government's disaster response mechanism, which would improve Government's ability to respond to droughts and other natural disasters in the dium and long-term.         A strong and resilient framework of macroeconomic policies can help the government in the context of the proposed stronger engagement on such issues, an possible DPL.				
	<b>Resp:</b> Government and Bank	Stage: All	Due Date: Continuous	Status: In progress	
	<b>n</b>	363 /			
Political economy / Governance / Transparency & accountability:	Rating:	Moderate	10.10 ct 14.00	'n	
reinforcing concerns about the nature of Ethiopian democracy. This has manifested itself through restrictive civil society and media laws; tight control on information key to development outcomes; lack of separation of party and state; and allegations that program benefits have been subject to political capture.	<ul> <li>Kisk Management: Government remains committed to continue with GTP</li> <li>implementation as planned. Since the WBG Strategy and program are firmly anchored</li> <li>in the GTP, the risks to their implementation will be closely linked to that of the</li> <li>national program.</li> <li>The Bank continues to focus on fostering improved governance, which is the</li> <li>foundation in the new CPS.</li> </ul>				
In 2012 there was a smooth transition following the death of the	foundation in the new	v CPS.			

create some instability going forward, although these processes are part of a long-term plan originally initiated by the previous Prime Minister, and have so far been rolled out with little controversy. The government has confirmed that the GTP remains the centerpiece of the country's development strategy, its commitment to the vision and goals stated in the GTP and that it will pursue its implementation as planned. In the longer term there is also a risk associated with the next elections scheduled for 2015. Levels of corruption in Ethiopia are thought to be low by regional standards; in traditional service delivery sectors the use of public resources for private gain is not considered widespread or systemic, but corruption in generative device the next the next set of the next sector.	initiatives.			
Ethiopia's scores of 2.7 on the Transparency International 2010 Corruption Perception Index suggest that its perception of corruption is similar to that of other East African countries - Tanzania (2.7); Uganda (2.5) or Kenya (2.1).	<b>Resp:</b> Government and Bank	Stage: All	Due Date: Continuous	Status: In progress
Institutional capacity to implement:	Rating:	Moderate		
There is a risk, that capacity development and probity of the public service may not be able to keep pace with the broader reform agenda. Turnover rates within the public service are high, resulting in limited institutional memory and disruption of service delivery. The inadequate stock of skilled and experienced personnel at all levels will slow the pace of execution, and jeopardize its efficacy. The expansion of the number of woredas has exacerbated this challenge. The risk of the potentials of inadequate capacity is one which has been identified by Government itself, and it has invested much effort already in building capacity and local leadership. A greater use of public private partnerships would help close financing gaps, and also bring in needed expertise.	<ul> <li>Risk Management: The foundation of the CPS and the proposed lending and non-lending activities, including those supporting work on safeguards are designed to provide the support to the government to help them manage this risk.</li> <li>Many projects include TA components to strengthen implementing institutions. The PSCAP operation has worked with the government to promote business process re-engineering and 'balanced scorecard' appraisals to make government at all levels more efficient and goal oriented.</li> <li>PBS Sub-programs C1 and D strengthen decentralized FM, procurement and M&amp;E systems</li> </ul>			
While the government has continued to make progress in budget	Resp: Government	Stage: All	Due Date: Continuous	Status: In
formulation and execution with the ongoing technical assistance of development partners, a lot remains to be done especially in the area of public financial management.	and Bank			progress
2.2. Institutional (Sector/multi-sector)	Rating:	Moderate		
<b>Description :</b> The GoE has restructured EEPCo in two public enterprises, (i) Ethiopia Electric Power (EEP) – responsible for generation and transmission and (ii) Ethiopia Electric Utility (EEU) – responsible for distribution and sales. GoE has also appointed a Management Contractor for two years to manage the EEU and operational assets of	(i) The Bank team is in constant dialogue with the MoWIE as the restructuring proce takes place. Meanwhile, the project will include financing for capacity buildine measures and will provide support the interim challenges.			
EEP. Implementation of projects during this transition period of institutional restructuring will be challenging.	Resp: GoE	Stage:	Due Date :	Status:

3. Implementing Agency Risks (including FM and PR)					
3.1. Capacity	Rating:	Substantial/High			
Description : EEP is a new organization which has inherited the generation and transmission projects of EEPCo. EEPCo had been facing growth challenges, mainly due to the doubling of its generation portfolio within a very short period and of its distribution network over the last several years. This has created severe capacity constraints and delays in operational delivery, timely financial management issues, etc. There are several large generation, transmission and access projects in preparation. Inadequate procurement management capacity coupled with generic gap of procurement, contract management, governance and lack of system of business delivery standards and accountability were major	Risk Management :         Recent projects (ENREP) have included extensive program to train the EEPCo staff.         The areas of focus could include procurement, contracting, budgeting, FM, HR,         project management, etc.       The restructuring of EEPCo and creation of EEP offers an         opportunity to EEP to start afresh and remove old constraints.       Bank is supporting EEP         in this endeavor.       EEP has focused to strengthen its procurement and contract management capacity.         The risk management measures include: establishing PIU and staffing with critical personnel including skilled procurement staff; and providing continues procurement and contract management measures to be implemented.				
challenges in EEPCo.	Resp: EEPCo	Stage:	Due Date :	Status:	
3.2. Governance	Rating:	Moderate			
<b>Description :</b> Due to the growth experienced in the past several years, the billing and accounting systems have come under a lot of stress. As a result,	<b>Risk Management :</b> Sector restructuring has offered the two organizations to start operation with clean balance sheets from December 9, 2013.				
there has been a delay (of nearly 12 months in the past two financial years) in producing reconciled financial accounts as well as audited financial statements.	Resp: EEPCo	Stage:	Due Date :	Status:	
Fraud & Corruption (sub-category of Governance risk)	Rating:	Moderate			
<b>Description :</b> Opportunities for fraud and corruption are common in situations involving large contracts and may affect Ethiopia as well. Contracts	<b>Risk Management :</b> Project staff and other stakeholders will receive capacity building in procurement strategy for large and complex contracts, bid evaluation and contract negotiation.				
under projects could be awarded on specific interests which are not always competitive and benefits specific individuals.	Resp: EEPCo	Stage:	Due Date :	Status:	
4. Project Risks (GSDP)	<u> </u>				
4.1. Design	Rating:	Substantial			
<b>Description :</b> There are inherent technical risks involved with the geothermal technologies such as: drilling failures, dry wells, low steam, cost	<b>Risk Management :</b> GSDP will provide PIU with international expertise to design the project and the project will be closely monitored in order to ensure progress is managed at each step.				
overruns, etc.	Resp: EEPCo	Stage:	Due Date :	Status:	
4.2. Social & Environmental	Rating:	Moderate			
<b>Description :</b> The GSDP has been considered as category "A" project, while most of the project sites are in remote areas and have limited exposure to	Risk Management : The Project will finat develop and closely r	nce extensive support to the nonitor implementation of	ne staff of the implementing EMPs and RAPs.	g agencies to	
populations. However, there could be unforeseen environmental and social impacts.	Resp: EEPCo	Stage:	Due Date :	Status:	
13 Program & Donor	Rating	Substantial			

Description :	Risk Man	Risk Management :				
The project is supported by IDA, SREP, GoJ, GoI and GoE.	The Project Design follows parallel financing approach among the different partners.					
Coordination within this partners could pose a challenge to EEP.		ach will h	elp in reducing coordination	on challenges.		
	Resp:		Stage:	Due Date :	Status:	
4.4. Delivery Monitoring & Sustainability	Rating:		Substantial	·		
Description :	Risk Man	agement :				
Given the capacity limitations at EEP there is risk of delays in the	Project sta	ff and othe	er stakeholders will receive	capacity building in vario	us areas of	
implementation of the project.	project ma	nagement	including procurement, co	ntracts, bids, fiduciary mar	nagement,	
	etc.					
	Resp: EE	PCo	Stage:	Due Date :	Status:	
5. Project Team Proposed Rating <u>Before</u> Review		I = • =				
5.1. Preparation Risk Rating: Moderate		5.2 Implementation Risk Rating: Substantial				
Comments:		Comments:				
6. Risk Team		r				
6.1. Preparation Risk Rating	6.2 Implementation Risk Rating					
Comments: Comments:						
7. Overall Risk Following Review						
7.1. Preparation Risk Rating:			7.2 Implementation Risk Rating:			
Comments:		Comme	nts:			

#### **Annex 6: Implementation Support Plan**

## ETHIOPIA: Geothermal Sector Development Project (P133613)

## **Strategy and Approach for Implementation Support**

1. The strategy for implementation support (IS) was developed based on the nature of the project and its risk profile. Its aim is to make IS to the client more flexible, efficient, and focused on the risk mitigation measures defined in the ORAF.

## Implementation Support Plan

2. Bank team members will be based both at headquarters and in the Ethiopia Country Office to ensure timely, efficient and effective implementation support to the client. Formal IS missions and field visits will be carried out twice a year.

3. **Technical inputs**: Technical knowledge of the geothermal site development and the associated, engineering works and site supervision are required for proper assessment of technical specifications and other aspects of bids and contracts. During project implementation, technical supervision is required to ensure contractual obligations are met. EEPCo's technical and supervisory capacity will be augmented by hiring of consultants as needed. The Bank's project team and PIU staff will conduct site visits to project sites on a regular basis throughout the duration of the project.

