United Nations Development Programme
Country: Equatorial Guinea

PROJECT DOCUMENT

Project title: Sustainable Energy for All: Promoting small-scale hydropower in Bioko and other clean energy solutions for remote islands

UNDAF Outcome 4.5: National capacity regarding sustainable management of natural resources and the environment has been strengthened in the areas of water, soils, forest and waste management (2013-2017); **Output 4.5.5**: Sustainable energy technologies and services are available and local management capacities have been strengthened in 4 pilot areas

UNDP Strategic Plan Outcome SP1: Growth and development are inclusive and sustainable, incorporating productive capacities that create employment and livelihoods for the poor and excluded; **Output 5.1** Inclusive and sustainable solutions adopted to achieve increased energy efficiency and universal modern energy access (especially off-grid sources of renewable energy (2014-2017)

Country Programme Outcome: The country has a stronger legislative and institutional framework that guarantees sustainable management of the environment, adaptation to climate change and mitigation of its effects (2013-2017)

Implementing Partners: Ministry of Fisheries and Environment

Brief description:

The goal of the project is to create a market for decentralized renewable energy solutions in small island and remote territories. The goal will be reached by addressing the weakness of the country's policy-institutional, market and technology supply frameworks and tackle the root causes of the barriers to RE utilization in the country. The project consists of the following components: (1) Clean energy planning and policies for implementation and scaling up; (2) Clean energy technology (hydro) demonstration; (3) Clean energy technology (solar) demonstration; (4) Clean energy knowledge & capacity development. The project is expected to generate global benefits in directly avoided greenhouse gas (GHG) emissions of almost 1,780 kilotons of CO_2 due to switching from fossil fuels for power generation to small hydro, solar PV and wind power (over the lifetime of 20 years) and an estimated 7,121 0ktCO_2 as indirect emission reduction impact.

Programme Period:	2013-2017
ATLAS Award ID:	00094909
ATLAS Project ID:	00098972
GEF Sec Project ID: 5286	
PIMS:	5143
Start date:	May 2016
End date:	April 2021
Management Arrangement:	NIM
PAC Meeting date:	TBD

Total resources required:	USD 43,502,968
Total allocated:	USD 43,502,968
• Regular (UNDP):	USD 500,000
• Other (cash):	
o GEF	USD 3,502,968
o Government	USD 37,550,000
• In-kind	USD 1,950,000

"Promoting small-scale hydropower in Bioko and other clean energy solutions for remote islands"
Award ID **00094909**, Project ID **00098972** and **PIMS 5143.**

Agreed by	Signature	Fecha	Cargo
Exam Dra.Coumba Mar Gadio		18-3-16	**REPRESENTANTE RESIDENTE PNUD GUINEA ECUATORIAL**
Agreed by	**Signature**	**Fecha**	**Cargo**
Exmo Sr. Estanislao Don Malabo		18-3-2016	**Ministro de Pesca y Medio Ambiente GUINEA ECUATORIAL**

"**Promoting small-scale hydropower in Bioko and other clean energy solutions for remote islands**" Award ID **00094909**, Project ID **00098972** and **PIMS 5143.**

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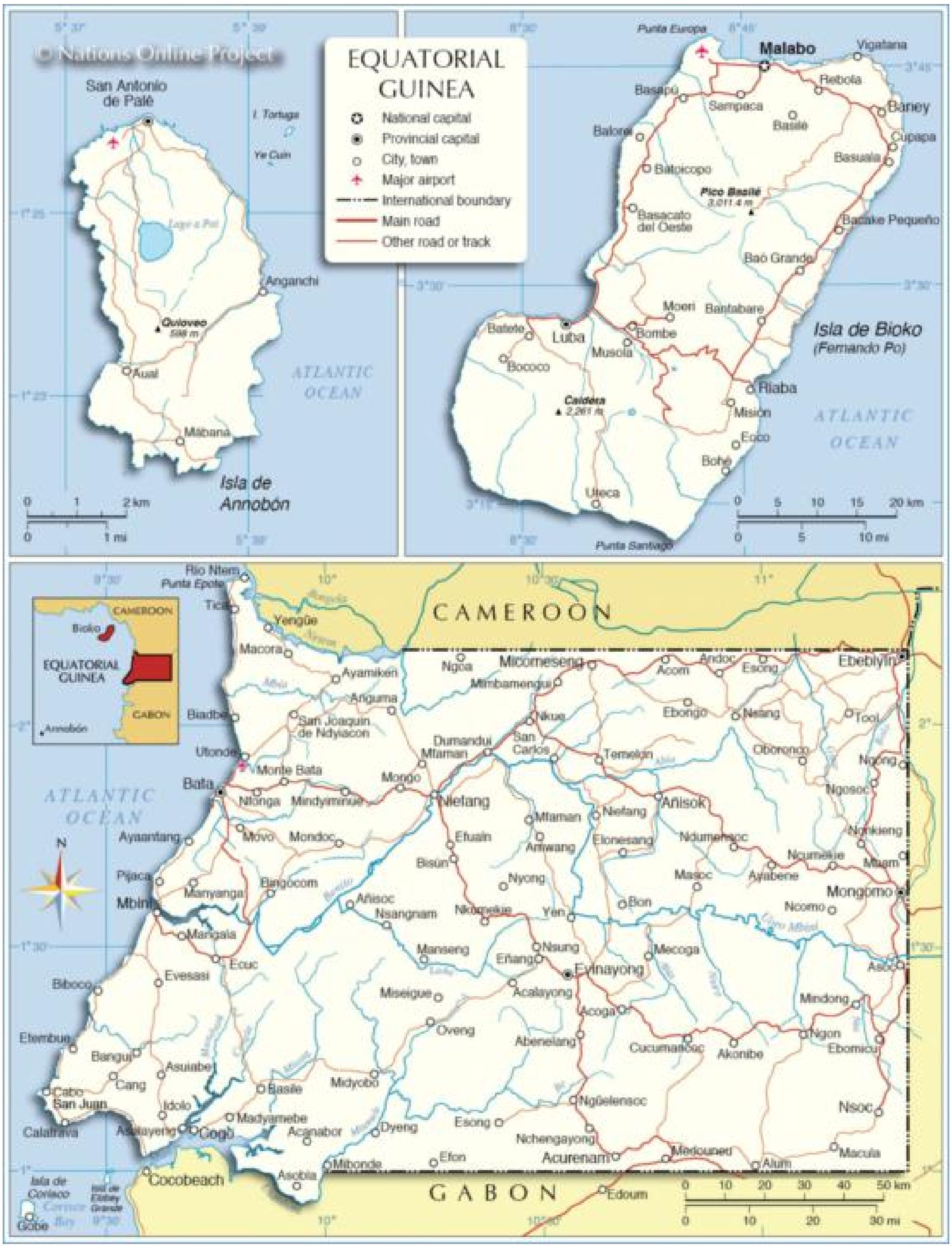
EQUATORIAL GUINEA
National capital
Provincial capital
City, town
Major airport
International boundary
Main road
Other road or track
© Nations Online Project
Isla de Annobón
Isla de Bioko
(Fernando Po)
ATLANTIC OCEAN
CAMEROON
GABON
Malabo
Bata
Luba
Riaba
Mongomo
Ebebiyin
Evinayong
Aconibe
Mbini
Cogo
Acurenam
Pico Basilé
Caldera
San Antonio de Palé

ACRONYMS

APR-PIR	Annual Project Review / Project Implementation Report
PB	Project Board
CC	climate change
CFA	African Financial Community (BEAC)
CP	UNDP Country Programme
CPAP	UNDP Country Programme Action Plan
CO	UNDP Country Office
CO_2	carbon dioxide
CTA	Chief Technical Advisor
ECCAS	Economic Community of Central Africa
EE	energy efficient
EU	European Union
FCFA	CFA Franc (XAF)
FiT	feed-in tariff
GEF	Global Environment Facility
GDP	gross domestic product
GHG	greenhouse gas
GNP	gross national product
GWh	gigawatt-hour (1000 million watt-hours)
IPP	independent power producer
ITNHGE	National Technological Institute for Hydrocarbons of Equatorial Guinea
IUCN	International Union for the Conservation of Nature
$ktCO_2$	1000 tonnes of carbon dioxide equivalent
kW	kilowatt (1000 Watt)
kWh	kilowatt-hour
LNG	liquefied natural gas
LPG	liquid propane gas
M&E	monitoring and evaluation
MDG	Millennium Development Goals
MMIE	Ministry of Mining, Industry and Energy
MJ	megajoule (millions of Joules)
MPM	Ministry of Fisheries and Environment
MW	megawatt
MWh	megawatt-hour (1000 kilowatt-hour)
NEP	National Electrification Plan
NESDP	National Economic and Social Development Plan
NGO	non-governmental organisation
NPD	National Project Director
PPA	power purchase agreement
PPG	GEF project preparation grant
PM	Project Manager
PMU	Project Management Un it
PSC	Project Steering Committee
ProDoc	Project document
RCU	UNDP/GEF Regional Coordination Unit
PV	photovoltaic
QPR	quarterly progress report
R&D	research and development
RE	renewable energy

RTA	UNDP/GEF Regional Technical Advisor
RET	renewable energy technology
SEGESA	Electricity Company of Equatorial Guinea
SME	small and medium-sized enterprise
tCO_2	tonne of carbon dioxide equivalent
UN	United Nations
UNDAF	UN Development Assistance Framework
UNDP	UN Development Programme
UNFCCC	UN Framework Convention on Climate Change
UNGE	National University of Equatorial Guinea
USD	US dollar

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Part 1. SITUATION ANALYSIS

1. CONTEXT AND GLOBAL SIGNIFICANCE: ENVIRONMENTAL, POLICY AND INSTITUTIONAL

Equatorial Guinea

Equatorial Guinea a small country located in West Central Africa, with an area of 28,000 km^2 and a population of around 720,000. The insular region consists of the islands in the Gulf of Guinea, namely Bioko (with the capital Malabo) and Annobón (a small volcanic island south of the equator). The mainland region, Río Muni, also includes several small offshore islands (such as Corisco).

The discovery of large oil reserves in 1996 and its subsequent exploitation have contributed to a dramatic increase in government revenue. As of 2004, Equatorial Guinea is the third-largest oil producer in Sub-Saharan Africa. With a population of 720,000, it is one of the richest country per capita in Africa[1]and its gross domestic product (GDP) per capita ranks 69th in the world. However, the country ranks 136th on the UN's 2011 Human Development Index. Forestry, farming, and fishing are also major components of GDP. Subsistence farming predominates. Although pre-independence Equatorial Guinea counted on cocoa production for hard currency earnings, the neglect of the rural economy in the years of oil bonanza has diminished potential for agriculture-led growth. However, the government has stated its intention to reinvest some oil revenue into agriculture.

Oil and gas

Since 1995, when significant off shore oil discoveries were made in the Gulf of Guinea, oil has become Equatorial Guinea's most important export. Today, about 75% of export revenues come from crude petroleum exports and 22% from liquefied hydrocarbons. The oil and gas industry accounts of 95% of the Gross Domestic Product. Due to the oil bonanza, Equatorial Guinea has the highest gross national income per capita (USD 17,608) of any other Sub-Saharan country[2].

As of 2013, Equatorial Guinea's proven oil reserves were put at 1.1 billion barrels (204×10^6 m^3); oil production was estimated at 420,000 barrels per day (67,000 m^3/d) in 2005 and 316,000 barrels/d in 2012, of which crude oil accounted for over 90%[3]. The national oil company is GEPetrol, was founded in 2002, under the Ministry of Mines, Industry and Energy (MMIE). Domestic oil demand was around 2,500 barrels per day (400 m^3/d) in 2012. Since the country does not have any refinery capacity, all oil products are imported.

The country has proven natural gas reserves estimated in 2013 at 1.3 trillion cubic feet (37×10^9 m^3)[4]. The country's natural gas reserves are located off Bioko Island, which is the site of the nation's capital, Malabo, and mainly in the Zafiro and Alba oil and gas fields. The national gas company is Sonagas, which manages the country's natural gas assets, as well as the industrial and residential gas markets. The company is also in charge of the distribution, marketing, and exploration of natural gas. Most of the natural gas is exported as liquefied natural gas (LNG) produced by the national company EG LNG (243 billion cubic feet, 2012), which operates a LNG plant and terminal (Punta Europa). Domestic consumption of natural gas is estimated for 2012 at 57 billion cubic feet (1.65×10^9 m^3).

1 Source: Indexmundi (Mau 2013), based on PPP per capita GDP
2 World Bank, "50 Things You Did Not Know about Africa" (2012); UNDP "Africa Human Development Report" (2012)
3 World Oil; Energy Information, Department of Energy; USA (2012)
4 Oil and Gas Journal; Energy Information, Department of Energy; USA (2012)

Electricity

The national electricity company SEGESA under MMIE provides electricity. It operates the country's two small electricity transmission networks, which comprise approximately 80 miles of high voltage lines. The network on the mainland serves the suburban area of Bata. The second distribution system, on Bioko, serves the capital Malabo and connects with the port of Luba.(Bioko's second biggest town).

By mid-2012, the power generating capacity stood at 50 MW, of which 90% was conventional thermal. Production in 2012 was estimated at 100 GWh, while consumption was placed at 90 GWh. Production in 2012 was estimated at 100 GWh, while consumption was placed at 90 GWh. However, poor management and the use of aging generation equipment has resulted in prolonged power blackouts. As a result, companies use small gasoline and diesel-powered generators as backup power sources. By mid-2012, installed power capacity on Bioko Island had expanded to 211 MW, mainly due to the new turbo-gas plant (154 MW), 52 MW of diesel generators and 4.2 MW of small hydropower facilities (at Riaba and Musola). The power demand is expected to grow at pace with 4-6% GDP growth forecasted for 2012-2016, and with a population growth of 3% p.a.[5] power demand is unlikely to be met. The power tariff (non-commercial) is about USD 0.20/kWh.