4. *Fiduciary requirements and inputs*: The Bank project team will help EEPCo identify it's capacity building needs to strengthen its project financial management capacity and improve procurement management efficiency. The Bank's regular FM and procurement supervision will provide timely advice on budget planning and related matters. The PIU will be responsible for the timely compilation of annual project financial statements for the independent external audit. Project financial statements will be audited by an independent auditor acceptable to the Bank.

5. *Audit*: EEP has adequate internal controls for the project, including regular reconciliation of bank accounts, adequate segregation of duties, proper accounting policies and procedures, and monthly reconciliation of World Bank disbursement summaries with accounting records. However, EEPCo has been slow in proving timely annual audit reports. Therefore, the team will continue its diligent attention to the timing of audit report preparation to ensure that the audit reports are prepared and submitted on schedule. External auditors are expected to identify any internal control deficiencies and accounting issues. The audit reports, audited financial statements and management letter will be delivered to the Bank within six months of the end of each fiscal year.

6. *Monitoring and evaluation*: EEP has developed some M&E capabilities from working on other World Bank projects, and will further strengthen its capacity for project performance and results monitoring as needed. M&E will be based on administrative data sources. The baseline indicators developed by EEPCo draw from existing EEPCo data and project preparation studies. The results of the M&E activities will be fed back into the implementation process to inform decisions for improved implementation.

		- L		
Time	Focus	Skills Needed	<b>Resource Estimate</b>	Partner Role
First twelve	Hiring of the engineering	Technical and	\$150,000	Close coordination of
months	consultants and completion of	procurement		implementation
	the Aluto plant design and	expertise		activities is required for
	preparation of corresponding			parallel financing.
	Procurement documents.			
	Implementation of	Safeguards		
	environmental and social			
	safeguards			
	EM/D			
	FM/Procurement system	FM/Procurement		
12-36	Technical supervision	Power Engr.	\$300,000	Close coordination of
months				implementation
	Safeguards supervision	Safeguards		activities is required for
				parallel financing.
	M&E supervision	M&E		
	Procurement & FM supervision	Procurement/FM		

## Figure 6.1: Implementation Support Plan

## Figure 6.2: Skills Mix Required

Skills Needed	Number of Staff Weeks	Number of Trips	Comments
Geothermal Engineer		2 per year	
Social		Country Based	To be adjusted
Environmental	7-10 weeks per year across	Country Based	annually depending on
Econ. / Fin Analyst	the team	2 per year	available supervision
Monitoring		1 per year	budget
Procurement		Country Based	-
Financial Mngmnt.		Country Based	
Energy Specialist		Country Based	
TTL		2 per year	

rigure own rathers						
Name	Institution/Country	Role				
EEP	Ethiopia	Implementing Agency				
GSE	Ethiopia	Collaborating Agency				
SREP	Donor	Complimentary financing				
ICEIDA	Donor	Complimentary financing				
JICA	Donor	Complimentary financing				

## Figure 6.3: Partners

#### **Annex 7: Economic and Financial Analyses**

#### **ETHIOPIA:** Geothermal Sector Development Project (P133613)

*Note*: Since the newly established entities, EEP and EEU are just at the onset of the process of creating financial and accounting data, it is important to note that the analysis in this section is based on data provided by EEPCo which represents the electricity sector as a whole.

## A. Economic Analysis

1. The analysis of economic justification was carried out in two main stages: (i) existence of a market for the output of the project; and (ii) a traditional cost-benefit analysis, which identifies and compares economic costs and benefits (together with estimation of the economic rates of return) in two cases, one 'with project' and the other 'without project.

## I. The existence of a market:

2. The Ethiopian energy sector is expanding at a very rapid pace. Through the PASDEP and GTP period investments, the government has been able to bring over 45% of the rural towns and villages under the electricity grid. This has resulted in rapid growth in the number of customers connected to the grid from 800,000 in 2005 to nearly 2.2 million in 2012, representing a growth rate of over 100% during the period. This growth has been achieved despite a moratorium on new connections in 2008-2009 due to shortage of electric supply (caused by delayed implementation of certain hydropower projects). The table below demonstrates the growth rates from 2005-2010.

Figure 7.1. In	univer u		ieis anu	Electi III		s œv ma	ges	
	2005	2006	2007	2008	2009	2010	2011	2012
Number of electrified villages	648	899	1,757	3,363	3,763	5,163	6,000	6,000
(growth rate)		39%	95%	91%	12%	37%	16%	11%
Number of customers connected	856,228	1,064,268	1,337,557	1,611,735	1,740,964	1,808,008	2,030,000	2,230,000
(growth rate)		24%	26%	20%	8%	4%	12%	12%

Figure 7.1: Number of Customers and Electrified Towns & Villages

3. Going forward, The GoE has ambitions of connecting most of the rural towns and villages of the country to the electricity grid, doubling the number of consumers to 4 million, while continually investing in new generation capacity and in modernization and upgrade of the grid network. With more and more areas being connected by the electric grid the domestic demand for electricity is expected to grow at a high rate over the coming years. The table below lists the anticipated growth in energy sales (from all sources) from FY2012-2030 based on various growth scenarios provided by EEPCo.

Figure 7.2: Anticipated Growth in Energy Sales <sup>10</sup>									
	2012 2020 203								
Moderate Forecast (GWh)	4 578	9 163	18 880						
Target Forecast (GWh)	4,578	11,012	30,537						

4. Thus, we find a thriving electricity market in Ethiopia. Moreover, investments in transmission upgrades also help with Ethiopia's goal of becoming a major supplier of electricity to regional markets. Ethiopia has already established interconnections with Djibouti and Sudan and the Ethio-Kenya interconnection line is under contracting (expected to be commissioned in FY2017/18).

5. Commensurate with the growing demand, capacity additions are planned to meet the demand in the least-cost and in an environmentally responsible and socially sustainable manner. However, in the short-medium term horizon, the immediate priority is to improve efficiency and reliability of the distribution system and to expand access to new markets in the rural areas. The proposed project is in line with this strategy.

## II. Cost Benefit Analysis

## Methodology and Assumptions:

6. The analysis focuses on the more quantifiable benefits resulting from the project. In particular, the main category of benefits assessed and estimated is: (i) incremental consumption by the new customers as a result of the project (geothermal power plant(s) at Aluto Langano site).

7. A range of less quantifiable benefits will also accrue from the project, including the socio-economic and environmental benefits of increased installed capacity and reliability of supply that promotes increased electricity access. Although not estimated, they should not be ignored in assessing the economic viability of the project. Business productivity will increase based on the increased reliability of base-load power. Increased access to electricity will ensure better education and income opportunities leading to improved living standards among the residents of the areas covered under the project. Children will be able to study at night; households will be enabled to start or expand home-based businesses, which are a main source of livelihoods especially among the poor. Reliable and expanded electricity supply will support commercial and industrial activities and lead to greater employment opportunities. Access to grid electricity will decrease reliance on polluting and expensive energy alternatives, reducing the threat to the environment and to people's health.

8. Project costs comprise all capital costs associated with construction of a geothermal power plant (70 MW) and with serving the additional consumption. Both benefits and costs are estimated in economic terms at constant 2013 prices. The analysis is built over a period of thirty years and uses a discount rate of 10 percent. Benefits are assumed to become effective the year following completion of investments (2018).

<sup>&</sup>lt;sup>10</sup> Estimated growth rate of 10% assumed

#### Customer Willingness to Pay (WTP):

9. The analysis uses a traditional consumer surplus methodology to measure the net economic benefits of the incremental electricity demand that will be served as result of the project. In particular, the analysis assesses the change in consumer surplus (CS) experienced by new users once they gain access to electricity. The CS has two main components: first, the avoided cost of alternative fuels for applications such as lighting and information/entertainment; and second the value attached to having access to electricity. Both are measured based on the willingness to pay for electricity (WTP). The change in consumer surplus of new electricity users is only part of the impact: this must be adjusted by the economic cost to the society in supplying the incremental consumption.

10. The benefits of incremental consumption are measured for new residential customers based on their respective WTP. Although, detailed analysis of household WTP for residential customers has yet to be carried out in Ethiopia, it is estimated to be at <u>30 US cents/kWh</u> based on regional trends in Sub-Saharan African countries. Although, it has been estimated that in Ethiopia the WTP could be as high as 50 US cents/kWh. The WTP for residential customers is based on expenditures on non-electric forms of lighting such as kerosene and candles as well as on battery-powered appliances. However, it is not clear to what level of consumptions are WTP related. An accurate analysis of economic benefits associated to electricity access would require differentiating between the amount of energy that is currently used by non-connected customers and any additional energy consumption that might be induced as a result of having access to grid electricity. This is especially important for residential customers.

11. As new residential customers, they may take time to reach the average consumption levels observed among mature utility customers. More importantly, new users may be unable to pay for additional consumption or attach a lower value to it. Unfortunately, the absence of detailed socio-economic analyses carried out in the areas targeted under the project does not allow estimating variations in the energy consumption associated to having access to grid electricity, nor the utility attached to different levels of consumption.

#### Net benefits of incremental consumption:

12. The net benefit is estimated at 552 GWh/year (70 MW installed capacity with a 90% load factor). The benefits assessed are adjusted to reflect the costs associated with serving the incremental consumption, including the economic costs of power generation, transmission and distribution. Distribution costs also reflect the new investments required for installing the additional connections.