Renewable energy

The country has significant renewable energy potential, and currently the vast majority of its total installed capacity comes from hydropower plants. The solar energy and wind energy potential remains largely unused. The power capacity has improved with the commissioning in October 2012 of the Djibloho hydroelectric plant (120 MW) and generation capacity now stands at 385 MW. Although largely undeveloped, Equatorial Guinea is estimated to have 11-26 GW of hydropower potential, of which 50% is deemed economically recoverable[6].

In contrast, small scale hydropower has received little attention; only 3 small hydropower schemes are used. For example, in the south of Bioko, the old 3.8 MW hydro plant in the town of Riaba has been operating at times as low as 2% of capacity due to lack of investment in maintenance, despite increasing economic activity from the nearby freeport in Luba. The plant is being refurbished, while also the hydropower plants at Musola (0.4-0.5 MW) and Bikomo on the mainland (3.2 MW).are in need of upgrading.

On Bioko Island the hydropower potential is quite underutilized; a study by Électricité du France (EDF) has identified 10 potential sites on Bioko Islands at the six main rivers (Cónsul; Balaopi/Tiburones; Musola; Tudela/Moaba; Ilachi; Ruma/Grande; Bao). The most promising site for a small hydropower plants would be Ilachi River with a height difference of 200 metres and a capacity of 12 MW (in the dry season and up to 18 MW)[7].

5 Economic Intelligence Unit (2012)

6 www.mbendi.com (2012); *El Sector Eléctrico en Guinea Ecuatorial* (Proexca, Gobierno de Canarias; 2011); NAPA Equatorial Guinea (2013)

7 Statistics in this section based on data provided by MMIE

2. STAKEHOLDER ANALYSIS

The main government entities involved in energy-related policy matters are:

Ministry of Fisheries and Environment (MPM)	MPM has the mandate over Equatorial Guinea's environment and fisheries policy, responsibility over its implementation, and national interface with the GEF as its political and operational Focal Point
Ministry of Mines, Industry and Energy (MMIE)	Key government partner with mandate over Equatorial Guinea's oil, gas and electricity policy, as well as mining (e.g. mines, quarries) and responsibility over its implementation. This includes policies related to generation, transmission and distribution of electricity
SEGESA	SEGESA is the single electricity provider in Equatorial Guinea. SEGESA is tasked to undertake planned investments in the new projects in line with the National Electrification Plan, including RE projects.
• Ministry of Planning, Economic Development and Public Investment • Ministry of Economy, Commerce and Business Promotion • Ministry of Finance	These Ministries design and execute the commercial and economic policy of the Government

Local population
The project is relevant for the local inhabitants, as in the increases reliability in power supply in the areas in which the hydropower technologies will be located (boosting power supply if power from main grid is interrupted) and increases availability where the grid does not reach (e.g. the island of Annobón) and power is generated by expensive diesel gensets. In addition, there are Pygmy minorities in Equatorial Guinea, locally called "bakola-Bagyeli". There are about 2,000 Pygmies in the country, living in the high forest regions. However, this project is not likely to have an impact on them. Most of them live in very remote parts, even far from villages. However, if it occurs during project implementation that a potential site is nearby their habitats, the project will ensure that their interest and participation are fully taken into account.

Private sector
There is little industry in the country, and the local market for industrial products is small. The government seeks to expand the role of free enterprise and to promote foreign investment but has had little success in creating an atmosphere conducive to investor interest. In 1998, the government privatized distribution of petroleum products; there are now Total and Mobil stations in the country. The government has expressed interest in privatizing the outmoded power utility model (see further) and about 30% of the capital of SEGESA is in private hands.

Donors
The European Union is a potential partner through the ACP-EU Energy Facility. The strong China-Eq. Guinea business relations may lead to additional development finance. Spain and France continue to provide some project assistance.

3. BASELINE AND BARRIER ANALYSIS

Policy and goals

Fossil fuels for commercial use in Equatorial Guinea are subsidized, but the Government is contemplating eliminating these over time. In 2012 fossil fuels subsidies amounted to an estimated 1.2% of GDP (about USD

227 million)[8]. In the power sector, generous subsidies to low-end consumers and illegal connections contribute towards SEGESA's financial difficulties, preventing the necessary upgrading of the grid.

Within the framework of the country's development plan, called Plan Horizon 2020, Equatorial Guinea MMIE's National Electrification Plan is primarily focusing on:

a) Taking advantage of the large hydropower in the mainland, the Djibloho power plant represents the first of a series of long-term planned large-scale hydropower facilities along the Wele River[9] in continental Equatorial Guinea (Río Muni) for which various large-scale, 200-400 MW-size hydropower schemes are planned at an estimated total of 2,000 MW;
b) Increase of power generation capacity on Bioko Island as well as the mainland region by means of adding new plants based on fossil fuels, expanding and upgrading the distribution and transmission network;
c) Rehabilitation of the existing small hydropower plants on Bioko (at Riaba and Musola) and the mainland region (e.g. Bicomo) which is being initiated; and adding new small hydropower capacity as well as development of the solar (and wind) resource (in particular on the remote island of Annobón);
d) Institutional and capacity improvements, including the a) introduction of a new Energy Law and restructuring of the power company SEGESA[10]; and b) technical capacity building of staff in the power sector by establishing a School for Electricity within the National Technological Institute ITNHGE[11].

Details on short-term activities and projects are given in the *Energy Sector Action Plan for 2014*[12]. Regarding renewable energy, the following project are e proposed GEF intervention, are:

- Feasibility study on the development of the hydropower potential of the Ilachi river (on Bioko) is planned for 2015 as well as a electrification of rural villages in the insular region;
- Electrification of Annobón island[13];
- To be initiated with the coming two years are resource and feasibility assessment of micro hydropower facilities on the rivers Bolo and Wele, as well as electrification of rural villages in the mainland region.

In the long term, stage would be to upscale grid extension and transmission to further expand electrification to remote rural areas, to link up with the power system of neighbouring countries (CAPP, Central African Power Pool) as well as an submarine power line interconnecting Bata and Malabo.

Small hydro, solar and wind energy

The insular regions rely almost 100% on fossil-fuel based electricity. However, given SEGASA's problems with providing reliable power, small hydro has been given more attention lately. Small hydropower development is expected to receive merits after the planned refurbishment of the Riaba (4 MW) and Bicomo (3.2 MW) and of the micro hydro facilities Musola 1 and 2 (totalling 0.4 MW) are finalised. A feasibility study on the development of the hydropower potential of the Ilachi River (10-15 MW) in Bioko is planned. A solar-diesel hybrid system (with 5 MW solar) is planned to be installed at Annobón Island.

GEF finance is sought to support these activities andto create an enabling environment for future investments in renewable energy, addressing a range of barriers exist to the use of solar, wind and small hydropower that are summarised below:

8 International Monetary Fund (2013), *Energy Subsidy Reform in Sub-Saharan Africa*

9 A.k.a Rio Benito or Mbini

10 This would imply slitting up the functions of energy service provider (the new SEGESA) and power grid operator, followed by allowing private capital The new Electric Energy Law would be the juridical instrument that regulates activities in the power sector, including the setting of tariffs

11 Instituto Tecnológico Nacional de Hidrocarburos de Guinea Ecuatorial

12 *Plan de Acción del Sector de Energía*

13 A solar-diesel facility (5 MW) is being proposed for Annobón

Barrier description	Baseline situation or action	GEF-supported alternative Incremental reasoning
Regulatory and policy barrier		
Lack of RE strategies and plans for off-grid island and hinterland remote areas: • Energy policy decision-making processes primarily focus on oil and gas developments, while in the power sector the focus is primarily on larger scale, grid extension and transmission concerns • Subsidized petrochemical products do not reflect the actual cost of fuel-generated electricity, deeming RETs expensive	• Apart from the electrification plan, there is no longer-term RE or off-grid electrification section or separate plan; • On-going large hydro developments, and Initial National Communication to the UNFCCC (in progress), are barely advancing the climate change mitigation agenda.	*Legal/policy provisions accommodate for smaller scale, decentralized solutions (e.g. small hydro, solar, wind), appropriate for each location and considering sustainable development concerns (e.g. employment generation, rural women).* **Outputs:** 1.1 Approved policy de-risking framework integrated resource planning and RE action plan
• Lack of procurement and licensing processes for (independent) power production in Equatorial Guinea) • Thus, limited scope for RET entrepreneurship and for IPP in general	• The monopolistic context in the power sector with no incentive for small scale electricity generation and distribution leads to a small market for RETs; • Plans of restructuring of SEGESA foresee splitting its functions of grid operator and distributor; next stage would see its privatization and the establishment of an independent regulatory authority for the sector; as well as introducing a more rational power tariff system	1.2 Accepted and implemented procedures for RE projects assessment and approval
Institutional / Technical / Economical:		
Limited institutional capabilities and local skills to embrace RETs: • Limited hydropower, solar or wind energy expertise in Equatorial Guinea's MMIE and MFE; No or limited coverage of climate mitigation concerns within the curriculum of the National Technology Institute ITNHGE • Inexistent technical capacity in the supply side (suppliers, installers, financiers) and limited hydropower maintenance capabilities (incl. administration and lack	• Lack of local skills and practical experience with small-scale RETs continues; • Lack of information on the costs and benefits of renewable energy sources and appropriate business models	*Capacity building processes address local individual and institutional technical development needs (e.g. solar PV, hydro), awareness raised on their benefits, and integration of RE in the curricula of ITNHGE. MMIE embraces climate mitigation in the reshuffled SEGESA management.* **Outputs:** 4.1 Awareness raised amongst decision-makers in public and private sector 4.2 Training programs on RET established and technicians trained

Barrier description	Baseline situation or action	GEF-supported alternative Incremental reasoning
of accountability over asset integrity)		
Market / informational / financial:		
Lack of awareness and information on the benefits of renewable energy sources in Equatorial Guinea • No knowledge of clean energy (particularly, solar and wind) resource endowments in Equatorial Guinea; • High upfront costs (augmented by custom duties) remain further impairing the cost of introduction of RETs in a small market (no economics of scale);	• National utility (SEGESA) is in the process of rehabilitation of the small hydropower plant at Riaba (3.8 MW) and the micro hydro Musola (2 facilities of 0.5 MW located in the south of Bioko island), but it is unclear that technical and economic feasibility and environmental considerations are met in the current rehabilitation activities or how can be translated in a feasible business plan for administration, operation and maintenance; • Plans for solar project on Annobón (up to 5 MW) with the American MAECI Solar	*Government is informed by techno-economic considerations, as appropriate for smaller scale and higher maintenance hydro plants (e.g. river flow estimates, turbine type, head size), and corresponding environmental conditions of the south of Bioko island (e.g. aquatic life, riparian flora, dry season)* **Outputs:** 2.1 Resource assessment and pre-feasibility for small hydro (Ilachi, 12 MW, and other) 2.3 Completed pilot project demonstrations of rehabilitated (Riaba, Musola, Bicomo; 7.6 MW) and new small-scale hydropower plants 3.1 Feasibility and business plan for solar (Annobón) and resource and pre-feasibility assessments (solar for remote/rural villages) 3.2 Completed pilot project demonstrations of solar at Annobón (5 MW) 4.3 Project impact assessment; dissemination of best practices and lessons learned 4.4 Monitoring and evaluation
Economic / investment decision		
No economies of scale and scope identified to leverage RE small investments • No consideration of innovative financing mechanisms for RE developments (e.g. feed-in-tariffs, carbon finance); • General poor framework for foreign investment, impairs investments in RE	• Available public funds from oil and gas revenues bankroll nationwide infrastructure developments, including small hydropower, solar, and wind**)**. UNDP and MMIE interface with oil and gas players on social contributions targeting clean energy (e.g. Noble Energy); this may be replicated by other operators that dominate the hydrocarbons market (mainly US companies, such as ExxonMobil, Marathon Oil, Hess; although European and Chinese companies are increasingly active and providing significant credit lines)	*GEF funding of de-risked policy, business and institutional environment, devoted to obtaining further technical information on resource endowments, and assessing other financing options, (e.g. feed-in-tariffs, domestic carbon finance, hydrocarbon sector contributions) that can leverage additional (national and international) renewable energy funds, leads to the promotion of on-grid and decentralized electrification (i.e., remote islands, isolated hinterlands, rooftop), and sustainable development gains (e.g. employment, local content, gender empowerment).* **Outputs:** 2.2 Completed business plan for Ilachi (with detailed feasibility, environmental impact analysis and detailed technical design) 1.3Endorsed financial de-risking measures to implement innovative public and private funding options for recommended small hydropower, solar and wind in small islands;

Barrier description	Baseline situation or action	GEF-supported alternative Incremental reasoning
		4.3 Project impact assessment; dissemination of best practices and lessons learned; 4.4 Monitoring and evaluation

Part 2. PROJECT STRATEGY

4. PROJECT RATIONALE; DESIGN PRINCIPLES AND STRATEGIC CONSIDERATIONS

GEF-supported alternative scenario

The project is set against the background of rising electricity cost. Despite the continuing revenues from oil and gas exports, the Government is aware of its reliance on imported fossil fuels for power generation and the rising cost of fuel and electricity subsidies. Also, the Government aims at achieving universal access to energy for all. This offers scope for the utilization of renewable sources of energy (RE), i.e. small hydropower, solar and wind energy, both for on-grid and off-grid applications. However, this recognition is in stark contrast with the actual low level of application of RE.

The project will promote a reduced dependence of Equatorial Guinea, particularly its island regions, on fossil fuel-generated electricity, with increased access and consideration of cleaner energy resources (i.e. small scale hydro, solar and wind power). The approach proposed will holistically address the weakness of the country's policy-institutional, market and technology supply frameworks and tackle the root causes of the barriers (see A.4) and associated risks (see A.6) that inhibit the application of renewable sources of energy in power production. Through targeted assistance on RE development, the project can improve the country's energy security on the longer run, reduce the bill of fuel subsidies and reduce electricity sector related greenhouse gas emissions.