13. The analysis builds on the cost of service analysis carried out as part of sector financial analysis in previous IDA funded projects and other relevant studies. It provides a basis for identifying the utility's revenue requirements and sets appropriate, cost-recovering tariffs for different consumer classes. The use of full cost of service presents its limitations. Full cost of service may not be the perfect representation of the economic cost associated with the expanded electricity supply enabled under the project. In particular, there may be a double-counting problem related to distribution costs. In the estimation of the costs for the project, average

economic cost of supply of <u>6 US cents/kWh</u> has been assumed in addition to the normal operation and maintenance costs incurred by the sector.

#### Additional assumptions:

14. Analysis of the rate of return of the project are based on the following broader assumptions:

- f. Capital costs of the components are based on estimates that include costs associated with the Aluto project; including contribution and co-financing from other partners (total US\$ 258 million).
- g. The capital costs are assumed to be invested over 5 years with the following rate: Year 1: 5%, Year 2: 15%, Year 3: 30%, Year 4: 30%, Year 5: 20%.
- h. The capital costs are assumed to be invested at constant USD rate (of 2013).
- i. Benefits vary by project components, however, a project-level analysis is provided for ease of comparison.
- j. Components 2, 3, and 4 are not included in analysis.

#### **Economic Returns:**

15. Based on the methodology and assumptions described above, the estimated Economic Internal Rate of Return (EIRR) of the project at 8 percent discount rate is 32 percent and the Net Present Value (NPV) is about US\$ 606 million. At a 10 percent discount rate, the NPV is approximately US\$ 446 million.

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_									•

	Discount Rate 8%	Discount Rate 10%
NPV (US\$ million)	606	446
EIRR (%)		32

## Sensitivity analysis:

16. Sensitivity analysis was conducted to test the robustness of the profitability of the project to changes in key parameters of project costs and benefits. The rates of return were examined under the following cases:

- a. Total project costs: Increase of 5 percent and 10 percent in the overall project cost was considered which could be introduced as a result of delays or other unexpected variables.
- b. Decrease in benefits: Decrease in benefit of the project of 5 percent and 10 percent was considered which could be introduced as a result of slower consumption rates or fewer new customers.

c. Combined effect: The combined effect of 10 percent increase in project cost and 10 percent decrease in benefit was also considered as a worst case scenario for the project.

Secondaries (at Discount Date 1007)	NDV (US¢ million)	EIDD(07)
Scenarios (al Discount Kale 10%)	NPV (US\$ million)	<i>EIKK (%)</i>
Base Case	606	32
Costs Increase 5%	595	31
Costs Increase 10%	583	30
Benefits Decrease 5%	564	31
Benefits Decrease 10%	523	30
Costs Increase and Benefits Decrease 10%	500	28

Figure 7.4: Results of Sensitivity Analysis

17. In summary, the benefit from *incremental sales* for the project is the most important variable and the one that has the strongest impact on the economic viability of the project.

ASSUMPTIONS				2013 Data								
	Ethiopia Geothermal Sector Development Project P127010 Economic Cost-Benefit Analysis							Capital Cost of Project (\$ million) 258 Starting Year FY 2014 Ending Year FY 2018 Discount Rate 8%				
BENEFITS		2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	
Project Deployment Complet Value of Incremental Sales(V Losses %	ion % VTP, \$/kWh) Vied (CWh)	0% 0.30 22%	5% 0.30 21%	20% 0.30 20%	50% 0.30 19%	80% 0.30 18%	100% 0.30 18%	100% 0.30 18%	100% 0.30 18%	100% 0.30 18%	100% 0.30 18%	
Project Related Energy Supplied (GWh) (From Energy Sales - Direct New Customers) Economic Benefit (\$M) =		0	552	26	67	109	136	136	136	136	136	
соятя		2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	
Capital Costs of Project, Per Total Energy Sold (GWh) Average Economic Cost of Su Operations and Maintenance	Year (\$ million) Ipply (\$/kWh) e (\$ million)	431 0.06 0.00	12.90 436 0.06 0.26	38.70 442 0.06 1.03	77.40 447 0.06 2.58	77.40 453 0.06 4.13	51.60 453 0.06 5.16	453 0.06 5.16	453 0.06 5.16	453 0.06 5.16	453 0.06 5.16	
Economic Costs (\$ million)	-	26	26	28	29	31	32	32	32	32	32	
Net Economic Benefit (\$ m Net Present Value (\$ million EIRR	)	-26 \$606.42 32%	-33	-40	-40	0	52	103	103	103	103	

Figure 7.5: Economic Cost Benefit Analysis (Sample Data Set)

#### **B.** Financial Analysis

18. The financial analysis includes: (i) an overview of sector finances, (ii) a detailed review of the financial performance of the sector, and (iii) an analysis of project level finances.

## I. Sector Background:

19. Former vertically integrated entity, EEPCo, has been split into EEP and EEU. EEP: will be responsible for large, capital intensive, infrastructure projects for generation, transmission, sub-transmission (above 33 kV levels) expansion. It will be responsible for raising capital (through public, multilateral, and private sources), procurement, implementation, as well as for the operations of the generation power plants and transmission networks. EEP will also implement the UEAP projects, whereas, after completing construction of the rural distribution network, EEP will transfer the assets to the distribution entity for operation and maintenance. EEU: will act as the main operations and maintenance power utility responsible for the retail end of the energy value chain. It will be also responsible for day to day running and upkeep of the distribution network, billing and collecting, client relationship, and associated functions.

## **Operational Performance – Sales and Revenue:**

20. In the past few years, the sector has done very well in terms of connecting many new towns and villages as well as connecting new customers to the grid. In fact, due to the success of the expansion program, the demand for electricity surpassed the supply capacity. As a result, in FY2008 to FY2010 there was a partial moratorium placed on new connections. During the period of the moratorium, the acceleration in the number of new connections and villages connected slowed down; as a consequence, energy sales were stagnant. Energy sales improved once the moratorium was lifted and in FY2012, sales were over 4,500 GWh with over 2.2 million customers.

21. However, despite the impressive increase in the customer base and energy sales, the sector's operating revenue has not greatly improved. In fact, operating revenue in FY2012 was US\$ 190 million which is marginally above the FY2006 operating revenue of US\$ 166 million. Moreover, the average operating revenue per customer fell from US\$ 156 per year in FY2006 to US\$ 73 per year in FY2012 (table below). There were a few reasons for this:

- a. **The tariff rates** (average of US\$ 0.03/kWh) in Ethiopia have not changed since 2006 and this has affected revenue growth (more discussion on the tariff structure in the sections below).
- b. **The UEAP** has added many new customers in the rural parts of the country. The average energy consumption of these new customers is lower than those already connected which has slowed the revenue growth rate.
- c. **The devaluation in Ethiopia Birr** as compared to US Dollar from 8.3 Birr/US\$ in FY2006 to 18.1 Birr/US\$ in FY2012 has contributed to lower operating revenues.

	2006	2007	2008	2009	2010	2011	2012
Operating Revenue (US\$							
million)	166	208	202	164	132	137	190
Growth Rate (Year to Year)		25%	-3%	-19%	-20%	4%	39%
Energy Sales (GWh)	2,408	2,799	2,966	3,132	3,264	4,218	4,578
Growth Rate (Year to Year)		16%	6%	6%	4%	29%	9%
Customers (million)	1.1	1.3	1.6	1.7	1.8	2.0	2.2
Growth Rate (Year to Year)		26%	20%	8%	4%	12%	10%
Villages Connected	899	1,757	3,363	3,763	5,163	6,000	7,000
Growth Rate (Year to Year)		95%	91%	12%	37%	16%	17%
Revenue per Customer (US\$)	156.0	155.7	125.2	94.5	73.1	67.5	85.2
US\$ to Birr Conversion	8.3	8.7	9.3	9.9	13.5	17.1	18.1

Figure 7.6: Historical Operating Revenue, Energy Sales and New Connections

Figure 7.7: Historical Operating Revenue, Energy Sales and New Connections



#### Future Growth in Demand:

22. As the sector continues to expand its access program and connect more customers from additional parts of the country, the domestic demand for electricity is expected to remain strong. The domestic demand is expected to reach nearly 9,000 GWh by end of this decade using the sector's moderate growth forecast.

23. Moreover, a large part of the future growth will also come from energy exports to neighboring countries. The Djibouti interconnector has already started power trading (as of 2011) and the Sudan interconnector began power trading in 2012. The Kenya interconnector is expected to being trading in 2017/2018. The combined electricity export is expected to exceed 7,000 GWh by end of this decade - the bulk of which would come from the Kenya interconnector (see table below). The international sale of power is expected to be at competitive prices (approx.

US\$ 0.07/kWh) which will bring significant foreign exchange revenue. Overall, it is anticipated that the sector's operating revenue will grow around 8-10% to US\$ 200 million a year (on average) from FY2013-2016, growing to US\$ 600 million FY2017-20 (after exports to Kenya start).