The project reflects commitment to increase the use of small-scale sources of renewable source of energy, namely small hydro, wind and solar, as a pivotal way to meet the climate change challenge. The project will save money on the imports ill by avoiding the use of imported fossil fuels. Although large part of the equipment will be imported, the local economy will benefit from the market development of electrical and mechanical technology skills that comes with the installation, operation and maintenance of the systems.

In addition to economic benefits, the renewable energy technologies offer great potential to avoid CO_2 emissions from direct fossil fuel burning for electricity generation. The manufacture and production of renewable energy systems does not involve dealing with hazardous or toxic substances and the systems are easy to recycle.

By demonstrating functioning renewable energy technologies, individual citizens are offered a grasp of energy and environmental issues. Gender aspects will be taken into account as part of the social and environmental impact assessments (outputs 2.2 and 3.1). Gender mainstreaming action will be integrated in all stages of a project cycle, including design of interventions, execution, monitoring and evaluation. References to gender will be consistent throughout the project approach, the activities, indicators, and budget. Female experts will be encouraged to participate in the training and other project activities.

Strategic considerations; consistency with UNDP Country Program

The proposed project is line with the 2013-2017 UNDAF for Equatorial Guinea, contributes directly to its *Outcome 4.5* "National capacity regarding sustainable management of natural resources and the environment" has been strengthened in the areas of water, soils, forest and waste management" and *Output 4.5.5* "Sustainable energy technologies and local management capacities have been strengthened in 4 pilot areas". The project will have a direct impact both on Millennium Development Goal (MDG) no. 7, to "ensure environmental sustainability" by 2015.

As detailed in the Section 2 and 3 of this document, the project is consistent with the vision of the Government to provide energy for all (as stated by the President in 2011), the National Development Plan "Horizonte 2020" and the country's National Electricity Plan.

5. POLICY CONFORMITY AND COUNTRY OWNERSHIP

Policy conformity

The project is in consistency with GEF-5 Climate Change Focal Area Objective 3 (CCM-3) aiming at promoting investments in renewable energy technologies. It presents a program that promotes renewable energy technologies in insular Equatorial Guinea, by means of in an effective policy framework, institutional capacity and demonstration of small hydropower. The importance of access to energy is also confirmed by the country's commitment of its entire STAR allocation under GEF-5 to its first climate change mitigation project.

Country ownership, country eligibility and country drivenness

Equatorial Guinea's NAPA (National Adaptation Plan of Action was finalised in November 2013. The country's Initial National Communication (INC) to the UNFCCC is under development, with a key focus on identifying the mitigation options suitable to the country. Its finalization will be informed by international long-term initiatives, such as the global Sustainable Energy for All (SE4ALL) initiative, as well as national mid-term development and energy policy frameworks:

- Horizon 2020: National Economic and Social Development Plan (NESDP),
- National Electrification Plan (NEP).

The project is in line with Equatorial Guinea's goal of provide access to energy to its entire population, while at the same time lead to the avoidance of greenhouse gas emissions, not often the priority of Least Developed Countries (LDCs).

6. PROJECT OBJECTIVE, OUTCOMES AND OUTPUTS

Project objective

The project objective "to create a market for decentralized renewable energy solutions in small-island and remote territories" will be achieved by removing barriers to the application of RE-based power generation in Equatorial Guinea and on Bioko Island in particular.

Outcomes and outputs

Component 1 Clean energy planning and policies for implementation and scaling up

This component addresses the barrier of the lack of a clean energy framework, in particular for projects by third parties (other than SEGESA) and attracting investment that would provide investors with predictable long-term price for renewable energy options, and the consequent revenue, profit and value-added streams. First, the activities will help to formulate a renewable energy policy that would boost RE-based power generation and an RE Strategy and Action plan, clarifying targets, budgets and roles and responsibilities. The plan will include a 'pro-poor off-grid' dimension in order to contribute to the goal of achieving reliable and affordable electricity access for all. Further, the activities of this Component will help formulate a framework of rules and regulations

that enables legislators and regulators and brings confidence to investors. GEF assistance is required for the incremental assistance in continuing drafting of rules and regulations and of strategic RE plans, as indicated below.

Outcome: • Implementation of an approved clean energy enabling framework and mechanisms established for scaling up and replication of investment in on/off-grid	
Outputs	*Activities*
1.1 Approved policy de-risking framework integrated resource planning and RE action plan (renewable energy)	• Assessment of existing legal and regulatory framework and recommendations • General awareness-raising and project progress discussion seminars; • Formulation of an RE Law and RE action plan (with RE on-grid and off-grid targets, timeframe and budget) that operationalizes the cleaner energy aspects of Equatorial Guinea's national electrification plan[14]
1.2 Accepted and implemented procedures for RE projects assessment and approval (e.g. PPA, FiT)	• Grid integration assessment to manage variability of RE sources, define operational parameters for grid-connected RE plans • Formulation of procedures in line with the planned restructuring of the power sector that will streamline any required procurement, licensing, permitting procedures and other policy de-risking instruments (e.g. PPA) that would strengthen the enabling environment for clean energy investments by non-SEGESA investors • Stakeholder workshops and meetings
1.3 Endorsed financial de-risking measures to implement innovative public and private funding options for recommended small hydropower, solar and wind in small islands	• Review and selection of technology options with socio-economic costs and benefits; list of viable RE investment opportunities[15] • Assessment study on financial issues and options to transfer the risks to interested financiers (e.g. treasury, development banks, bilateral donor partners) and suggested supportive mechanisms for implementation[16] • Workshop and seminars

Component 2 Clean energy technology (hydro) demonstration

This Component is intended to address the lack of resource data on sites along rivers for development of small-scale run-of-the-river hydropower systems and lack of properly maintained and functioning small hydropower plants, first by supporting the ongoing refurbishment of existing facilities at Riaba and Musola (Bioko Island) and

[14] The RE Strategy and Action Plan will supplement and embed RE in the Electrification Plan and the planned new Electric Energy Law and combine elements of a supportive regulatory framework (entry of independent RE providers; public-private partnerships; feed-in tariffs, tax incentives) with finance instruments (investment regulations; guarantee schemes for RE loans) and non-financial interventions (capacity building, knowledge management, stakeholder involvement and coordination) with RE targets (on-grid, off-grid; technology-wise) and financing plan;

[15] RE investment proposals in this pipeline can be in various phases of completion at the end of the GEF program, i.e. pre-feasibility study, full feasibility and business plan, financial and investment plan. RE options may include off-grid, mini-grid, on-grid as well as various technologies (small hydro, solar, wind, other)

[16] E.g. feed-in-tariffs, tax incentives (e.g. RE incentives such as duty-free imports), lending support which would provide investors with more predictable long-term price for renewable energy options, and the consequent revenue, profit and value-added streams;

Bicomo (mainland). Then by supporting the feasibility assessment, planning, design of a new small hydropower facilities (on river Ilachi on Bioko Island) as well as the assessment of other potential sites (on Bioko island and on the mainland region on the rivers Bolo and Wele). More details regarding energy production potential, capacities and cost estimates are provided in Annex D.

GEF assistance will be required for setting up and conducting the resource assessments:

- Evaluate and assess the data to identify possible sites,
- Assess feasibility and social and environmental impacts,
- Install and commission new RE plants at these sites
- Monitor and evaluate their operation and administration of the rehabilitated hydropower facilities (Riaba, Musola, Bicomo) during the GEF project's period of implementation.

Outcome: • Hydro energy technology and business model demonstrated in Equatorial Guinea's main insular and mainland regions	
Outputs	*Activities*
2.1 Resource assessment and pre-feasibility for small hydro (Ilachi, 12 MW, and other)	• River flow tests (small and mini hydro; Bioko Island) • Necessary technical detail (e.g. minimum river flow, expected rainfall variability, estimated hydropower capacity) to inform the physical specifications of the planned investments (e.g. recommended turbine size and type, adequate rotation speed, grid frequency); • Identification and assessment at other potential sites for small-scale in Eq. Guinea, in particular on Bioko Island
2.2 Completed business plan for Ilachi (with detailed feasibility, environmental impact analysis and detailed technical design)	• Design study and bankable business plan (Ilachi, 12 MW; other) o Full feasibility study with full technical design details (technical specification; equipment lead times) according to climate variability information (annual changes; dry/wet season) and studied socioeconomic issues and environmental impact assessment (e.g. riparian flora, aquatic life) o Estimates of energy production and expected sales (tariff); o Business model (ownership and management structure) and economical/financial feature (financing initial investment and costs of operation and maintenance; insurance premiums, contingencies)
2.3 Completed pilot project demonstrations of rehabilitated (Riaba, Musola, Bicomo; 7.6 MW) and new small-scale hydropower plants	• Technical support and business model advice provided during the rehabilitated plants, operation and maintenance (Riaba, Musola, Bicomo; 7.5 MW) as well commissioning of new plants • Evaluation report, discussed at stakeholder meetings, with recommended action after first period of operation

Component 3 Clean energy technology (solar and wind) demonstration

This Component is intended to address the lack of experience with other renewable sources of energy, in particular solar and wind energy. Being located near the equator with a low wind speed regime, the economic wind potential may be limited, although attractive wind speeds would be available at Annobón. The GEF project will support the feasibility analysis planning, design and installation and commissioning of at least one solar-diesel based mini-grid system in the remote island of Annobón. More details regarding energy production potential, capacities and cost estimates are provided in Annex D. Also, GEF assistance will be required for setting up and conducting the

resource assessments, evaluate and assess the data and to identify possible sites to implement solar energy technologies (solar-based minigrids in other sites, stand-alone solar PV applications) and assess the wind energy potential on Annobón.

The outcome of Components 2 and 3 will be increased availability on renewable energy (RE) resource information and knowledge on sites for possible RE projects and a number of functioning installed hydro power plants and solar and wind installations. In addition, the capacity of the energy ministry, SEGESA and other local stakeholders to generate reliable RE data; plan, assess and design; and manage and operate RE systems will be strengthened by means of 'learning by doing'.

Outcome: • Other clean energy (solar) technology and business model demonstrated in the insular and remote regions	
Outputs	*Activities*
3.1 Feasibility and business plan for solar (Annobón) and resource and pre-feasibility assessments (solar for remote/rural villages)	• Support project preparation of the solar hybrid system on Annobón (feasibility, demand and social study, design study, EIA and business plan) • Identification of and resource assessment in other sites (including mainland locations) and analysis of technology options for certain applications (e.g., mini-grid solar/hybrid; rooftop PV, etc.) or target group (rural villages; stand-alone applications) • Workshops and seminars
3.2 Completed pilot project demonstrations of solar at Annobón (5 MW)	• Targeted technical support in the installation, commissioning and initial operation of the diesel-solar hybrid (5 MW solar) on Annobón Island • Workshop and seminars

Component 4 Clean energy knowledge and capacity

The planning capacity of staff of the government entities involved in electricity (Ministry; SEGESA) will be in tandem with the supportive regulations and operational rules for RE projects (Outcome 1). In addition, GEF assistance will be crucial to train a critical mass of private investors, technicians and service providers that can develop, install and maintain future RE projects, through training workshops and technical courses, workshops and awareness creation events (seminars, industrial conference, matchmaking) for non-technical staff and decision-makers in private and public sector entities.

Outcome: • Information and knowledge on sustainable energy solutions widely shared; • Clean energy technical, individual and institutional capacity strengthened	
Outputs	*Activities*
4.1 Awareness raised amongst decision-makers in public and private sector[17]	• Awareness events led by MPM and MMIE for various stakeholders • Industry conferences and consultations; Study tours • Assisting project proponents in the identification and design of RE projects and arranging or suggesting sources of financing

[17] Targetimg prospective project developers, financial institutions and public officials and administrators

4.2 Training programs on RET established and technicians trained	• Setting up training programme of SEGESA & ITNHGE technicians on RETs; • Trainings and workshops carried out for different target individuals (e.g. technicians, contractors, planners) and communities and institutions/NGOs
4.3 Information dissemination and awareness creation of the general public	• Info in press, radio/TV, blogs on project progress and on small RE applications in general
4.4 Project impact assessment and lessons learned reporting	• Support project inception, work planning, impacts and progress reporting; Final project report, incorporating lessons learned and recommended post-project activities • Project site visits and publications
4.5 Monitoring and evaluation	• Mandatory mid-term and final evaluation; audits • Inception workshop and report

7. KEY INDICATORS, RISKS AND ASSUMPTIONS

Indicators

Indicators of the project's results given in the project results framework in Part III and described below. The most important impact indicator relates to the avoidance of CO_2 emissions by replacing fossil fuels in power generation with renewable sources of energy (small-scale hydro, solar and wind energy).

- The fully operational hydro plants (at Riaba, Musola and Bicomo; 7.6 MW in total) plus newly added RE capacity (Ilachi, 12 MW, becoming operational shortly after project's end; as well as the solar-based generation on Annobón) produce an estimated 101,441 MWh/yr annually, which otherwise would have been produced by on-grid or mini-grid diesel generators on the islands. The corresponding CO_2 emission reduction (direct) is 1,781 ktCO_2 over the lifetime of the technologies (assumed to be 20 years);

Other indicators gauge the success of the project's outcomes:
- New RE specific legislation in place (supplementing the proposed new Energy Law)
- RE Strategy and Action plan (supplementing existing Electrification and other energy plans);
- Set of rules and regulation allowing third-party electricity production, including with RE sources
- Number of projects (hydro, solar PV, wind) that have been identified, assessed (feasibility; social and environmental impacts), designed, reached financial closure, installed and under operation
- Number and type (workshop, seminar, study tour, campaign; conference; training) of awareness creation and capacity strengthening events organized

Risks and assumptions

The main risks and mitigation options are listed in below. The reader is also referred to the risks/assumptions column in the project results framework in Part III.

1. Climate variability leading to changed rainfall patterns (flooding, drought)	Medium	Hydrological tests and other technical (solar, wind) socioeconomic and environmental assessments will consider patterns of resilience and vulnerability to inform turbine type and size, rotor speed, or location

		of installations. This data also helps mitigate related investment risks (e.g. insurance premiums, contingency expenses).
2. Hydroelectric generation jeopardizes human and/or ecosystem activity (e.g. water access, reduced flow, aquatic life)	Low	Planned hydropower developments will be of a micro- to small scale (up to 10MW, with much lower impact than large scale facilities), and will adhere to the residual flows recommended by the feasibility studies. This will prevent any possible concentration of pollutants, adequate management of waste, and mitigate potential water borne diseases, per UNDP's social and environmental safeguards.
3. Lack of coordination / conflict amongst various government institutions with a role in joint energy-environmental matters (e.g. electricity licenses, water policy, public works, impact assessments, agriculture)	High	The project will prioritize the integration of support and activities spearheaded by SEGESA and MMIE, with the necessary guidance from other ministries –e.g. MPM (Environment); Agriculture & Forestry; Infrastructure & Public Works; the public sector–e.g. GEPROYECTOS (state company managing all development project contracts), AGENCIA 2020 (agency overseeing the implementation of the national social and economic development plan "Horizonte 2020"). The established monitoring and reporting processes will be the platforms for such integration (e.g. project inception, start-up launch/implementation, steering committee meetings, as well as national and international forums).
4. Crude oil and gas prices drop making gas-fired electricity and generation fuel cheaper	Low	The trend of fuel prices will be regularly monitored during project execution, to ensure its negative impact on planned clean energy investments can be mitigated. There is high probability that fuel prices will continue rising in the short/medium term. The project will promote the progressive phase-out of fuel subsidies.
5. Limited technical expertise available in-country to support climate change project formulation, preparation, start-up, monitoring and evaluation activities.	Medium	UNDP-GEF support will ensure global best practices and lessons learned are shared and disseminated at all project stages, referring to international recruitment/procurement practices, drawing from knowledge networks and technical rosters to engage qualified professionals with expertise in capacity development. The local university and technological institute (UNGE and INTHGE) and professionals from key ministries will be fully engaged to ensure management and technical know-how is transferred.
6. RE projects do not generate sufficient energy	Low	The project will support adequate sizing, equipment specifications and supervise installation of the demo projects and thereafter monitor operations and adhere to guarantees provided by the RET suppliers in order to maximize power generation
7. The business environment in Equatorial Guinea remains challenging (limited finance, high cost of imported goods, cumbersome institutional procedures; small size of domestic market. Policy-regulatory framework no sufficient for private investors and IPPs	Medium	The government is prioritising the establishment of an efficient system of commercial arbitration as part of its strategy to promote private sector development. Regarding RE, a significant part of the Project will be dedicated to de-risking measures (resource assessment and cost-benefit analysis, strengthening and streamlining regulatory process for RE off-grid and on-grid project development, preparing and executing PPAs, feed-in tariffs) in such a way that terms and conditions are sufficiently attractive for non-government investors, large and small.
8. Insufficient capital made available for RE scale up	Low	This risk will be mitigate through the implementation and monitoring of pilot projects to show both government and private investors that RE projects can be successfully implemented (see 6.) as well as the implementation of de-risking measures (see 7.). This will raise the confidence of institutions to provide capital funding for post-project investments.
9. Lack of policy and regulatory framework for new renewable energy investments	Medium	Part of this is discussed in points 3 (targets for RE) and 7 (attracting private/foreign investment). Often private sectors want to see two matters: 1) a statement on policy target of (grid-connected) RE in the country, as an indication for Government commitment, and 2)

		procedures for defining FiTs sufficient to attract investors. The project will specifically address these issues in Output 1.1 (Integrated resource planning in an approved policy de-risking framework with and RE (renewable energy) action plan) and 2.2 (Accepted and implemented procedures for RE projects assessment and approval, e.g. PPA, FiT).

8. COST-EFFECTIVENESS

The project would have considerable global environment benefits in terms of GHG emission reduction through, fuel switching by replacing fossil fuels with renewable energy. The GEF contribution of USD 3,502,968 will result in a cumulative emission reduction of 1,780 kilotons of CO_2 from the pilot/demo project in Components 2 and 3:

- Direct:
  - Rehabilitation of the existing small hydropower plants at Riaba, Musola and Bicomo; 7.6 MW);
  - Solar-diesel hybrid systems (on Annobon Island; 5 MW)
- Post-project direct: small hydropower facility at Ilachi on Bioko Island (12 MW)

This translates into a GEF (direct emission reductions) abatement cost of USD 2.25 per tonne of CO_2. The following table compares the cost effectiveness of reducing GHG emissions in the proposed project, based on the estimates presented in Annex D of the UNDP Project Document.

	Cumulative GHG reduction ($ktCO_2$)	**Cost-effectiveness (USD/tCO_2)**
Direct emission reductions: ➢ Small hydropower (7.6 MW) ➢ Solar (5 MW) ➢ Small hydropower (12 MW)	 643 123 1,015	
Total direct	1,781	2.25
Indirect emission reductions ➢ Hydro, solar, wind (repl. factor, 4)	7,121	0.56
Total emission reductions (Direct + Indirect)	8,902	0.45

The project will strengthen skills and knowledge on the effective implementation of RE projects. Together with institutional strengthening and investor-friendly regulations, this will catalyse RE investment after the completion of the project. As such, the project will generate indirect emission reduction. Adopting a bottom-up approach (assuming g that the pilot/demos, if well-managed, will be replicated) this will result in reduction of 6,374 $ktCO_2$ (taking a replication factor of 4).

In terms of cost effectiveness of the technologies, the calculations of Annex E give levelised cost of energy (LCOE) of small hydro of USD 0.07-0.10/kWh and USD 0.29/kWh for the solar PV in Annobón, in comparison with USD 0.31/kWh for a 5 MW diesel generator set. From the viewpoint of LCOE, these RE system are competitive, but their investment cost (USD 2500-3000/kW) is an order of magnitude higher making investment decision-makers prefer diesel generator sets.

9. SUSTAINABILITY AND REPLICABILITY

This first ever GEF-funded climate mitigation project tackles the key sector of Equatorial Guinea's economy. The country's current focus is on increasing hydrocarbons and large-scale power for exportation, but this intervention is expected to prompt a paradigm shift towards smaller-scale investments to boost production for local consumption. Particularly, its focus on fossil-fuel dependent islands will help achieve the government's ambition to provide electricity to all in a sustainable manner, by replacing gas-fired electricity with hydropower.

Sustainability

A number of risks may affect the likelihood of continuation of the project's benefits after the project ends. These are listed section 7 and possible risk mitigation measures are assessed. The project's outputs are designed to implicitly improve the sustainability of renewable energy in Equatorial Guinea:

- Having legislation, policy and streamlined procedures to approve RE projects for investment;
- Have the experience and know-how of developing and implementing RE projects;
- Collect and store data and information on renewable energy resources and the feasibility of technology for selected applications; and have a pipeline of potential RE projects;
- Manage capacity strengthening in close cooperation with academic and training institutions.

Tariffs will be decided by SEGESA and MMIE in accordance with current regulations. Although the end-user will not cover the LCOE (levelised cost of energy), the basic idea is that tariffs should cover operation and maintenance and part of replacement cost. However, it should be note that the proposed renewable energy generation in terms of LCOE cheaper than diesel-fired generation (as is explained in detail in Annex D of the UNDO Project Document. In practice this means a cross-subsidy from power generated conventionally to finance the initial investment for the new RE technologies, which will be paid back over time by avoided cost of fuel purchase. On repair and maintenance, this will be responsibility for the technical units of SEGESA that also service existing conventional facilities. To ensure that sufficient local capacity is available the project will train SEGESA and MMIE staff as well local experts (consultants, university) in RE technology (hydro, solar, wind) as part of Output 4.3.

Replicability

Regarding scaling up, the expected benefits and awareness raising initiated by the Riaba, Musola and Bicomo rehabilitated plants (7.6 MW) and the demonstration of new small-scale hydro at the Ilachi plant (12 MW) on Bioko Island as well as the solar hybrid system (5 MW) at Annobón will boost the planned 200 MW hydro investments in the mainland and scaling up investments in solar, wind and small hydropower. The MMIE will ensure an enabling de-risked environment is created that, beyond project closure, will attract foreign/private investment by:

- An approved policy de-risking framework with and RE (renewable energy) action plan that sets targets for RE to be achieved in a certain period; this will give confidence to investors regarding government plans and commitment;
- Accepted and implemented procedures for (small-scale) RE projects assessment and approval for independent power producers that want to operate facilities and/or sell to the grid (e.g. PPA, FiT)
- Financial de-risking measures to implement (e.g. incentives such as tax/duty exemptions, tax holidays/reduction; quick permit approval procedures, etc.

The combination of the new policies, the demo projects, and institutional capacities developed in this project will scale-up investments in new renewable energy technologies in an energy market where fossil energy resources are rich.

Part 3. PROJECT RESULTS FRAMEWORK

UNDP Strategic Plan Outcome SP1: Growth and development are inclusive and sustainable, incorporating productive capacities that create employment and livelihoods for the poor and excluded; **SP Output 5.1** Inclusive and sustainable solutions adopted to achieve increased energy efficiency and universal modern energy access (especially off-grid sources of renewable energy (2014-2017)

UNDAF Outcome 4.5: National capacity regarding sustainable management of natural resources and the environment has been strengthened in the areas of water, soils, forest and waste management (2013-2017); **Output 4.5.5**: Sustainable energy technologies and services are available and local management capacities have been strengthened in 4 pilot areas

Country Programme Outcome: The country has a stronger legislative and institutional framework that guarantees sustainable management of the environment, adaptation to climate change and mitigation of its effects (2013-2017)

Applicable GEF Strategic Objective and Program: GEF-5 CCM-3 Promote investment in renewable energy technologies

Applicable GEF Outcome: • Favourable policy and regulatory environment created; • Investments in renewable energy technologies increased; • GHG emissions avoided

Applicable GEF Outcome indicator: a. Extent to which RE policies and regulations are adopted and enforced; b. Volume of investment mobilized; c. Tonnes of CO2 equivalent avoided

	Indicator	Baseline	Target	Source of verification	Assumptions
Project objective: To create a market for decentralized renewable energy solutions in small island and remote territories	A) Lifetime direct and post-project direct CO_2 emission reduction as a result of project-supported demo/pilots B) Indirect GHG reduction due to project's policy, institutional and capacity building and finance mobilization C) Installed capacity of (small-scale) RE and annual power generation	• 0 • 0 • 0 MW[18]	• Direct[19]: 1,781 $ktCO_2$ • Indirect: 7,121 $ktCO_2$ • 24.6 MW[20]	• Project final reports; Project progress reports; • Monitoring reports of the demo/pilot projects (Components 2 and 3) • Official publications (Ministry of Energy) and studies/reports	• Government support for RE will not change; • Government support for implementing de-risking measures and attract IPPs will not change • Economic growth will continue; Macro-economic reforms needed to attract foreign (private) investments will also enable investment in RE • Fossil fuel prices will not sharply fall, while fuel

18 Some 15 MW was installed during 1979-1990, but lack of maintenance has left these plant non-operational over time; Riaba, Musola and Bicomo are planned to be rehabilitated;

19 Emissions from the upgraded Riaba, Musola 1 and 2 and Bicomo small hydropower plants (643 $ktCO_2$) and newly added capacity (Annobón, solar; 123 $ktCO_2$ and Ilachi, Bioko; 1,015 $ktCO_2$

20 Small hydro: Riaba, 4 MW, Musola I and II: 0.4 MW, Bicomo: 3.2 MW; Solar hybrid on Annobón: 5 MW and Ilachi small hydro: 12 MW

	Indicator	Baseline	Target	Source of verification	Assumptions
					subsidies will be phased out;
Outcome 1: Implementation of an approved clean energy enabling framework and mechanisms established for scaling up and replication of investment in on/off-grid	D) Status of RE Strategy and Action plan E) Status of set of regulations and procedures F) Number of alternative sources of finance identified G) Number of RE projects proposed for approval (and post-project implementation)	• 0 • 0 • 0 • 0	• 1 • 1 • 3[21] • 5[22]	• Completed studies and plan (with on-grid and off-grid targets; policy instruments/tariffs; regulations; budget and sources of finance); • Guidebook with rules and procedures for RE projects • Documents on RE projects feasibility and potential sources of finance for RE • Website on RE resources, options and regulations and latest news • Official publications	• Sufficient capacity and willingness to coordinate exists amongst various Government entities; • Government support for RE and for support for implementing de-risking measures and attract IPPs will not change
Outcome 2: Hydro energy technology and business model demonstrated in Equatorial Guinea's main insular and mainland regions	H) Number of small hydropower assessed, of which I) Number of small hydropower projects in advanced stage of development J) Number of small hydropower projects that are operational	• 2 • 2 • 0[23]	• 4 • 2[24] • 3[25]	• Assessment reports for particular locations • Documents on feasibility and design (feasibility, design, financial closure) • Monitoring reports of construction and operations; records of power generation • Project progress reports • Website on RE resources, options and regulations and latest news	• No real change in rainfall patterns; Impacts of small hydropower development does not jeopardize human or ecosystem activity; • Government support for RE will not change; • Adequacy of support in design, installation and operation and maintenance

21 Funding other than form the public energy sector (Ministry; SEGESA), i.e. other Ministries, bank, private sector or international loan or grant funding

22 Projects of Indicators I) and K), of which 5 are considered for approval and financing

23 Existing small-scale hydropower facilities (e.g., Riaba and Musula I & II) are not operational

24 Includes the Ilachi facility (12 MW) expected to become operational after project's end (post-project direct emission reduction) and at least one other facility in advanced stage of preparation (hence, Indicator I has the value of 2), based on the resource assessments carried out at other river areas (e.g. Bolo and Wele rivers)