Figure 7.8: Energy Sales Forecast									
	2012	2013	2014	2015	2016	2017	2018	2019	2020
Domestic Moderate Growth (GWh)	) 4,273	4,927	5,441	5,999	6,600	7,214	7,840	8,491	9,163
Export to Dibouti Forecast (GWh)	120	150	318	788	788	788	788	788	788
Export to Sudan Forecast (GWh)	185	788	1,577	1,577	1,577	1,577	1,577	1,577	1,577
Export to Kenya Forecast (GWh)						2,978	3,723	4,468	5,585
Total Energy Sold (GWh)	4,578	5,866	7,336	8,364	8,965	12,558	13,928	15,323	17,112

24. In a large part, the sector's future revenue potential would be influenced by the domestic tariff regime. As mentioned before, due to GoE's policy of universal subsidy to the electricity sector, the tariff rates in Ethiopia have been highly suppressed. The tariff structure has not been updated since 2006. When it was last updated, the average tariff was set at Birr equivalent of US\$ 0.06/kWh, however, due to currency depreciation over time, as of 2011 the effective average electricity tariff rate in Ethiopia stood at US\$ 0.03/kWh which makes it largely out of sync with global competitive tariff rates (see table below).

		Rate
Tariff Category	Consumption	(US\$)
Domestic		
Equivalent Flat Rate		0.023
First Block	50 kWh	0.016
Second Block	50 kWh	0.017
Third Block	100 kWh	0.024
Fourth Block	100 kWh	0.027
Fifth Block	100 kWh	0.027
Sixth Block	100 kWh	0.028
Seventh Block	> 500 kWh	0.033
General		
Equivalent Flat Rate		0.032
First Block	50 kWh	0.029
Second Block	> 50 kWh	0.033
Industrial		
Equivalent Flat Rate		0.028
Industrial - 15 kV		
Equivalent Flat Rate		0.020
Industrial - 132 kV		
Equivalent Flat Rate		0.018
Street Lighting		

## Figure 7.9: Ethiopia Electricity Tariff Structure

25. When compared to global trends of electricity tariffs of net energy importing and exporting nations (both low and high income), Ethiopia has fallen far below international trends (figure below). In fact, even when compared to the regional countries, Ethiopia's tariff rates are some of the lowest (table below).



26. The sector's operating expenses (mostly based on hydropower) are low and it can even sustain an operating profit in most years of normal rainfall (more details in sections below). However, for long term financial feasibility, especially in the wake of huge existing and even larger future debt obligations, the sector must revisit its tariff structure in order to bring it to competitive levels. The combined effect of tariff underpricing coupled with system losses (discussed below) mean significant loss of revenue for the sector and the GoE.

#### **Operational Performance – Expenses:**

27. The increase in the sector's operating expenses has been much higher than the increase in revenues during the past five years, mainly due to high generation costs. Generation cost increased by 73% in FY2008, by 72% in FY2009 and by 48% in FY2010. The main drivers for the increased operating expenses were:

- a. Delayed commissioning of major hydropower plants: the sector's access expansion program was successful in creating the target demand, however, the planned capacity increase via three new hydropower plans (Tekeze 300MW, Gilgel Gibe II 420 MW, Beles 460MW) suffered from many months of construction delays. The plants were eventually commissioned in 2011.
- b. There was also a two year period of low rainfall which limited hydropower production from existing plants.
- c. Sector had to rent expensive fossil fueled thermal power generation to meet the demand shortfalls which increased their production costs significantly.
- d. Also, the increase in international fuel prices, combined with the fact that the sector's expenses were denominated in foreign currency while the Birr was devaluating against the US Dollar.

28. As a result of these predominately generation related issues, the sector's operating expenses during this period were much higher than anticipated and the sector suffered operating losses during this period. However, as of FY2012, the per unit generation costs, due to heavy hydropower usage, were very moderate and stood at below US\$ 0.02/kWh. Table below summarizes the generation related costs over 2006-2012.

0							
	2006	2007	2008	2009	2010	2011	2012
Total Cost of Sales (US\$ million)	38	39	63	91	109	29	27
Generation Cost (US\$ million)	5	7	21	59	86	21	21
Growth Rate (Year to Year)		5%	75%	75%	48%	-76%	-2%
Per Unit Generation Cost (US\$ / kWh)	0.002	0.002	0.007	0.019	0.026	0.019	0.019
Hydropower							
Hydro Generation Cost (US\$ million)	4	5	9	12	12	18	19
Growth Rate (Year to Year)		28%	83%	40%	-4%	51%	6%
Generation Amount(GWh)	2,371	2,765	2,830	2,769	2,890	4,168	4,558
Thermal (Diesel)							
Diesel Generation Cost (US\$ million)	1	2	12	46	74	2	2
Growth Rate (Year to Year)		57%	457%	267%	62%	-97%	-97%
Generation Amount(GWh)	37	34	136	351	355	30	10
Geothermal							
Geothermal Generation Cost (US\$ million)	0	0	0	1	1	0	0
Growth Rate (Year to Year)					6%	1%	1%
Generation Amount(GWh)	0	0	0	12	19	20	20



# 29. Overall, it is estimated that EEPCo's operating expenses would grow at approximately 2% to US\$ 100 million a year (on average) in FY2012-16 growing to US\$ 150 million in FY2017-20.

#### Investment Program and Financing Expenses:

30. As the sector ramps up its investment in generation, transmission and distribution, access expansion, sector modernization and other related projects, there is an associated large investment program which can have significant current and future financial implications.

31. Overall, GoE's GTP related sector investments call for **US\$ 11 billion** worth of new projects. The financing plan for these public sector projects includes a mix of funding sources, part of it coming from GoE's self-financing and customer contributions, but most of it coming from new loans. Borrowing is sought from multilateral and bilateral partners, international donor agencies, commercial banks as well as domestic and Diaspora bonds issued directly by the sector. It is important to note that as of now, there is no private financing included in the investments.

32. Of the total investment program, over **US\$ 5 billion** has already been raised and the expectation is that an additional US\$ 4-5 billion will be raised and invested in the remainder of the GTP period (through FY2015) with the remainder to the program investments coming before the end of the decade (FY2020).

33. The current loan portfolio (US\$ 6 billion) which sits on the sector's balance sheets can be summarized in the following categories (table below):

- a. **Government to Sector Institutions on-lending**: GoE (MOFED), signs loans with international finance institutions (such as: IDA, AfDB, EIB, etc.) on concessional financing terms and on-lends them to the sector. Typically, these loans have a 20 year maturity with a 5 year grace period and charge interest rates of 3-6% to the sector. The current estimated portfolio of such loans is over US\$ 1.2 billion.
- b. **Commercial bank loans**: The sector has also been able to raise significant amount of money from commercial sources (mostly Chinese and Indian banks) for financing of large projects, especially hydropower. Typically, these loans have a 10 year maturity with a 3 year grace period and charge interest rates around 6% to the sector. The current estimated portfolio of such loans is US\$ 1 billion.
- c. **Bonds issues by The Sector**: the sector has been highly successful in raising financing from domestic and Diaspora bonds. Many Ethiopians (nationally and internationally) have spent a month's worth of their salaries to purchase these bonds as part of the government's campaign to promote sector investments. Typically, these bonds have a 7 year maturity with a 5% interest rate. The current estimated portfolio of these bonds is over US\$ 3 billion.
- d. **Supplier's credits**: The sector also has long term agreements with many suppliers for providing credit. Typically, these loans tend to be for 2-4 years with 1 year grace period and carry interest rates of 4-6%. The current estimated portfolio of these suppliers credit is around US\$ 240 million.
| Borrowing Source              | Loan<br>Amount<br>US\$ million | Repayment<br>Period<br>years | Grace<br>Period<br>years | Interest<br>Rate<br>% |
|-------------------------------|--------------------------------|------------------------------|--------------------------|-----------------------|
| IFIs / Government On-         |                                |                              |                          |                       |
| Lending                       | 1,250                          | 20                           | 5                        | 5.00%                 |
| Commercial Banks              | 1,000                          | 10                           | 3                        | 6.00%                 |
| Bonds                         | 3,000                          | 7                            | 0                        | 5.00%                 |
| Supplier's Credits            | 240                            | 4                            | 1                        | 5.00%                 |
| <b>Total Current Estimate</b> | 5,490                          | [a                           | verages of cate          | gories used]          |

Figure 7.13: The Sector's Current Estimated Loan Portfolio

### **Debt Servicing:**

34. As many of these loans were taken on in the recent past, the repayments have not significantly affected the sector's financial performance. However, many of the loans are now starting to become due and the repayment will significantly ramp up in FY2012/13 and beyond. The sector has already been feeling the burden of the repayments as some of the past loans (mostly on-lending by the government) were not fully serviced in the past financial years, including 67% of debt service shortfall in FY2010.

35. In the coming years, it is estimated that the maturing loans would amount to a yearly debt service obligation of US\$ 250 million (on average, FY2013-18) for the sector, growing even higher in the following years.

Figure 7.14: The Sector's Future Debt Servicing (Next 5 Years)

U			<u> </u>			
US\$ million	2013	2014	2015	2016	2017	2018
Estimated Debt Service Amount						
Repayment (Principal)	92	90	90	96	98	117
Interest	27	149	163	168	157	135
Total Debt Service	119	239	253	264	255	252

#### **Financial Projections:**

36. Based on the details provided in the preceding sections, the overall assessment is that the sector will have positive operating cash flows and will deliver solid operating performance. The sector will benefit from strong domestic demand growth and the revenues will increase at around 8-10% per year in the coming decade. The prospects of bilateral trade are even more lucrative with potential for huge financial returns in the latter half of the decade. On average the operating revenues are expected to be around US\$ 400 million from domestic and export sources in FY2013-18 (at current tariff rates).