25 It is expected that the three hydropower facilities at Riaba, Musola I and II and Bicomo will be rehabilitated and operational (contributing to direct emission reduction)

	Indicator	Baseline	Target	Source of verification	Assumptions
Outcome 3: Other clean energy (solar and) technology and business model demonstrated in the insular and remote regions	K) Number of sites assessed for application of solar PV or solar hybrid systems (feasibility) L) Number of small hydropower projects operational	• 0 • 0	• 5 • 1[26]	• Assessment reports for particular locations • Documents on feasibility and design (feasibility, design, financial closure) • Monitoring reports of construction and operations; records of power generation • Project progress reports	• Adequacy of support in design, installation and operation and maintenance
Outcome 4: Information and knowledge on sustainable energy solutions widely shared; Clean energy technical, individual and institutional capacity strengthened	M) Number of awareness-raising events organised and attendance N) Number of RE-relevant training programmes and attendance O) Number and status of RE info campaign	• 0 • 0 • 0	• 10[27] • 2[28] • 1	• Workshop and seminar proceedings; evaluations by participants • RE training course materials; evaluations by participants • RE info materials designed and published • Monitoring and evaluation reports; Project Final report	• Sufficient expertise exists to plan, execute and monitor projects and staff has willingness to take part in training/capacity strengthening programmes • Sufficient interest and participation by decision-makers in institutions, NGs and private sector

[26] Solar-diesel hybrid system at Annobón Island (5 MW of solar)

[27] The project should organize at least 10-15 events a year (1 or 2-day workshops), of which 9 event/days for decision-makers

[28] At least one RE course designed and implemented plus targeted 1-day workshops (total of 25 training.days)

Part 4. TOTAL BUDGET AND WORK PLAN

Award ID:	00094909	
Project ID:	00098972	
Award Title:	PIMS 5143 Sustainable Energy for all EQG	
Business Unit:	GNQ10	
Project Title:	PIMS 5143 Sustainable Energy for all EQG	
Implementing Partner (Exec. Agency):	Ministry of Fisheries and Environment	

GEF Outcome / Atlas Activity	Resp. Party (Impl. Agency)	Fund ID Donor name	Atlas Budget Account Code	ERP/ATLAS Budget Description/Input	Year 1	Year 2	Year 3	Year 4	Year 5	Total (USD)	Notes
Outcome 1 Implementation of an approved clean energy enabling framework in Equatorial Guinea	MPM	GEF 62000	71200	International Consultants	32,063	43,333	45,938	21,063	29,479	171,875	1
			71300	Local Consultants	6,750	19,500	19,083	9,083	4,583	59,000	2
			71600	Travel	8,556	12,392	22,242	14,985	11,338	69,513	3
			72100	Subcontracts	2,500	18,667	10,167	17,667	1,000	50,000	4
			72200	Equipment and furniture	5,000	500	2,000	2,500		10,000	5
			72500	Supplies	1,500	1,500	1,500	1,500	1,500	7,500	6
			73400	Rental and Main Equip		2,000	500	2,000	1,500	6,000	7
			74200	Audio visual & Printing Prod.costs	500	1,000	1,000		500	3,000	8
			74500	Miscellaneous	1,000	883	994	1,042	481	4,400	9
			sub-total		**57,869**	**99,775**	**103,423**	**69,840**	**50,381**	**381,288**	
Outcome 2 Hydro energy technology and business model demonstrated in Equatorial Guinea's main insular region (Bioko)	MPM	GEF 62000	71200	International Consultants	6,250	11,458	2,083	9,896	7,813	37,500	10
			71300	Local Consultants	5,000	6,000	2,000	8,000	3,000	24,000	11
			71600	Travel	2,125	2,800	725	2,900	2,025	10,575	3
			72100	Subcontracts	219,896	567,833	761,128	123,643		1,672,500	12
			72200	Equipment and furniture	27,104	34,333	35,705	17,857	5,000	120,000	13

			72500	Supplies	2,500	2,500	2,500	2,000		9,500	6
			74200	Audio visual & Printing Prod.costs	1,600	1,600	1,200	1,100		5,500	8
			74500	Miscellaneous	6,400	5,400	725	1,650	1,250	15,425	9
			sub-total		**270,875**	**631,925**	**806,067**	**167,046**	**19,087**	**1,895,000**	
Outcome 3: Clean energy (solar and wind) technology and business model demonstrated in the insular regions chains	MPM	GEF 62000	71200	International Consultants	2,083	2,083	2,083		18,750	25,000	14
			71300	Local Consultants	2,000	2,000	2,000		8,000	14,000	15
			71600	Travel	725	725	725		6,025	8,200	3
			72100	Subcontracts	103,544	175,519	207,394	38,542		525,000	16
			72200	Equipment and furniture	47,289	30,314	58,439	31,458	2,500	170,000	17
			72500	Supplies	2,500	2,500	2,500	2,000		9,500	6
			74200	Audio visual & Printing Prod.costs	2,500	2,500		2,500		7,500	8
			74500	Miscellaneous	2,500	2,500	5,225	5,500	447	16,172	9
			sub-total		**163,142**	**218,142**	**278,367**	**80,000**	**35,722**	**775,372**	
Outcome 4: Information and knowledge on sustainable energy solutions widely shared; Clean energy technical, individual and institutional capacity strengthened	MPM	GEF 62000	71200	International Consultants	1,511	3,876	17,209	7,504	19,901	50,000	18
			71300	Local Consultants	967	2,480	6,747	4,803	9,003	24,000	19
			71600	Travel	502	1,287	8,167	2,491	8,754	21,200	3
			72100	Subcontracts	15,000	16,357	27,757	37,364	40,521	137,000	20
			72200	Equipment and furniture	2,000	2,000	2,000	2,000	2,000	10,000	5
			73400	Rental and Main Equip	1,000		1,000	1,000	1,500	4,500	7
			72500	Supplies	3,500	500	3,000		3,000	10,000	6
			74100	Professional services (audits)	2,500	2,500	2,500	2,500	2,500	12,500	21
			74200	Audio visual & Printing Prod.costs			5,000		5,000	10,000	8
			74500	Miscellaneous	2,021		1,620	500	1,159	5,300	9

			sub-total		**29,000**	**29,000**	**75,000**	**58,163**	**93,338**	**284,500**	
Project Management Unit	MPM	GEF 62000	71400	Contractual Services-Indv	33,280	33,280	33,280	33,280	33,280	166,400	22
			71600	Travel							3
			74500	Miscellaneous	408					408	9
			Sub-total		**33,688**	**33,280**	**33,280**	**33,280**	**33,280**	**166,808**	
		UNDP	71200	International Consultants	48,000	48,000	48,000	48,000	48,000	240,000	23
			71400	Contractual Services-Indv	42,906	42,906	42,906	42,906	42,906	214,530	22
			71600	Travel	6,632.80	6,633	6,633	6,633	6,633	33,164	24
			72200	Equipment and furniture	7,500		2,500			10,000	25
			74500	Miscellaneous	500	400	500	400	506	2,306	9
			Sub-total		**105,539**	**97,939**	**100,539**	**97,939**	**98,045**	**500,000**	
TOTAL GEF					**554,573**	**1,012,122**	**1,296,136**	**408,328**	**231,808**	**3,502,968**	
TOTAL UNDP					**105,539**	**97,939**	**100,539**	**97,939**	**98,045**	**500,000**	
GRAND TOTAL					**660,112**	**1,110,060**	**1,396,675**	**506,267**	**329,853**	**4,002,968**	

DONOR	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**TOTAL**
GEF	554,573	1,012,122	1,296,136	408,328	231,808	3,502,968
UNDP	105,539	97,939	100,539	97,939	98,045	500,000
Government (cash)		5,000,000	15,000,000	12,550,000	1,704,762	34,254,762
Government (in-kind)	390,000	390,000	390,000	390,000	3,685,238	5,245,238
TOTAL	**1,050,112**	**6,500,060**	**16,786,675**	**13,446,267**	**5,719,853**	**43,502,968**

General notes to the budget:

- International consultants (IC) are budgeted at USD 3,125 per week and short-term national consultants (NC) are budgeted at $ 1000 per week. The travel budget (tickets and DSA) is estimated at 30% of international consultant fee and 5% of national consultant fee.
- The cost of workshops and training organisation (space rental, organisation, food and DSA, presentation materials, etc.) is estimated at USD 2,500 per day (with 20 participants for workshop and 40 participants on average for trainings)

Specific notes (the numbers correspond to the last column of Table 6)

1. 55 person-weeks of international expertise
2. 59 person-weeks of national expertise
3. International/domestic travel to project sites
4. Subcontracts for workshop and stakeholder meetings organisation (incl. logistics, space); USD 50,000
5. Supplies and office stationary
6. Office equipment
7. Rental equipment and premises for project activities
8. Printing and reproduction cost of project reports, background studies, workshop proceedings
9. Miscellaneous and unforeseen expenses
10. 12 person-weeks of international expertise
11. 24 person-weeks of national expertise
12. Subcontracts for organisation of stakeholder consultations and workshops (USD 17,500); Subcontract for hydro resource assessments (Ilachi and other sites; USD 310,000), TA support O&M and management improvement Riaba, Musola and Bicomo (USD 500,000); TA support Ilachi (assessment, design, and supervision during construction, installation and commissioning; on –the-job training on operation and maintenance; USD 845,000). Note: separate budget line for equipment (see next note 12)
13. Equipment for surveys, data analysis, measurements; software and computing; auxiliary equipment in design and installation (USD 110,000 in total)
14. 8 person-weeks of international expertise
15. 14 person-weeks of national expertise
16. Subcontracts for organisation of stakeholder consultations and workshops (USD 20,000); Subcontract for resource assessments solar and wind; insular: USD 70,000); TA support Annobon solar hybrid and solar applications at other sites (assessment, feasibility, design, and supervision during construction, installation and commissioning; on –the-job training on operation and maintenance; USD 835,000). Note: separate budget line for equipment (see next note 16)
17. Equipment for surveys, data analysis, measurements; software and computing; auxiliary equipment in design and installation (USD 160,000 in total)
18. 8 person-weeks of international expertise
19. 16 person-weeks of national expertise
20. Subcontract for awareness-raising and publicity seminars and conferences (USD 22,500); Subcontracts for setting up and carrying out RE training course (USD 87,500); Subcontract for setting up general public info and awareness campaign on RE (USD 15,000)
21. Services for annual financial audit of the project
22. Project manager salaries (USD 800 per week for 250 weeks; of which 4/5 funded by GEF and 1/5 by UNDP) as well as two technical experts (facilitation and demand; technology support: USD 150,000; 125 weeks each) and financial support (USD 31,250; cost-shared with co-financing)
23. Chief Technical Advisor (USD 240,000 for 80 weeks)
24. National travel of project management staff
25. Office equipment (computer, printer, scanner, camera)

Budget details per output and budget line

BUDGET - DETAILS		71200	71300-400	71600	72100	72000	72500	74200	74100	74200-500	
		Int'l consult	**Nat'l consult**	**Travel**	**Contracted services**	**Equipm & furniture**	**Supplies**	**Comm & audiovisuals**	**Audits;**	**Misc**	**TOTAL**
Component 1		**171,875**	**59,000**	**69,513**	**50,000**	**10,000**	**6,000**	**7,500**	**0**	**7,400**	**381,288**
Output 1.1	- assessment legal and regulatory framework	12,500	6,000	4,050							**22,550**
	- awareness raising seminars and action plan workshop	12,500	6,000	4,050	20,000						**42,550**
	- action plan formulation	12,500	6,000	4,050							**22,550**
	- study tour			15,000							**15,000**
Output 1.2	- study and recommendation on instruments	12,500	9,000	4,200							**25,700**
	- workshops				10,000						**10,000**
Output 1.3	- Assessment on financial and de-risking options	12,500	8,000	4,150							**24,650**
	- C/B study RETs with recommendations	37,500	20,000	12,250							**69,750**
	- Workshops and stakeholder consultations	9,375	4,000	3,013	20,000						**36,388**
Output 1.3	- Project impact assessment and reporting	62,500		18,750							**81,250**
Other						10,000	6,000	7,500		7,400	**30,900**
Component 2		**37,500**	**24,000**	**10,575**	**1,672,500**	**120,000**	**9,500**	**5,500**	**0**	**15,425**	**1,895,000**
Output 2.1	- resource assessment and pre-feasibility, Ilachi, other				310,000	40,000					**350,000**
	- stakeholder consultation	12,500	10,000	4,250	5,000						**31,750**
Output 2.2	- technical design and business plan				845,000	50,000					**895,000**
	- stakeholder consultation	6,250	6,000	2,175	7,500						**21,925**
Output 2.3	- TA support installation and operation; Riaba, Ilachi				500,000	20,000					**520,000**
	- evaluation and performance report	12,500	4,000	3,950							**20,450**
	- workshop	6250	4,000	200	5,000						**15,450**
Other						10,000	9,500	5,500		15,425	**40,425**
Component 3		**25,000**	**14,000**	**8,200**	**525,000**	**170,000**	**9,500**	**7,500**	**0**	**16,172**	**775,372**
Output 3.1	- resource assessment solar and wind; islands and other				70,000	90,000					**160,000**
	- feasibility analysis and design; commissioning				335,000	50,000					**385,000**
	- Workshops	6250	6000	2175	10,000						**24,425**
Output 3.2	- Targeted TA				100,000	20,000					**120,000**
	- evaluation and performance report	12,500	4,000	3,950							**20,450**
	- Stakeholder consultations	6,250	4,000	2,075	10,000						**22,325**