37. In terms of expenses, barring unforeseen circumstances, such as massive reductions in rainfall levels, the need for rental thermal generation, etc., the sector's expenses should nominally grow at around 2% per year in the coming decade. It is estimated to around US\$ 200 million in FY2013-18. Major risks to financial viability of the sector stem from two factors:

- e. **Debt service obligations**: as described before, the debt service obligation for the sectors' investment program would be in the order of US\$ 250 million a year in the coming years. With limited operational cash flow, this amounts to a possible shortfall for servicing debt obligations, at least until export revenues ramp up.
- f. **Outdated tariff structure**: current average tariff of US\$ 0.03/kWh means that the full potential of revenue growth cannot be realized. Positive operational cash flow would be maintained due to low generation costs however, the tariff regime should be updated to keep pace with investment program priorities.
- g. **Delay in export revenue**: In case of construction delays related to the commissioning of the Ethio-Kenya Interconnector, a major anticipated source of revenue, the financial viability of the sector and its ability to repay debt would be challenged.
- h. **Other factors**: slower than expected local demand and foreign exchange risk (devaluation of the Birr against the Dollar) could also potentially cause financial viability concerns.

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Year		2013	2014	2015	2016	2017	2018
Energy Sales - Domestic, at mode	rate growth rate (GWh)	4,927	5,441	5,999	6,600	7,214	7,840
[Assumed domestic tariff of \$0.03	/kWh]						
Energy Sales - Dibouti (GWh)		150	318	788	788	788	788
Energy Sales - Sudan (GWh)		788	1,577	1,577	1,577	1,577	1,577
Energy Sales - Kenya Forecast (G	Wh)					2,978	3,723
[Assumed export tariff of \$0.07/k	Wh]						
Total Energy Sold (GWh)		5,865	7,336	8,364	8,965	12,557	13,928
Operating Revenue (\$M)		213	296	346	364	590	661
Operating Expenses (\$M)		114	145	171	209	250	294
Debt Service Obligation (\$M)		119	239	253	264	255	252
<b>Operating Cash Flow (or Shortf</b>	all) (\$M)	-20	-88	-79	-109	85	116

Figure 7.15: Financial Projection of the Sector (Related to Debt Service Obligation)

#### Fiscal Impact:

38. There could be significant fiscal challenges to the government ahead in terms of sector wide issues (which are not essentially project related). To a lesser significant level, there may be loss of revenue to the government if the sector appropriates all proceeds from customers added as part of the project and is not required to pay taxes or dividends to the government based on the benefits from the project. On the other hand the government budget could benefit from the differential between the concessional terms upon which the IDA credit and other soft loans will be extended to the government and the near-commercial terms on which part of the credit will be on-lent to the sector. However, the key issues to be dealt with are the issue of ballooning debt (mostly short-term) that the sector is taking on due to the capital investment required for the government's public policy related projects.

39. Policy makers in the government would have to enact a sector wide approach in order to tackle the issue of US\$ 250 million a year in immediate debt service obligation and potential shortfall that the sector faces in the immediate future. The discussion below offers some suggestions on how these changes could be incorporated to meet the financial challenges of the sector:

# Tariff Structure Revision:

40. Increasing the average tariff rate to be able to recover costs would be the most financially prudent way to balance the investment program needs with the operational reality of the sector. This would ensure that there is adequate coverage for servicing the debt obligations. However, it is recognized that there are several socio-political challenges associated with tariff structure revisions, especially for a country where significant portion of the population lives below the poverty line. The solution could lie in achieving the desired average tariff level using a tiered tariff structure that represents the economic reality of the various segments of the population.

41. Studies have shown that the economic loss to the country due to cost of un-served energy is nearly US\$ 450 million per annum. This leads to captive power generation which pushes up production costs for the industrial and commercial sectors. It is estimated that, in parts of the consumer segments, the willingness to pay for electricity is over US\$ 0.5/kWh.

# Other Options:

42. At present, the sector is directly responsible for implementation of the government's public policy goals for the sector. The financial health of the sector would be better served with assistance from the government in term of bearing the burden of some of the capital costs of the investment program. This could be achieved by restructuring of the sector's current debt portfolio by the line ministries – this effort has already been used in past fiscal years.

43. A large portion of the sector's debt is on-lent by the government on near commercial terms to the sector. Further, the sector is also taking on a lot of direct loans from other sources including commercial banks and bond issuances. The Government could assist the sector by restructuring the debt by means of a debt for equity swap, or changing of the lending terms that the sector is charged for these loans.

# Conclusion:

44. In conclusion, it should be reiterated that the sector is an operationally sound entity based on the financial analysis. It is able to control and meet its expenses and will experience significant growth over the coming years. The financial challenges related to the sector are more structural in nature (cash-flow management of debt service obligation) than project oriented. Some fundamental reforms need to be carried out by policy makers in order to ensure the financial health of the sector. The proposed project, GSDP, does not significantly add incremental financial burden to the sector.

# II. Project-Level Financial Analysis:

45. The discussion of project level finances involves a financial internal rate of return (FIRR) analysis of the project. For the purpose of the financial analysis, only core financial expenses related to the Aluto Langano project are considered including IDA and GOJ credit/loan and without the other grant funded expenditures (\$27.5 million) totaling US\$ 150 million.

46. To evaluate if the project is financially viable on its own, a virtual project entity is assumed, which would invest in, operate and maintain the investments. The basic assumptions related to the analysis were similar to the ones described in the economic analysis section.

#### Additional assumptions:

47. Financial benefit of incremental energy sales are assumed at the current effective tariff rate, scheduled to increase as per the sector's plans and based on standard inflation. As the Aluto Langano geothermal plant will be a publicly owned facility, the financial expenses are only related to those of financial cost of supply, and other expenses related to operations and maintenance similar to the ones described in the previous section.

48. Overall, from an operational standpoint, the project is financial viable with a NPV of US\$ 560 million (at 8% discount rate) and US\$ 336 million (at 10% discount rate) and the FIRR of 15% (see table below). The rate of return is typical for a public financed project of this type.

Figure 7.16: Results of Financial Analysis							
	Discount Rate 8% Discount Rate 10%						
NPV (US\$ million)	560	336					
FIRR (%)	15						

49. Sensitivity analysis was also conducted to test the robustness of the financial profitability of the project relative to changes in key parameters of project revenue and expenses (see results below).

50. The rates of return were examined under similar conditions as described in the previous section - total project costs: increase of 5% and 10% in the overall project cost, decrease in revenue: decreases in revenue of 5% and 10% were also considered.

×		
Scenarios (at Discount Rate 10%)	NPV (US\$ million)	FIRR (%)
Base Case	560	15
Expenses Increase 5%	551	15
Expenses Increase 10%	543	14
Revenues Decrease 5%	520	14
Revenues Decrease 10%	479	14
Expenses Increase and Revenues Decrease 10%	462	13

Figure 7.17: Results of Financial Analysis - Sensitivity Analysis

51. In summary, from a financial analysis, *incremental sales* are the key variable that will have the strongest impact on the financial viability of the project.

ASSUMPTIONS			2	2013 Data							
	Ethiopia Geothermal Sector Development Project P127010 Financial Cost-Benefit Analysis						Capital Cost of 258 Starting Year FY 2014 Ending Year FY 2018 Discount Rate 10%	Project (\$ mil	lion)		
BENEFITS		2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Project Deployment Comple Value of Incremental Sales( Losses %	tion % Revenue, \$/kWh)	0% 0.03 22%	5% 0.05 21%	20% 0.05 20%	50% 0.06 19%	80% 0.07 18%	100% 0.08 18%	100% 0.09 18%	100% 0.10 18%	100% 0.12 18%	100% 0.12 18%
Project Related Incremental (From Energy Sales - Dir	I Energy Sales (GWh) rect New Customers)	552	552	552	552	552	552	552	552	552	552
Financial Benefit (\$M)	=	0	1	4	13	24	34	40	46	52	54
COSTS		2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Capital Costs of Project, Per Total Energy Sold (GWh) Average Financial Cost of Su Operations and Maintenanc	Year (\$ million) upply (\$/kWh) re (\$ million)	431 0.01 8.00	12.90 436 0.01 8.00	38.70 442 0.01 8.00	77.40 447 0.01 8.00	77.40 453 0.01 8.00	51.60 453 0.01 8.00	453 0.02 8.00	453 0.02 8.00	453 0.02 8.00	453 0.03 8.00
Financial Costs (\$ million)	=	14	14	14	14	14	14	19	19	17	22
Net Economic Benefit (\$ r	nillion)	-14	-26	-48	-79	-68	-32	21	27	35	33
FIRR	ny 	\$560.32 15%									

# Figure 7.18: Financial Cost Benefit Analysis (Sample Data Set)

Annex 8: Scaling-Up Renewable Energy Program (SREP) in Low Income Countries
ETHIOPIA: Geothermal Sector Development Project <sup>11</sup>