Other						10,000	9,500	7,500		16,172	**43,172**
Component 4		**50,000**	**24,000**	**21,200**	**137,000**	**10,000**	**14,500**	**10,000**	**12,500**	**5,300**	**284,500**
Output 4.1	- Awareness raising events	6,250	4,000	2,075	12,500						**24,825**
	- Industry conferences	6,250	4,000	2,075	10,000						**22,325**
Output 4.2	- Info and awareness, general public				15,000						**15,000**
Output 4.3	- Setting up training programme				25,000						**25,000**
	- Trainings and specialised technical workshops	12,500	8,000	4,150	62,500						**87,150**
Output 4.4	- M&E	25,000	8,000	12,900	12,000				12,500	4,600	**75,000**
Other						10,000	14,500	10,000		700	**35,200**
PM			**166,400**	**0**						408	**166,808**
TOTAL		**284,375**	**287,400**	**109,488**	**2,384,500**	**310,000**	**39,500**	**30,500**	**12,500**	**44,705**	**3,502,968**

Budget overview of consultants and subcontracts (GEF budget)

Component	Consultants GEF funds	International Weeks	International Total (USD)	National Weeks	National Total (USD)
1	- Legal framework and policy instruments	8.0	25,000	13.0	13,000
1	- Project impacts and reporting	20.0	62,500		0
1,4	- RE planning and cost-benefits	13.0	40,625	22.0	22,000
2,3	- Hydropower experts	16.0	50,000	28.0	28,000
3	- Wind power experts	10.0	31,250	14.0	14,000
3	- Solar PV experts	10.0	31,250	14.0	14,000
3	- Demand and social-economic aspects		0	10.0	10,000
4	- Capacity strengthening and training	6.0	18,750	12.0	12,000
4	- M&E	8.0	25,000	8.0	8,000
	Total	**91.0**	**284,375**	**121.0**	**121,000**

	Subcontracts (GEF funds)	USD
1,2,3,4	Organisation of events, workshops, training	110,000
4	Technical training course (plan, design and O&M)	87,500
2	Resource assessment, Ilachi, other	310,000
3	Resource assessment, solar adn wind insular	70,000
2	Feasibility, business plan, design; hydro (Ilachi)	845,000
3	Feasibility, business plan design; solar	335,000
3		0
2	Targeted TA support (support upgrading and operations); hydro	500,000
3	Targeted TA support (install and commissioning); solar	100,000
4	M&E (inception; final workshops)	12,000
4	RE awareness campaign	15,000
	Total	**2,384,500**

Project management and management support

Project administration	USD/week	Weeks	GEF	UNDP	Local cofin (USD)
Project Director	1,000	65			65,000
Project manager	800	260	166,400	33,280	8,320
Travel				33,164	40,000
Support	250	125		31,250	
Counterpart staff (MMIE, MPM)	600	1,560			936,000
Facil. & demand; Tech support & supply	600	250		150,000	
CTA	3,000	80		240,000	
Equip and premises				10,000	348,204
Misc			408	2,306	7,238
TOTAL	**6,250**	**2,340**	**166,808**	**500,000**	**1,404,762**

Part 5. MANAGEMENT ARRANGEMENTS

10. PROJECT ORGANIZATION STRUCTURE

The project will be implemented according to UNDP's National Implementation Modality (NIM), as per the NIM project management guidelines agreed by UNDP and the Government of Equatorial Guinea. The project is co-financed with funding from the GEF and UNDP acts as the *GEF Executing Agency*.

The Ministry of Fisheries and Environment (MPM) will assume overall responsibility for the achievement of project results as the *GEF Local Executing Agency (Implementing Partner)* with the Ministry of Mines, Industry and Energy (MMIE) as *Responsible Party* and the national utility SEGESA as *Technical Party*.

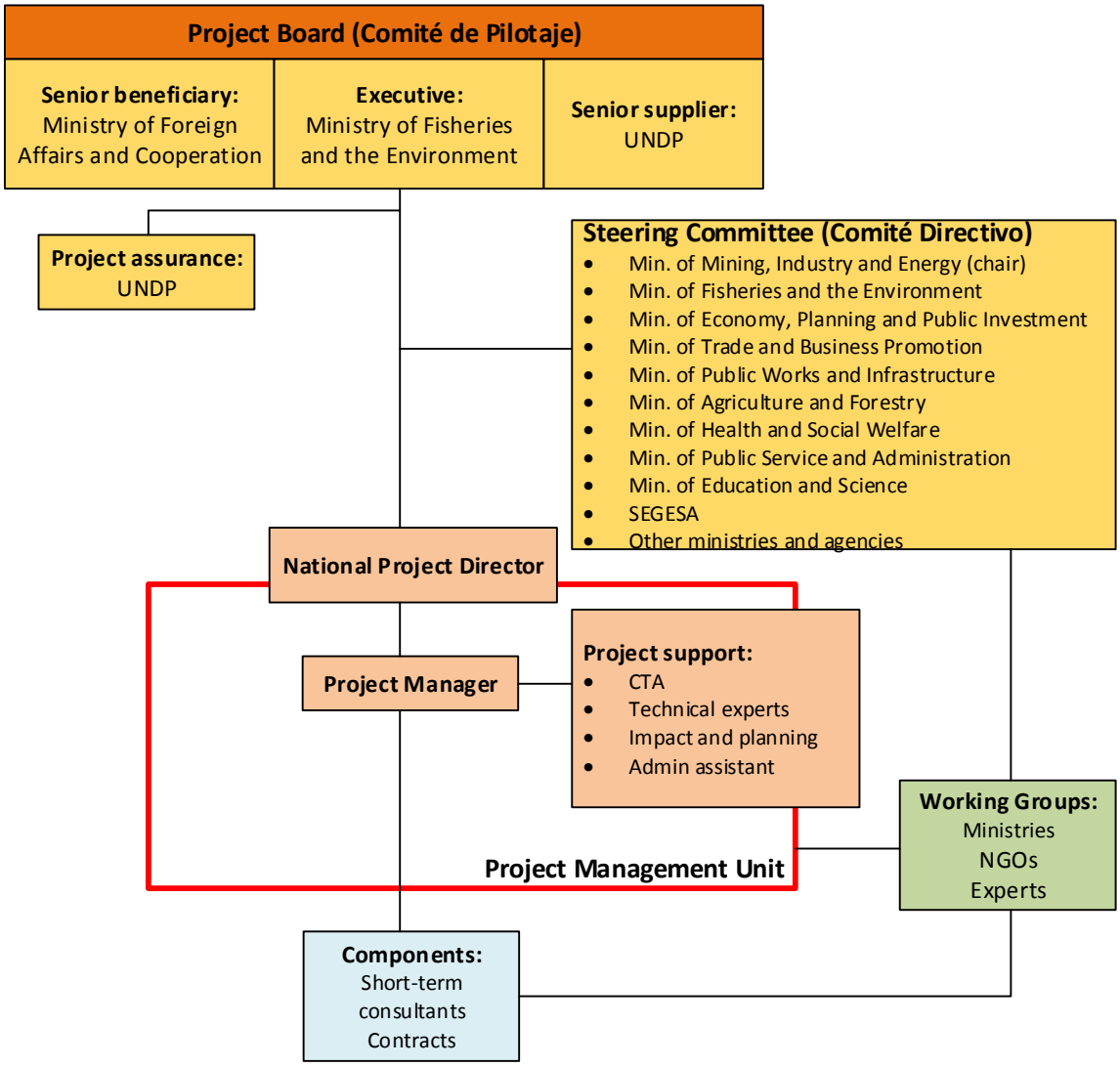
Project Board will be set up, on which UNDP, Ministry of Foreign Affairs and Cooperation and the Ministry of Fisheries and Environment will be represented. The Project Board (PB) ensures that required resources are committed and arbitrates on any conflicts within the project or negotiates a solution to any problems with external bodies. It ensures proper coordination and communication with other UN and UNDP projects. In addition, it approves the appointment and responsibilities of the Project Manager and any delegation of its Project Assurance responsibilities.

The MPM will designate a senior official as the **National Project Director (NPD)** for the project. The NPD will be responsible for overall guidance to project management for all its components, including adherence to the Annual Work Plans and achievement of planned results as indicated in this Project Document, and for the use of GEF and UNDP funds through effective management and well-established project review and oversight mechanisms. The NPD will also ensure coordination with the various ministries and agencies, provide guidance to the Project Management Unit, review reports and manage administrative arrangements as required.

The **Project Steering Committee (PSC)** is responsible for providing strategic to the project and plays a critical role in project monitoring and evaluations by quality assuring the project's processes and products, and using evaluations for performance improvement, accountability and learning. Based on the approved Annual Work Plan, the PSC can also consider and approve the quarterly plans (if applicable) and also approve any essential deviations from the original plans. Potential members of the PB are reviewed and recommended for approval during the PAC meeting. Representatives of other stakeholders can be included in the Steering Committee as appropriate.

A small **Project Management Unit (PMU)** will be set up that will coordinate the project's operation on a day-to-day basis with the government agencies involved (especially Ministry of Fisheries and Environment; Ministry of Mining, Industries and Energy; and SEGESA) and report on the progress in implementation of the project activities. The PMU will consist at least of three staff, of which the concept Terms of Reference (ToRs) are provided in Annex B.

- Project Manager (PM) – full time
- Administrative/financial support
- Technical experts (facilitation and demand; technology) – part-time
- CTA (Chief Technical Advisor) – part-time



The Project Manager will be the primary contact person for the Project for external communication and will act as the convener for meetings between the national implementing partners and UNDP.

UNDP will provide overall management and guidance from its Country Office in Malabo and through the UNDP/GEF Regional Technical Advisor, and will be responsible for monitoring and evaluation of the project as per normal GEF and UNDP requirements.

11. GENERAL

Prior obligations and prerequisites

There have no prior obligations or prerequisites been identified

Audit arrangements

The project will be audited according to the UNDP Financial Regulations and Rules and applicable audit policies.

Agreement on the intellectual property rights and use of logo on the project's deliverables

In order to accord proper acknowledgement to GEF for providing funding, a GEF logo should appear on all relevant GEF-supported project publications, including among others, project hardware, if any, purchased with GEF funds. Any citation on publications regarding projects funded by GEF should also accord proper acknowledgement to GEF. The logos of the GEF, UNDP and the Government should be equal and appear on all communication and other public materials, as relevant.

Cooperation with related projects and activities

The project will be implemented by MPM with the MMIE and SEGESA, in direct coordination with all activities Equatorial Guinea plans to undertake related to the international "Sustainable Energy for All" (SE4ALL) initiative. The preparation of the White Paper on energy access mainstreaming, renewable energy and energy efficiency for CEMAC (Central African Economic and Monetary Community) and ECCAS (Economic Community of Central Africa), including Equatorial Guinea, is an example of planned project coordination.

The project will seek to establish links and exchange of know-how with regional knowledge centres, such as ARPEDAC[29] (which is a non-profit association involved in research and promotion of services and technologies related to energy efficiency and renewable energy in the Economic Community of Central Africa) and the Regional Centre for Small Hydropower in Africa (based in Abuja, Nigeria), as well as with the GEF-funded project "GEF Strategic Program for West Africa: Energy Component".

The MPM recently elaborated Equatorial Guinea's National Adaptation Plan of Action (NAPA), also with UNDP-GEF support. The energy sector figures an adaptation priority, considering water issues of large scale hydropower developments in the mainland region. The project will have the standard management arrangements other projects have, including a project steering committee with representatives from MPM, MMIE and other Ministries, which will ensure coordination within and outside the GEF project portfolio.

[29] Association pour la Recherche et la Promotion de l'Energie Durable en Afrique Centrale, based in Yaoundé, Cameroon. ARPEDAC has proposed a EU-funded project to establish a Centre of Excellence in Renewable Energy and Energy Efficiency in the Central Africa (CEREEECA)

Part 6. MONITORING AND EVALUATION

The project team and the UNDP Office in Equatorial Guinea will be supported by the UNDP-GEF Technical Advisor will be responsible for project monitoring and evaluation conducted in accordance with the established UNDP and GEF procedures. The Project Results Framework provides performance and impact indicators for project implementation along with their corresponding means of verification (see Annex A). The GEF CC Tracking Tool will also be used to monitor progress in reducing GHG emissions. The M&E plan includes: a) inception workshop and report, b) project implementation reviews, quarterly and annual reviews, c) independent mid-term evaluation and final evaluation, d) audits and e) project impact reports. The M& E plan and budget are summarized below, while more details are provided in the UNDP Project Document:

M&E Activity	**Responsible Parties**	**Timeframe**	**Indicative GEF budget (USD) – Output 4.3**
Inception Workshop (IW) and Report	• Execution: PMU, UNDP CO, UNDP GEF	• Immediately following but within four months project start-up	• GEF: 7,000
Measurements of means of verification • Project results • Project progress (output	• Oversight by RTA/PMU and progress monitoring consultant	• Start, mid and end of project (during evaluation cycle) and • Annually prior to APR/PIR and AWPs	• Finalised in Inception phase and part of the annual work plan support and progress reporting (Output 1.3);
Progress reporting: • ARR/PIR • Periodic status and progress reports	• ARR/PIR: PMU; UNDP CO, UNDP RTA	• ARR/PIR by July each year • Other: Quarterly	• GEF: 5,000 (for completion; updating tracking tool)
Project Terminal Report	• Project manager and progress monitoring consultant • UNDP CO	• At least three months before the end of project implementation	• -
Project technical and thematic reports	• PMU, UNDP CO, UNDP RTA	• As requested	• GEF: 4,600
Mid-term evaluation	• PMU, UNDP CO, UNDP RTA, external consultants	• At the midpoint of project implementation	• GEF: 20,900
Final evaluation	• PMU, UNDP CO, UNDP RTA, external consultants	• At least three months before the end of the project	• GEF: 20,000
Audits	• UNDP CO; PMU	• Annual	• GEF: 12,500
Site visits	• UNDP CO, RTA, government representatives	• As appropriate	• GEF: 5,000 • UNDP staff travel to be charged to IA fees
TOTAL indicative COST Excluding project team staff time and UNDP staff and travel expenses			**GEF: USD 75,000** (Output 4.3 in the budget) **Co-fin: USD 40,000**

Project start: A Project Inception Workshop will be held within the first two to four months of project start with those with assigned roles in the project organization structure. The Inception Workshop is crucial to building ownership for the project results and to plan the first year annual work plan. The Inception Workshop should address a number of key issues including:

- Understand objectives & other outputs and activities
- Assist all partners to fully understand and take ownership of the project. Detail the roles, support services and complementary responsibilities of UNDP and local project partners vis-à-vis the project team;
- Discuss the roles, functions, and responsibilities within the project's decision-making structures, including reporting and communication lines, and conflict resolution mechanisms. The Terms of Reference for project staff will be discussed again as needed.
- Based on the project results framework, finalize the first annual work plan. Review and agree on the indicators, targets and their means of verification, and recheck assumptions and risks.
- Provide a detailed overview of reporting, monitoring and evaluation (M&E) requirements. The Monitoring and Evaluation work plan and budget should be agreed and scheduled.
- Discuss financial reporting procedures and obligations, and arrangements for annual audit.
- Plan and schedule Project Steering Committee meetings. Roles and responsibilities of all project organization structures should be clarified and meetings planned. The first Project Steering Committee meeting should be held within the first 12 months following the inception workshop.

An Inception Workshop report is a key reference document and must be prepared and shared with participants to formalize various agreements and plans decided during the meeting.

Quarterly review: The contents of the Quarterly Progress Reports (QPRs) include:

- Progress made shall be monitored in the UNDP Enhanced Results Based Management Platform and the UNDP Regional technical Advisor (based in the UNDP-GEF regional coordinating unit, Panama)
- Based on the initial risk analysis submitted, the risk log shall be regularly updated in ATLAS. Risks become critical when the impact and probability are high. Based on the information recorded in Atlas, Project Progress Reports (PPR) can be generated in the Executive Snapshot.
- Other ATLAS logs can be used to monitor issues, lessons learned, etc. The use of these functions is a key indicator in the UNDP Executive Balanced Scorecard.

Annual review: Annual Project Review/Project Implementation Reports (APR/PIR): These key reports are prepared to monitor progress made since project start and in particular for the previous reporting period (30 June to 1 July). The APR/PIR combines UNDP and GEF reporting requirements. The APR/PIR includes, but is not limited to, reporting on the following:

- Progress made toward project objective and project outcomes - each with indicators, baseline data and end-of-project targets (cumulative);
- Project outputs delivered per project outcome (annual);
- Lesson learned/good practices;
- AWP and other expenditure reports;
- Risk and adaptive management;
- ATLAS Quarterly Operation Reports (QORs);
- Portfolio level indicators (i.e. GEF focal area tracking tools) are used by most focal areas on an annual basis as well.

UNDP CO and the UNDP RCU (regional coordinating unit, based in Panama) may conduct visits to project sites based on the agreed schedule in the project's Inception Report/Annual Work Plan to assess first hand project progress. Other members of the Project Board may also join these visits. Field Visit/Back-to-Office Reports will

be prepared by the CO and UNDP RCU, and will be circulated no less than one month after the visit to the project team and Project Board members.

Mid-term of project cycle: The project will undergo an independent Mid-Term Evaluation at the mid-point of project implementation. The Mid-Term Evaluation will determine progress being made toward the achievement of outcomes and will identify course correction if needed. It will focus on the effectiveness, efficiency and timeliness of project implementation; will highlight issues requiring decisions and actions; and will present initial lessons learned about project design, implementation and management. Findings of this review will be incorporated as recommendations for enhanced implementation during the final half of the project's term. The organization, terms of reference and timing of the mid-term evaluation will be decided after consultation between the parties to the project document.

The Terms of Reference for this Mid-term evaluation will be prepared by the UNDP based on guidance from the Regional Coordinating Unit, UNDP-GEF. UNDP will a Management Response. The GEF Climate Change tracking tools will be reviewed and updated during the mid-term evaluation.

End of project: An independent Final Evaluation will take place three months prior to the final Project Steering Committee meeting and will be undertaken in accordance with UNDP and GEF guidance. The final evaluation will focus on the delivery of the project's results as initially planned (and as corrected after the mid-term evaluation, if any such correction took place). The final evaluation will look at impact and sustainability of results, including the contribution to capacity development and the achievement of global environmental benefits/goals. The Terms of Reference for this evaluation will be prepared by the UNDP CO, based on guidance from the UNDP Regional Coordinating Unit, UNDP-GEF on all aspects of the evaluation.

The Final Evaluation should also provide recommendations for follow-up activities and requires a management response which should be uploaded on the UNDP PIMS and to the UNDP Evaluation Office Evaluation Resource Center (ERC). During the last three months, the project team will prepare the Project Terminal Report. This comprehensive report will summarize the results achieved (objectives, outcomes, outputs), lessons learned, problems met and areas where results may not have been achieved. It will also lay out recommendations for any further steps that may need to be taken to ensure sustainability and replicability of the project's results.

Learning and knowledge sharing: Results from the project will be disseminated within and beyond the project intervention zone through existing information sharing networks and forums. In addition, the project will participate, as relevant and appropriate, in UNDP/GEF sponsored networks, organized for senior personnel working on projects that share common characteristics. The project will identify and participate, as relevant and appropriate, in scientific, policy-based or other networks, which may be of benefit to project implementation through lessons learned.

The project will identify, analyse, and share lessons learned that might be beneficial in the design and implementation of similar future projects. Identifying and analysing lessons learned is an ongoing process and the need to communicate such lessons is a requirement to be delivered not less frequently than once every 12 months. UNDP/GEF shall provide a format and assist the project team in categorizing, documenting and reporting the lessons learned. To this end a percentage of project resources will be allocated for these activities.

Part 7. LEGAL CONTEXT

This Project Document shall be the instrument referred to as such in Article I of the Standard Basic Assistance Agreement between the Government of Equatorial Guinea and the United Nations Development Programme, signed by the parties on _____. The host country implementing agency shall, for the purpose of the Standard Basic Assistance Agreement, refer to the government co-operating agency described in that Agreement.

The UNDP Resident Representative in Equatorial Guinea is authorized to make the following types of revisions to this Project Document, provided that such changes are made after written notification to all signatories to the Project Document of any proposed change, written agreement from all signatories to the Project Document of any proposed change, and after written approval of the modified Project Document by the UNDP-GEF Unit.

- Revision of, or addition to, any of the annexes to the Project Document;
- Revisions which do not involve significant changes in the immediate objectives, outputs or activities of Project 5143, but are caused by the rearrangement of the inputs already agreed to or by cost increases due to inflation;
- Mandatory annual revisions which re-phase the delivery of agreed project inputs or increased expert or other costs due to inflation or take into account agency expenditure flexibility; and
- Inclusion of additional annexes and attachments only as set out here in this Project Document.

Part 8. ANNEXURES

ANNEX A. RISK ANALYSIS

#	Description	Date Identified	Type	Impact & Probability	Countermeasures / Management Response	Owner	Submitted, updated by	Last Update	Status (compared with previous evaluation)
1	Climate variability leading to changed rainfall patterns (flooding, drought)		Environment	P = 3 I = 3	Hydrological tests and other technical (solar, wind) socioeconomic and environmental assessments will consider patterns of resilience and vulnerability to inform turbine type and size, rotor speed, or location of installations. This data also helps mitigate related investment risks (e.g. insurance premiums, contingency expenses).	Project manager	Submitted by Project Proponent, updated by Project Manager		
2	Hydroelectric generation jeopardizes human and/or ecosystem activity (e.g. water access, reduced flow, aquatic life)		Technical	P = 2 I = 2	Planned hydropower developments will be of a micro- to small scale (up to 15 MW, with much lower impact than large scale facilities), and will adhere to the residual flows recommended by the feasibility studies. This will prevent any possible concentration of pollutants, adequate management of waste, and mitigate potential water borne diseases, per UNDP's social and environmental safeguards.	Idem	Idem		
3	Lack of coordination / conflict amongst various government institutions with a role in joint energy-environmental matters (e.g. electricity licenses, water policy, public works, impact assessments, agriculture)		Political	P = 4 I = 4	The project will prioritize the integration of support and activities spearheaded by SEGESA and MMIE, with the necessary guidance from other ministries –e.g. MPM (Environment); Agriculture & Forestry; Infrastructure & Public Works; the public sector–e.g. GEPROYECTOS (state company managing all development project contracts), AGENCIA 2020 (agency overseeing the implementation of the national social and economic development plan "Horizonte 2020"). The established monitoring and reporting processes will be the platforms for such integration (e.g. project inception, start-up launch/implementation, steering committee meetings, as well as national and international forums).				

4	Crude oil and gas prices drop making gas-fired electricity and generation fuel cheaper		Market	P = 3 I = 1	The trend of fuel prices will be regularly monitored during project execution, to ensure its negative impact on planned clean energy investments can be mitigated. There is high probability that fuel prices will continue rising in the short/medium term. The project will promote the progressive phase-out of fuel subsidies.				
5	Limited technical expertise available in-country to support climate change project formulation, preparation, start-up, monitoring and evaluation activities.		Technical	P = 5 I = 3	UNDP-GEF support will ensure global best practices and lessons learned are shared and disseminated at all project stages, referring to international recruitment/procurement practices, drawing from knowledge networks and technical rosters to engage qualified professionals with expertise in capacity development. The local university and technological institute (UNGE and INTHGE) and professionals from key ministries will be fully engaged to ensure management and technical know-how is transferred.				
6	RE projects do not generate sufficient energy		Technical	P = 1 I = 3	The project will support adequate sizing, equipment specifications and supervise installation of the demo projects and thereafter monitor operations and adhere to guarantees provided by the RET suppliers in order to maximize power generation				
7	The business environment in Equatorial Guinea remains challenging (limited finance, high cost of imported goods, cumbersome institutional procedures; small size of domestic market. Terms and conditions are no sufficient for private investors and IPPs		Political	P = 4 I = 3	The government is prioritising the establishment of an efficient system of commercial arbitration as part of its strategy to promote private sector development. Regarding RE, a significant part of the Project will be dedicated to de-risking measures (resource assessment and cost-benefit analysis, strengthening and streamlining regulatory process for RE off-grid and on-grid project development, preparing and executing PPAs, feed-in tariffs) in such a way that terms and conditions are sufficiently attractive for non-government investors, large and small.				
8	Insufficient capital made available for RE scale up		Market and political	P = 3 I = 1	This risk will be mitigate through the implementation and monitoring of pilot projects to show both government and private investors that RE projects can be successfully implemented (see 6.) as well as the implementation of de-risking measures (see 7.). This will raise the confidence of institutions to provide capital funding for post-project investments				

ANNEX B. TERMS OF REFERENCE FOR KEY PROJECT STAFF

National Project Director

Duration: part-time
Purpose: As a representative of the Government and the project's national implementing agency, the National Project Director (a senior official from the Ministry of Fisheries and the Environment) is having the main responsibility to ensure that the project is executed in accordance with the project document and the UNDP guidelines for nationally implemented (NEX) projects (for the UNDP-GEF funds).

His/her main *duties and responsibilities* include:
- Supervising the work of the Project Manager through meetings at regular intervals to receive project progress reports and provide guidance on policy issues;
- Certifying the annual and, as applicable, quarterly work plans, financial reports and requests for advance of funds, ensuring their accuracy and consistency with the project document and its agreed amendments;
- Authorizing the project contracts, following the approval of UNDP, respectively;
- Unless otherwise agreed, chairing the Project Steering Committee and representing the project in other required meetings;
- Taking the lead in developing linkages with the relevant authorities at national, provincial and governmental level and supporting the project in resolving any institutional or policy related conflicts that may emerge during its implementation;

Project Manager

Duration: 5 years
Purpose: The incumbent will be responsible for implementation of the project, including mobilization of all project inputs, supervision of project staff, consultants and oversight of sub-contractors. The PM will be the day-to-day leader of the Project Management Unit (PMU) and shall liaise with the government, UNDP, and all stakeholders involved in the project.

Duties and Responsibilities:
- Overall management of the project;
- Work closely with project stakeholders and ensure the project deliveries as per project document and work plan;
- Ensure technical coordination of the project and the work related to legal and institutional aspects;
- Mobilize all project inputs in accordance with UNDP procedures and GEF principles;
- Finalize the ToR for the consultants and subcontractors and coordinate with UNDP Procurement for recruitment, procurement and contracting; Supervise and coordinate the work of all project staff, consultants and sub-contractors;
- Ensure proper management of funds consistent with UNDP requirements, and budget planning and control;
- Prepare and ensure timely submission of monthly reports, quarterly consolidated financial reports, quarterly consolidated progress reports, annual, mid-term and terminal reports, and other reports as may be required by UNDP; Submit the progress reports and key issue report to the Project Steering Committee and the Project Board,
- Prepare quarterly and annual work plan;
- Provide regular input to UNDP corporate system ATLAS for financial and program management on project progress, financial status and various logs;

- Arrange for audit of all project accounts for each fiscal year;
- Undertake field visit to ensure quality of work, and undertake any activities that may be assigned by UNDP and the Project Steering Committee and Project Board

Qualifications and Experience: The incumbent should have a minimum Bachelor degree in Engineering with MBA/Master degree or Masters in energy/environment or other relevant academic discipline and profession qualifications with at least ten (10) years professional experience at senior level. S/he should have extensive experience and technical ability to manage a large project and a good technical knowledge in the fields related to renewable energy development, climate change and institutional development and/or regulatory aspects. S/he must have effective interpersonal and negotiation skills proven through successful interactions with all levels of project stakeholder groups, including senior government officials, private entrepreneurs, technical groups and communities. S/he should have ability to effectively coordinate a complex, multi-stakeholder project and to lead, manage and motivate teams of international and local consultants to achieve results. Good capacities for strategic thinking, planning and management and excellent communication skills both in Spanish and English are essential. Knowledge of UNDP project implementation procedures, including procurement, disbursements, and reporting and monitoring will be an added advantage.