Indicator	SREP/IDA Project	Transformational Scaled-up Phase: CRGE's Target of 1,000 MW geothermal capacity by 2030 <sup>12</sup>
Geothermal <u>capacity</u> <u>confirmed</u> for electricity generation (MW) as a result of SREP intervention	70	1,000
Annual geothermal electricity generation capacity (GWh) (once the power plant is constructed) <sup>13</sup>	552	7,884
Number of women and men, businesses and community services benefiting from improved access to electricity (inferred access) <sup>14</sup>	1.1 million people (0.8 million new customers, 0.3 million existing customers)	n/a
<ul> <li>Tons of GHG emissions savings</li> <li>Tons per year (tCO<sub>2</sub>eq/yr)</li> <li>Tons over 20 year lifetime (tCO<sub>2</sub>eq)</li> </ul>	<ul> <li>438,122 tCO<sub>2</sub>eq /year</li> <li>8.7 MtCO<sub>2</sub>eq / over lifetime of the project</li> </ul>	6,257 MtCO <sub>2</sub> eq/year
Financing leveraged through SREP funding (US\$ million, cumulative)	Total: US\$ 301.5 - US\$ 176.0 (IDA Credit)	Total: US\$4-6 billion <sup>15</sup> (80% private, 20% public and

<sup>&</sup>lt;sup>11</sup> Clarification Note: The scope of the GSDP project will be limited to the confirmation of geothermal resources for electricity generation in the Aluto and Alalabad sites. SREP funding will be applied exclusively for production drilling and testing in Aluto. The output of the project is not to produce electricity, but rather confirm geothermal resources in the aforementioned sites. The data collected from the project will be used to design the power plant in Aluto, which will be financed with support from Government of Japan. In this context, the hereby presented results framework has been produced implying causality and attribution between the activities proposed for funding under the project and the generation of electricity in the Aluto geothermal site. The table illustrates the possible results from operating 70MW of geothermal power plant in Aluto (it is too premature to provide estimates about Alalobad). <sup>12</sup> Government of Ethiopia's Climate Resilient Green Economy (CRGE) Strategy.

<sup>&</sup>lt;sup>13</sup> Note that electricity generated (GWh) is an outcome but not a direct output of the GSDP project. The figures provided are estimates of the expected power generation capacity in Aluto once the power plant has been installed. The calculations are based on 70MW geothermal power plant operating at 90% load factor. Same load factor was assumed for the transformational phase.

<sup>&</sup>lt;sup>14</sup> Methodology and assumptions are available in section "Assessment of Proposed Project with SREP Investment Criteria"<sup>15</sup> Assuming cost per MW installed between US\$4-6 million.

	<ul> <li>US\$ 3.5 (GoI Grant)</li> <li>US\$ 110.0 (GoJ Loan)</li> <li>US\$ 12.0 (GoE)</li> </ul>	other sources)				
SREP leverage ratio	1:12	1:163 - 1:245				
Key transformational aspects of SREP intervention	Promoted dialogue and ensured prioritize geothermal power dev energy mix and increasing energy historical approach of relying or	ogue and ensured commitment from GoE to hermal power development for diversifying id increasing energy security. Helped shift GoE's roach of relying on hydropower only.				
Co-benefits	<ul> <li>Increased penetration of georenergy mix, therefore diversimix for increased energy sec</li> <li>Creation of employment oppiderived from geothermal drid development;</li> <li>Promotion of low-carbon declimate resilience and development</li> <li>Enhanced overall knowledge geothermal development.</li> </ul>	thermal energy in Ethiopia's ifying hydro-dominant energy purity; portunities (direct/indirect) lling operation and power plant velopment pathway, enhancing opment of green economy; e and experience in the				

### A. Introduction

#### **Country and Sector Context**

1 Ethiopia is a large and diverse landlocked country located in the Horn of Africa with an area of 1.1 million square kilometer-about the size of France and Spain combined. Ethiopia is a country of many nations, nationalities and peoples, with a total population of 91.7 million (2012). Of these, only 17 percent lives in urban centers, mostly in Addis Ababa. Ethiopia is one of the world's poorest countries, with its per capita income of US\$ 370 laying significantly lower than the regional average of US\$ 1,257 and among the ten lowest worldwide. However, high economic growth experienced over the past decade has helped reduce poverty, in both urban and rural areas. Economic growth averaged 10.7 percent per year in 2003/04 to 2011/12, compared to the regional average of 5.4 percent. Approximately 2.5 million people have been lifted out of poverty over the past decade, and the share of the population below the poverty line has fallen from 38.7 percent in 2004/05 to 29.6 percent in 2010/11 (using a poverty line of close to US\$1.25/day). Currently, the Government of Ethiopia is implementing an ambitious Growth and Transformation Plan (GTP) 2010/11-2014/15, which sets a long-term goal of becoming a middle-income country by 2023, with growth rates of at least 11.2 percent per annum during the plan period.

2. Within the context of the GTP, the energy sector strategy calls for institutional modernization and further expansion of sector and large scale investments in energy infrastructure. In 2013, the GoE restructured the vertically integrated utility, Ethiopian Electric Power Corporation (EEPCo), to transform the sector. EEPCo was unbundled in two public

enterprises, Ethiopian Electric Power (EEP) and Ethiopian Electric Utility (EEU), aimed at creating entities capable of providing efficient, reliable, and quality services.<sup>16</sup> Further, the GoE signed a management contract with the Power Grid Company of India (PGCI) for a period of two and a half years for introducing modern utility practices in these two new institutions. The ambitious target of 11 percent of GDP growth as envisioned under the GTP anticipates domestic demand for electricity to grow by above 25 percent per year. To keep up with the anticipated demand, the GoE wants to harness the abundant renewable energies available in Ethiopia, including hydro (about 45,000MW potential), geothermal (5,000+ MW potential), and wind (5,000MW potential) resources.

3. To address the challenge of low electricity access rates, the GoE plans to scale up grid connectivity as well as expand off-grid energy programs. According to the GTP, the target is to expand the coverage of electricity services to 75 percent of towns and villages and to increase the number of consumers connected to the grid to 4 million by 2015. The GoE plans to expand the grid through intensification programs. It also plans to increase the adoption of off-grid renewable energy and energy efficiency products for households who are unable to afford the cost of grid connection, or are far from grid connected areas.

4. Diversification of generation resources is an essential part of the expansion strategy. At present, more than 97 percent of Ethiopia's electricity generation is derived from hydropower resources, and is entirely dependent on rainfall. Rainfall in Ethiopia has wide seasonal variation and is vulnerable to fluctuations due to climate change. In order to ensure reliability of clean electricity for the expansion of access and regional power trade, the GoE plans to scale-up the exploitation of geothermal resources. This would not only improve energy security and economic development for Ethiopia, but will also enhance climate resilience and development of a green economy. In addition, the GoE's Climate Resilient Green Economy (CRGE) Strategy outlines a plan to reach at least 10 percent non-hydro renewable energy mix in the electricity supply to ensure sufficient energy resources are available throughout the year for economic growth and access enhancement. To this end, increased exploration and exploitation of geothermal resources is critical.

#### **Ethiopia's SREP Investment Plan**

5. The SREP Investment Plan for Ethiopia was endorsed by the SREP Sub-Committee in March 2012. Under this Plan, the GoE will utilize US\$50 million in SREP funding to support the national goal of expanding energy markets by developing geothermal and wind power generation and focusing on capacity building and Small and Medium Enterprise (SME) financing. Successful implementation of SREP will pave the way for diversifying the energy mix of the national power system by incorporating geothermal and wind power in a sustainable way, thereby increasing the system's reliability and resilience towards climate change. It will also accelerate the electrification of the country by making more energy available in the system. The table below shows tentative funding for each SREP project as envisioned in the SREP Investment Plan endorsed in March 2012.

<sup>&</sup>lt;sup>16</sup> EEP will be responsible for construction and operation of the power generation and transmission part of the sector, while EEU will be responsible for construction and operation of power distribution and sales.

Project	Total Cost	GoE	SREP	MDBs	Others
Aluto Langano Geothermal Field Development	231.6	80.6	24.5	60.0	66.5
Geothermal Sector Strategy	2.0	0.5	1.5	-	-
Assela Wind Farm Project	250.0	40	20.0	140.0	50.0
Clean Energy SMEs Capacity Building and Investment Facility	12.0	-	4.0	4.0	4.0
Total	495.6	121.1	50.0	204.0	120.5

 Table 8.1: SREP Investment Plan for Ethiopia (US\$ Million)

#### **B.** Project Description

6. The objective of the Geothermal Sector Development Project (GSDP) is to develop geothermal resource for electricity generation in Ethiopia. The scope of the project will be limited to better define the potential of geothermal resources in Aluto and Alalobad geothermal sites. The project will also support enhancement of legal, institutional, and regulatory framework for sustainable geothermal development in Ethiopia and to successfully promote private sector participation. The project will help improve the electricity generation mix in Ethiopia as well as provide substantial amounts of stable base load power which will increase reliability of the electricity sector.

7. **Problem Statement.** The geothermal potential within Ethiopia has long been recognized with an estimated potential in excess of 5,000MW. However, only a fraction of that potential has been harnessed so far. The main reasons include the lack of priority given to geothermal sector development due to the GoE's least cost development strategy - which only focused on hydropower, limited technical knowhow on geothermal as compared to hydro, risks associated with the confirmation of geothermal resources, etc. In order to develop the resource base and handle the current and forthcoming growth in the sector, the country needs to build capacity by investing in human resources, training, and related geothermal initiatives. As it is a relatively new technology in the region with relatively higher risk of development, geothermal resource development requires public sector support to reach commercial scale success. Perception of risk for any geothermal project remains high until the result of test drillings are found positive. As of now, there has been limited identification of resource potential beyond initial inventory and surface reconnaissance studies. Geothermal projects in developing countries usually find it challenging to raise funds for test drilling and well testing given the high risk profile of the project at the initial stage of development. Public sector leadership and funding seems to be necessary to bring a geothermal project from pre-feasibility to the post-test drilling phase. After the test drilling and well testing results are available, the perception of risk is substantially reduced relative to the drilling of production and injection wells and construction of the power plant and could be done entirely by the public sector, through a public private partnership or by the private sector.