Financial-administrative assistant (AA)

Duties and Responsibilities: The incumbent will be responsible to provide overall administration and financial services of the project such as processing payments, raising requisition, purchase order, projects logs etc. using UNDP corporate software ATLAS. S/he will be responsible to provide information to UNDP Project web, and administrative troubleshooting. S/he will also perform (a) word processing, drafting routine letters/messages/reports, mailing (b) arrange travel, itinerary preparation for project related travels, (c) assist to arrange workshops/seminar/training programs and mailing, (d) work at reception desk and make appointments and schedule meeting, (e) assist in work-plan and budgeting, (f) photocopying, binding and filing, (g) maintenance of all office equipment and keeping inventory/records of supplies and their usage and any other duties assigned by Project Manager or concerned officials.

Qualifications and Experience: The incumbent should have at least a Bachelor degree in any discipline from a recognized university. S/he should have at least 3 years relevant working experience with foreign aided projects or international development or organizations. Computer proficiency in MS Office (Word, Excel and PowerPoint) and other common software is a prerequisite. Diploma in computer/secretarial science is desirable but not essential. Basic knowledge in procurement, petty cash handling, logistics supports, and filling systems is a basic requirement. Knowledge of UNDP project implementation procedures, including procurement, disbursements, and reporting and monitoring is preferable. Fluent Spanish and good knowledge of both written and spoken English is required.

Key part-time consultants/staff:

Chief Technical Advisor

Duration: 4 months/year
Duties and responsibilities:
- Provide management oversight for project as required and recommend actions that focus work plans on achieving key milestones in a timely manner; in particular regarding TA activities in the pilot/demo components 2 (small hydro) and 3 (solar/wind) and assist in formulation technology options and design, including equipment packages
- Recommend special expertise to be deployed on the Project to assist in its achievement of key milestones; and aid in identifying international consultants and expertise;

- Assist in developing study tour agendas and international training opportunities; as well as providing agendas for national and international training and workshops; Develop linkages with international RE and RE training institutes and experts (networking)
- Provide the interface between Project team and key specialist consultants, both domestic and international when appropriate; Provide advice on ToRs of consultants and ToRs and evaluation of bids of contractors;

Project impacts and monitoring advisor

Duration: 20 weeks (1 month/year)
Duties and responsibilities:
- Help prepare inception report and annual and periodic detailed wrk plans and budget;
- Develop the overall framework for monitoring an evaluation;
- Assist in the preparation of the various monitoring and progress reports (incl. APR/PIR) and monitor and evaluate the compliance of actual performance against work plan and progress indicators in the project's logframe and the project's budget;
- Prepare reports (including final report) on problems, bottlenecks and recommendations to reduce impacts of these;
- Design and implement a system to identify, analyze and disseminate lessons learned; facilitate two-way exchange in networks of UNDP/GEF projects and other networks on experiences and lessons learned

Technical experts, facilitation and demand; technology support and supply

Duration: 125 weeks each, or full-time (if combined)

Duties and responsibilities (facilitation and demand-side)
- Assess knowledge and skills gaps and training needs of stakeholders and organize training workshops, seminars and RE business conferences;
- Assist in formulation of ToRs for consultants and contractors
- Assist in setting up training course on RE and help identify possible participants;
- Facilitate contacts and networking with institutions/stakeholders/beneficiaries;
- Assist in energy demand and social and environmental impact assessments;
- Liaison with .Government Ministries and agencies, donors, financial institutions and NGOs/academia;
- Advice and provide support on policy formulation and strengthening of legal-regulatory framework for RE projects and investments; Assist in formulation and implementation of RE-relevant financial mechanism;
- Help identify RE opportunities and formulate bankable proposals

Duties and responsibilities (technology support and supply)
- Formulation of ToRs of consultants;
- Advice on resource, feasibility and social-environmental impact assessments;
- Supervise design, installation, commissioning process of demo/pilot activities of Components 2 and 3 (small hydro; solar and wind) and advice on skills strengthening and training needs for management, operation and maintenance of RE facilities;
- Help identify pipeline of RE technology options and investment opportunities for post-project replication;
- Assess knowledge and skills gaps and training needs of stakeholders and organize training workshops, seminars and RE business conferences;

Detailed ToRs of the short-term national and international consultants (listed in Part 4 of this Document) will be developed during the Project Inception period.

ANNEX C. AGREEMENTS

Co-financing letters

Please refer to a separate attachment.

ANNEX D. ENERGY SAVINGS AND EMISSION REDUCTION CALCULATION

RE investments, associated with Components 2 and 3

A number of RE project activities have already been identified by the Government and have been assessed during the PPG phase (see the report *Informe Técnico sobre proyectos de pequeñas centrales hidroeléctricas, eólicas y solares).* The GEF project will provide technical assistance to assist with the assessment/identification, design, installation and setting up operation, maintenance and management (OM&M) schemes. The Government has committed to provide the investment funds.

Small-scale hydropower

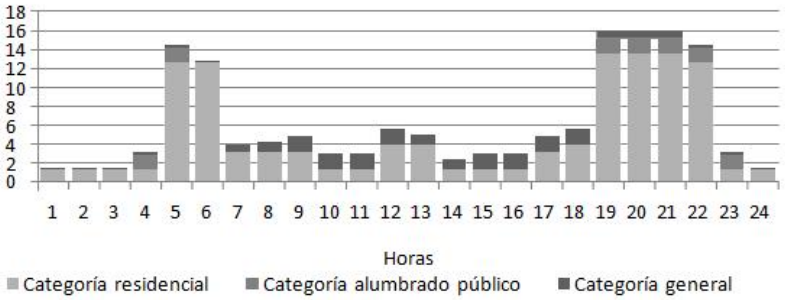
Rehabilitation Musola, Riaba and Bicomo
The mini hydropower facility of Musola I and II is planned to undergo a complete overhaul, including repairing damaged civil works, cleaning up the intake, canal and forebay of debris and silt particles and repairing the penstock, as well as providing repair and maintenance to the electromechanical equipment (turbines, generator, transformer). This will include carrying out a set of test and trial runs, obtaining the necessary spare parts and equipment as well as identifying, selection and training of the plant operators. The activities have started with cleaning up and repairing the civil works part. Similar type of overhaul and maintenance activities are planned for Riaba and a 33 kV transformer and transmission line is needed to connect the plant to the nearby town of Riaba. The nominal capacities are 3.8 MW (Riaba) with an estimated capacity factor of about 40% and 0.5 MW (Musola) with an estimated capacity factor of 55%, if fully functioning. On the mainland region, the existing small hydropower facility at Bicomo (3.2 MW) will be made operational in order to function again at maximum capacity with similar repair interventions as described above.

Proposed small hydropower facility, Ilachi River
As one of the two new pilot projects, TA will be provided for the assessment of the hydro-energy potential of Ilachi River (on South Bioko), design, feasibility and social-environmental impact assessment and subsequent procurement of equipment and installation. Part of these technical assistance cost will be covered by the GEF grant, while the remainder and cost of equipment is part of the co-financing. A first estimate of the plant's gross power production follows from rho*Q*g*h = 14 MW, based on the height (h) = 200 metres and a river flow of at least 7 m^3/second. Depending on the season (rainy or dry), gross power availability could be up to 18 MW. Conservatively, 12 MW is assumed for the pilot project calculations here, assuming the employment of two Pelton turbine groups of 6 MW each.

Annobón

Solar-diesel hybrid system

The population of Annobon is about 5,000; other power demand categories are public lighting (400 lighting points) and services (radio station, airstrip, clinic, and school). Demand could be supplied by a diesel-solar hybrid system, consisting of a solar PV facility (5 MW capacity), supplemented by a 10 MW diesel generator.



Power demand (MW) distribution, Annobon

Average daily irradiation on Annobón is 5.85-6.2 kWh/m2/yr, thus a 1 MW system could yield 4215-4515 kWh/day (capacity factor of 18%). A 5 MW solar project has been proposed by MAECI Solar (United States). A least 10 local residents will be trained so that they can maintain the installation in the future.

Wind-diesel hybrid system

Originally, the *Informe Técnico* of the PPG phase actually envisages a 10 MW wind system, instead of a solar facility. However, the authorities have decided to go ahead with the MAECI 5 MW solar facility. During project implementation, it is suggested to investigate the need for and feasibility of an additional 5 MW wind park in Annobón that could produce about 17.7-19.7 GWh annually, depending on the location of the facility. Assuming 15% of losses (electric; periods of non-availability), this would imply additional annual power production of at least 15 GWh per year. Being a suggestion only, this wind option has not been taken into account into the GHG emission reduction calculations.

Direct and post-project direct emission reduction

There direct emission reduction has been calculated following investments will take place during the proposed 5-year duration of the UNDP/GEF 'Sustainable Energy for All' project:

- Direct (12.6 MW):
  - Rehabilitation of the existing small hydropower plants at Riaba, Musola and Bicomo; 7.6 MW);
  - Solar-diesel hybrid systems (on Annobon Island; 5 MW)
  - Small hydropower facility at Ilachi on Bioko Island (12 MW)

The estimated initial investment needed for the 12.6 MW would be around USD 34 million, while finance for Ilachi would be sourced and decided upon, depending on the feasibility and design studies. The Government has already committed to at least USD 37 million of co-financing (see co-financing letter). The total cumulative emission reduction over the installations' lifetime of 20 years is an estimated 1,781 kilotons of CO_2 (direct).

Assumptions		
General		
Discount rate	11%	
Exchange rate	USD	=480 FCFA
Fuels		
Diesel	34.9	MJ/litre
Emission factor	2.8	$kgCO_2$/litre

Price	1.00	USD/litre		
RE technology costs				
Initial investment cost	2500	3000	2850	USD/kW
- Development cost (feasibility, design)	15%	10%	15%	
O&M	3%	1.00%	4%	
New RE projects	**Hydro**	**Solar**	**Hydro**	
	Riaba, Musola Bicomo	Annobón	Ilachi	
Base data				
Size	**7.6**	**5**	**12**	MW
Lifetime	20	20	20	yrs
Load factor	55%	16%	55%	
Power production	36,617	7,008	57,816	MWhe/yr
Investment -initial	19,000,000	15,000,000	34,200,000	USD
Costs				
Capital cost (annualised)	2,385,937	1,883,635	4,294,687	USD/yr
Annual O&M cost	71,578	150,000	1,368,000	USD/yr
Unit cost of generation	0.067	0.290	0.098	USD/kWh
Benefits				
Avoided diesel consumption	11,109,092	2,126,142	17,540,671	litres/yr
Avoided costs of diesel generation	11,475,979	2,196,360	18,119,966	USD/yr
Direct GHG				
Emission reduction	32,133	6,150	50,736	tCO_2/yr
Cumulative emission reduction	642,655	122,996	1,014,718	tCO_2

	Project - direct	**Post-project**	
Needed project investment	34,000,000	34,200,000	USD
Total cumulative GHG	765,651	1,014,718	tCO2
Net investment (minus GEF support)	32,975,000	33,105,000	

The 'GEF support' is detailed below. The project will provide some limited support by means of technical assistance and advice for the identification, assessment, procurement and installation of associated pilot/demo projects (Riaba, Musola, Bicomo, Annobón). This is summarised below:

GEF project development support (INV components,2 and 3) *(subcontracts, equipment)*		**Develop. cost (USD)**	**GEF contribution**	
			GEF (USD)	**%**
Small hydro				
TA support O,M&M Riaba, Musola, Bicomo	Output 2.3	1,900,000	520,000	
Resource assessment, Ilachi	Output 2.1	400,000	200,000	
Ilachi TA support: feasibility, design, install and operate	Output 2.2	2,450,000	895,000	
Resource assessment, other hydro	Output 2.1	150,000	150,000	
		4,900,000	*1,765,000*	36%
Solar and wind				
Resource assessment, Annobón/other	Output 3.1	320,000	160,000	
Solar (Annobón, other)), feasibility, design, install &operate	Output 3.2	1,180,000	385,000	
TA support installation & operation	Output 3.3		120,000	
		1,500,000	*665,000*	44%
Total		**6,400,000**	**2,430,000**	*38%*

Out of the GEF support of USD 2,430,000, the amount of USD 2,160,000 is in the form of subcontracts and USD 270,000 for equipment (e.g. measurements, etc).

The cost per unit of energy generated (USD/kWh) compares favourably with the cost of diesel generation, as indicated in the table below:

Base data			
Life		12	yrs
Size		5.0	MW
Investment cost		1,100,000	USD
Load factor		55%	
Electricity production		24,090	MWh/yr
Generator efficiency		34%	
Diesel consumption		7,308,613	litre
Price of diesel		1.000	USD/litre
Costs			
Capital cost (annualised)		169,430	USD
Diesel cost		7,308,613	USD
O&M	2.00%	55,000	
Overhaul cost (3 yrs)	5%	16,943	
Total cost		7,549,986	USD
Unit cost of generation		0.313	USD/kWh

Indirect emission reduction

The GEF manual for guidance on GHG emission reduction[30] suggests two approaches to estimate the longer-term of the project's technical assistance and capacity building efforts, namely a bottom-up (BU) and top-down approach. Indirect emissions are mainly based by applying a replication factor of four. We think a factor of 'four' is justified given the novelty of the GEF initiative that, if successful, will have great potential to unleash the RE potential in Equatorial Guinea. Thus, the indirect emission reduction can calculated as follows:

CO_2 indirect BU = CO_2 direct * RF, where

CO_2 direct = estimate for total direct and post-direct emission reductions

RF = replication factor

CO_2 indirect BU = 1,780 * 4 = 7,121 ktCO_2

[30] GEF/C.33/Inf.18 *Manual for Calculating GHG Benefits of GEF Projects: Energy Efficiency and Renewable Energy Projects* (2008)

ANNEX E. SOCIAL AND ENVIRONMENTAL SCREENING PROCEDURE (SESP)

Attached separately

NOTE:
The answers (yes/no/n.a.) to the screening questions in Tables 1 to 4 are based on the compilation of questionnaires distributed to the participants in the Stakeholder and Validation workshop, organized in Malabo, 19-20 December 2013.