8. GoE has adopted a multipronged approach to develop its geothermal resource. It has decided to (i) develop its Aluto site entirely through public sector support – starting from reconnaissance to power generation, (ii) develop its Corebetti site entirely through private sector – starting from surface exploration to power generation, (iii) develop the upstream activities of Alalobad site through public sector support – reconnaissance to exploration drilling. Experience of Aluto and Corbetti will help GoE determine how to develop the downstream power generation activities in Alalobad.

9. The proposed GSDP project is comprised of four primary components, designed to better define the potential of Aluto and Alalobad geothermal sites and to facilitate overall development in Ethiopia geothermal sector. These components are: (i) Aluto geothermal site development, (ii) Alalobad geothermal site development, (iii) purchase of two drilling rigs, associated accessories and spare parts, and (iv) legal, institutional and regulatory framework development. See Annex 3 for detail description of all project components.

10. SREP financing will support activities under component (i) Aluto geothermal site development. In particular, SREP funds will support production drilling and testing activities in order to establish the economic viability of the geothermal resources at Aluto. Based on surface exploration information, the project is conservatively planning to confirm 70MW of geothermal resource capacity in Aluto. For such target power capacity, the site would require a total of approximately 26 wells. Of these, 22 wells will be drilled under the proposed GSDP project, 4 wells are being drilled under an existing Bank funded project. Once the resource potential has been confirmed and approximately 60% of the wells are drilled, EEP with support from Government of Japan will carry out a feasibility study to design the steam gathering system, power plant and transmission evacuation system. The construction of the power plant will be conducted in two phases of 35MW each (70MW in total) to allow for the first 35MW unit to operate for some time in order to understand the reservoir production potential and characteristics before constructing the second power plant. The transmission evacuation system would be constructed for 70 MW prior to the completion of the first 35 MW plant.

11. Transformation. The proposed SREP-funded project has helped Ethiopia to acknowledge geothermal as viable energy resource apart from hydropower, which will benefit through increasing its electricity supply reliability. It opened up the dialogue on geothermal and allowed the GoE to start discussing with private sector to develop geothermal resources in Ethiopia. The SREP fund is also helping the GoE to develop a long-term strategy for the sustainable development of the geothermal sector. The preparation of the strategy for the geothermal sector is underway. The GoE has allocated US\$1.5 million from its SREP resources for the preparation of the strategy paper. The work is conducted under the leadership of GoE with support from the International Finance Corporation (IFC). It is expected that one or more functional geothermal power plants are needed in Ethiopia to demonstrate the resource's potential and encourage private sector participation in the sector in the medium to long term. These endeavors helped in designing the GoE plan to have 1000 MW of geothermal generation by 2030. This outcome is certainly transformative especially in the Ethiopian context after decades of limited progress in this area. To further support the expansion and transformation of the sector in a sustainable and cost efficient manner, the proposed project will also help establish

the legal, institutional, and regulatory framework to promote private sector participation in the geothermal sector in Ethiopia.

12. **Rationale for SREP financing.** The SREP financing was critical to show the value of geothermal generation mix to GoE in its 97% hydropower based system. The SREP financing helped the GoE design a project to develop the Aluto field. Once GoE decided to develop the project, they leveraged funds from other development partners, such as IDA, GoI, GoJ and their own contribution to finance this project. The opening up of geothermal as a potential electricity generation resource, contributed to their dialogue with the private sector, and GoE is now negotiating with the private sponsor to develop its Corbetti geothermal site. The SREP financing is also helping the GoE to prepare a long term geothermal development strategy, which will lay out how the GoE can benefit from public and private sector support to develop its geothermal resource. In addition GoE will be financing the geothermal well drilling and testing with SREP grant and IDA credit – hence reducing the total cost of geothermal drilling and reducing risk of upstream development.

# C. Assessment of Proposed Project with SREP Investment Criteria

#### a) Increased installed capacity from renewable energy sources

13. The project will confirm the economic viability of geothermal resources at the Aluto site and will enable development of 70 MW power plant. Once the resource potential of Aluto is confirmed, the site could be developed immediately for full-fledged power generation. For a target capacity of 70MW and assuming a capacity factor of 90%, the annual electricity generated at Aluto geothermal site would be 552GWh.

# b) Increased access to energy through renewable energy sources

14. The project will pave the way for the diversification of the electricity generation mix in Ethiopia through the provision of substantial amounts of stable base load power (non-hydro). GoE's access agenda was stalled during 2009-2010 due to severe draught and load shedding. Geothermal generation will help improve generation mix in Ethiopia and increase reliability of supply even during seasonal fluctuations. This will help Ethiopia achieve its target of covering 75% of population. Based on the World Bank methodology<sup>17</sup> for calculating inferred access to electricity for residential use from power generation projects, the proposed SREP-funded geothermal project (once the power plant has been installed) will improve access to electricity to 1.1 million people, of which 0.8 million new customers and 0.3 million existing customers. The project will also provide 308 GWh/yr of electricity for industries and businesses. Methodology and assumptions. The amount of generation capacity (70 MW) was converted into total annual energy (552 GWh per year) assuming a load factor of the geothermal power plant of 90 percent. Transmission and distribution losses were assumed at 10 percent. Net electricity generated was allocated for residential and nonresidential use based on the pattern appearing in the International Energy Agency's (IEA) Energy Balance Database for 2013. For Ethiopia, it was considered 38 percent and 62 percent

<sup>&</sup>lt;sup>17</sup> The World Bank, LiveWire, "Measuring the Results of World Bank Lending in the Energy Sector", 2014/6

for residential and non-residential consumption, respectively. The net amount of electricity generated for industries and businesses totaled 308 GWh. The resulting 188.7 GWh net electricity for residential consumption was allocated between new connections and increased consumption by existing consumers. It was assumed that new electricity generated would be allocated equally between new and existing consumers. The number of consumers benefiting from new electricity was determined based on the average level of residential consumption for Sub-Saharan Africa. The residential consumption per capita was considered 118 kWh and 318 kWh for new and existing consumers, respectively. As a result, this would benefit approximately 0.8 million of new consumers and 0.3 million of existing consumers.

### c) Low emission development

15. Over 97 percent of Ethiopia's electricity generation is produced from hydropower, which is a low carbon source of energy but at the same time is highly exposed to production fluctuation due to seasonal droughts. To ensure that sufficient energy resources are available throughout the year especially to support economic growth, the GoE's Climate Resilient Green Economy (CRGE) Strategy has outlined a plan to reach at least 10 percent non-hydro renewable energy mix in the electricity supply. The proposed SREP-funded project will promote and scale-up the exploitation and development of geothermal resources, which will not only improve energy security, but also enhance climate resilience and development of a green economy and will reduce need for fossil fuel based generation. The project will better define the potential of geothermal power resources at Aluto Langano and Alalabad sites. The confirmation of 70MW geothermal resources and installation of a power plant in Aluto Langano would allow for an estimated annual power generation capacity of 552GWh. The application of the proxy-based method agreed for the SREP program would help get a sense about the emission saving capacity of the proposed GSDP project vis-à-vis other projects either funded from SREP or other sources. Applying the proxy-based method to estimate emissions of CO<sub>2</sub>eq equivalent based on dieselgenerated electricity (793.7 tCO<sub>2</sub>eq per GWh), the proposed project would help avoid 438,122 tCO<sub>2</sub>eq on an annual basis and 8.7 MtCO<sub>2</sub>eq over the lifetime of the project, hereby estimated at 20 years.

#### d) Affordability and competitiveness of renewable sources

16. Ethiopia's Growth and Transformation Plan (GTP), which sets a long-term goal of becoming a middle-income country by 2023, sets growth rates of 11.2 percent per annum during the plan period (2010/11-2014/15). In the GTP, the GoE intends to undertake two major policy goals related to the energy sector which involves the exploitation of geothermal resources for increasing capacity of firm and reliable base load power. First, the GoE intends to expand coverage of electricity services to 75 percent of towns and villages and to increase the number of consumers connected to the grid to 4 million by 2015. Further, the GoE intends to become a regional power hub and generate export revenues by means of exploiting its vast natural (mainly hydropower) resources. To achieve this, the GoE has already invested in ambitious generation programs and is also participating in the East Africa Power Pool (EAPP) project by constructing transmission lines to Djibouti (commissioned in 2011), Sudan (commissioned in 2012) and Kenya (planned commissioning in 2017). A large part of the future growth in Ethiopia is

expected to come from energy exports to these neighboring countries. The ability of the GoE to export electricity will depend on the overall reliability and electricity generation capacity of Ethiopia's power sector. Currently, the electricity generation mix in Ethiopia is largely dependent on hydropower sources, with an average cost of electricity below US\$0.05 per kWh. The costs of geothermal power are higher at around US\$7 cents per kWh, but yet lower than most other alternatives, including all fossil fuel options, and prices in neighboring countries are higher than the in Ethiopia. The further development of firm and reliable base-load geothermal resources will contribute to the country's ability to meet increased demand for power from domestic and export markets.

### e) Productive use of energy

17. The electricity generated from geothermal plants will provide electricity directly to the grid and will allow more businesses to connect to the grid at affordable rates as well as improve supply to existing commercial consumers which is often rationed due to insufficient generation. The development and exploitation of geothermal resources will contribute directly to the diversification of Ethiopia's energy mix, as envisioned under the Growth and Transformation Plan (GTP). The promotion of geothermal resources is also integrated with the country's Climate Resilient Green Economy (CRGE) Strategy, which aims at diversifying the energy mix with at least 10 percent of non-hydro resources. The GTP and CRGE are explicitly focused on addressing issues of energy access, quality of supply, and productive energy use in the context of new energy policies and planning. Further, the proposed GSDP project will catalyze the development of geothermal power capacity, which will have the capacity to improve business productivity based on increased reliability of base-load power.

#### f) Economic, Social and environmental development impact

18. The project is in line with the vision of the GoE for the electricity sector as envisioned under the GTP and CRGE Strategy. The exploitation of geothermal resources will support Ethiopia's rural electricity access program and increase reliability of its grid network by diversifying energy resource mix in Ethiopia. The project will therefore promote industrial development, which will generate new employment. The project will promote climate resilient growth while increasing energy security to support the overall goal of increasing access to electricity and regional power trade. Consumers connected to the grid can also use electricity for operating cooking stoves and avoid use of firewood, improving the health and environmental benefits of the users.

19. The proposed project will help, among other things: (i) increase electricity supply, (ii) ensure reliability and adequacy of electricity supply for economic growth, (iii) promote industrial development and economic growth, (iv) generate new employment opportunities during the drilling phase, construction and operation phases of the power plant, (v) increase government revenue from exports of electricity.

#### g) Economic and financial viability

20. Economic and financial analyses, including methodology and assumptions, are presented in Annex 7. The Economic Internal Rate of Return (EIRR) of the project is 32 percent at 8 percent discount. The Financial Internal Rate of Return (FIRR) of 15 percent is typical for a public financed project of this type. See Annex 7 for more detailed Economic and Financial Analyses.

# h) Leveraging of additional resources

21. SREP funding will crowd-in funding from other sources, including GoE, IDA, Government of Iceland (GoI) and Government of Japan (GoJ). It is anticipated that the US\$ 24.5 million of SREP financing will mobilize a total of US\$301.5 million from the aforementioned sources. The financing leverage ratio for this project is estimated at 1:12 (US\$ 1 from SREP leverages an additional US\$ 12 from other sources). As anticipated during the endorsement of the SREP investment plan for Ethiopia in March 2012, there is no private sector participation expected for this project. However, this project has opened up GoE's dialogue on geothermal and participation of private sector in this field. At present, GoE is in active negotiations with a private sector to develop its Corbetti Geothermal site. GoE is also developing a long term strategy for the geothermal sector, which considers involvement of the private sector not only as project developer, but also as key stakeholder that can contribute financing to the sector. The preparation of the strategy is currently underway with support from the International Finance Corporation (IFC).

# i) Gender

22. Most of the constraints in the project area are related with cultural, social, economic, legal and environmental factors which affect both genders. However, the magnitude of the problems found to be critical when it comes to women. It is known that rural women have total responsibility for fetching water and collecting fuel wood. The availability or non-availability of these resources within a reasonable walking distance is of particular interest to women. Therefore, the depletion or total degradation of natural resource has adverse effects on women's status. Ecological disturbance, deprivation of water supplies and other related environmental damage expose the rural women to excessive hard work and destitution.

23. Special assistance will be rendered to vulnerable groups. The project will ensure provision of water supply within a reasonable distance. The project also plans to provide potable water supply to communities directly affected by the projects.

24. The easy and sustainable access to electric power supply in villages and towns would ease the burden on women. Dwelling houses around the project area are scattered and is difficult to supply electric to each household. In the relocation process, it will be advantageous to build dwelling houses near to each other so that communities will have access to electric power. Relocation activities shall consider formation of villages in the new relocation sites.

# j) Co-benefits of renewable energy scale-up

25. In addition to the environmental benefits ( $CO_2eq$  savings) outlined earlier in this section, the proposed project is expected to have a series of co-benefits, which will provide both regional and local benefits, including:

26. Increased energy security. Increased penetration of geothermal-based energy will help Ethiopia diversify its hydro-dominant energy mix. The increased share of geothermal will allow for a more sustainable energy mix than the current drought-prone hydro-based system, which has been challenged by severe droughts over the last years. Geothermal can provide complementary power generation during unfavorable periods of acute droughts. However, it should be clarified that by the time this proposed project completes its implementation and commissions the 70 MW geothermal power plant, Ethiopia's generation capacity would increase to about 10,000 MW of which about 97% will be based on hydropower. Hence, geothermal sector will have to develop further and faster to have a meaningful impact in Ethiopia's generation mix.

27. *Employment opportunities*. While it is currently unclear precisely how many additional jobs will be created, the project will generate employment opportunities for laborers and professionals from different sectors and during different stages of resource development. For reference, the Geothermal Energy Association (GEA) estimated that approximately 860 different people with a wide range of skills are employed over the development cycle in a typical 50MW geothermal project. Approximately 2 people per MW are involved during the drilling phase.<sup>18</sup>

28. *Built institutional capacity and knowledge*. The project will build local capacity and knowledge in issues related to geothermal resource development in Ethiopia, which has historically focused on large-scale energy generation projects in the hydropower sector. Learning gathered through the implementation of the project can be shared with other countries in the region with significant geothermal resource development potential such as Tanzania, Kenya, Rwanda, and Uganda.

29. *Low-carbon development*. The project will support Ethiopia's efforts to achieve a low carbon development pathway. In particular, the project will for the development of non-hydro renewable energies as a means to optimize the country's energy mix as mandated in Ethiopia's Climate Resilient Green Economy (CRGE) Strategy.

# D. Monitoring and Evaluation

30. Overall monitoring and evaluation (M&E) of project activities will be EEP's responsibility. In EEP, the required data will be furnished by the Project Implementation Unit (PIU), recently created under EEP's Generation Project Portfolio Management Unit. EEP will have the responsibility to supply current data on the set of agreed performance indicators (Annex 1) on a semiannual basis for PDO indicators and for the intermediate outcome indicators at the component level.

# E. Implementation Readiness

<sup>&</sup>lt;sup>18</sup> Geothermal Energy Association (GEA), "Green Jobs Through Geothermal Energy", October 2010

31. Country and Energy Sector Strategies. The National Energy Policy (NEP) places high priority on hydropower resource development, as hydrological resources are Ethiopia's most abundant and sustainable energy forms. At the same time, the NEP mentions to take advantage of Ethiopia's modern energy resources (including geothermal) on the basis of their economic profitability. The NEP talks about a gradual transition from traditional energy fuels to modern fuels. The Growth and Transformation Plan, which is the current GoE's development plan for the period FY2011-2015, seeks to accelerate poverty reduction and achieve macroeconomic stability through continued economic growth, to enhance social development and reach the Millennium Development goals (MDGs). The GTP includes two major public policy goals related to the energy sector: (i) Provide universal access to electricity, increasing the number of customers with access to electricity and 4 million and coverage in towns and villages to 75%, (ii) Generate export revenues by means of exploiting the country's vast natural resources (mainly hydropower). Further, the country's vision includes the installation of an additional 8,000MW of energy generated from renewable energy resources. The *Climate Resilient Green Economy* Strategy (CRGE), which guides the protection of the country against the adverse effects of climate change, outlines a strategy to build the country's green economy. The CRGE outlines a plan to reach at least 10 percent non-hydro renewable energy mix in the electricity supply to ensure sufficient energy resources are available throughout the year for economic growth and access enhancement. To this end, increased exploration and exploitation of geothermal resources, Ethiopia's second largest renewable energy resource, and power plant development based on geothermal resources is critical.

32. Institutional Arrangements. All components under the project will be implemented by EEP. Though EEP is a new enterprise, it has benefited from the transfer of qualified employees of EEPCo in EEP. It has also adopted the operational manual of EEPCo to start its operation. EEP will implement this project through its institutional systems. EEP has created a Project Implementation Unit (PIU), under its Generation Project Portfolio Management Unit. The Project Coordinator is a Geothermal Specialist and is supported by one Engineer. The Project Coordinator (PC) will be responsible for all of the components implemented by EEP. This project unit will be supported by Financial Management and Procurement Officers.

# F. SREP Additionality

33. The availability of low-cost electricity derived from abundant hydropower resources deterred efforts to exploit alternative resources in Ethiopia. However, the effects of severe droughts in 2009-2010 encouraged the GoE to re-consider the exploitation of alternative renewable energies such as wind and geothermal. In this context, the proposed SREP-funded project has been instrumental in starting a dialogue in the forefront and changing the mindset of GoE with regards to geothermal development. The various consultations that preceded the preparation of the SREP investment plan have promoted dialogue between GoE and development partners on issues related to geothermal development. The dialogue led GoE to prioritize geothermal development after decades of limited progress in this area, as well as attracted and mobilized other development partners into this area (e.g., World Bank, Government of Iceland, Government of Japan, French Development Agency, KfW, BGR, etc). GoE valued the SREP grant fund as it could be used as risk capital for upstream development of geothermal fields. Opening up the dialogue on geothermal development also opened up opportunities for

private sector to get involved in Ethiopia geothermal development. Currently GoE is negotiating the development of Corbetti Site with a private sector. The SREP supported project will also support development of legal and regulatory framework that will help in providing license and concessions to the private sector.

