GLOBAL ENVIRONMENT FACILITY
INVESTING IN OUR PLANET

Naoko Ishii
CEO and Chairperson

August 04, 2014

Dear Council Member:

UNIDO as the Implementing Agency for the project entitled: ***Cameroon: Promoting Integrated Biomass and Small Hydro Solutions for Productive Uses in Cameroon***, has submitted the attached proposed project document for CEO endorsement prior to final approval of the project document in accordance with UNIDO procedures.

The Secretariat has reviewed the project document. It is consistent with the proposal approved by Council in June 2012 and the proposed project remains consistent with the Instrument and GEF policies and procedures. The attached explanation prepared by UNIDO satisfactorily details how Council's comments and those of the STAP have been addressed. I am, therefore, endorsing the project document.

We have today posted the proposed project document on the GEF website at www.TheGEF.org. If you do not have access to the Web, you may request the local field office of UNDP or the World Bank to download the document for you. Alternatively, you may request a copy of the document from the Secretariat. If you make such a request, please confirm for us your current mailing address.

Sincerely,

Naoko Ishii
Chief Executive Officer and Chairperson

Attachment: GEFSEC Project Review Document
Copy to: Country Operational Focal Point, GEF Agencies, STAP, Trustee

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REQUEST FOR CEO ENDORSEMENT

PROJECT TYPE: Full-sized Project
TYPE OF TRUST FUND:GEF Trust Fund

For more information about GEF, visit TheGEF.org

PART I: PROJECT INFORMATION

Project Title: Promoting Integrated Biomass and Small Hydro Solutions for Productive Uses in Cameroon			
Country(ies):	Cameroon	GEF Project ID:[1]	4785
GEF Agency(ies):	UNIDO (select) (select)	GEF Agency Project ID:	120335
Other Executing Partner(s):	Ministry of Energy and Water Resources (MINEE) Cameroon Rural Electrification Agency (AER) Ministry of Economy (MINEPAT)	Submission Date: Re-Submission Date: Re-Submission Date:	03/10/2014 06/04/2014 07/15/2014
GEF Focal Area (s):	Climate Change	Project Duration(Months)	48
Name of Parent Program (if applicable):	NA	Project Agency Fee ($):	200,000

A. FOCAL AREA STRATEGY FRAMEWORK[2]

Focal Area Objectives	Expected FA Outcomes	Expected FA Outputs	Trust Fund	Grant Amount ($)	Co-financing ($)
CCM-3	Outcome 3.1: Favorable policy and regulatory environment created for renewable energy investments. Indicator 3.1: Extent to which RE policies and regulations are adopted and enforced	Output 3.1: Renewable energy policy and regulations developed and enforced.	GEF TF	236,000	700,000
CCM-3	Outcome 3.2: Investment in renewable energy	Output 3.2.1: Renewable energy capacity installed (2.825 MW	GEF TF	1,764,000	9,600,000

[1] Project ID number will be assigned by GEFSEC.
[2] Refer to the Focal Area Results Framework and LDCF/SCCF Framework when completing Table A.

Focal Area Objectives	Expected FA Outcomes	Expected FA Outputs	Trust Fund	Grant Amount ($)	Co-financing ($)
	technologies increased Indicator 3.2: More investors investing in RE development	of renewable energy capcity installed) Output 3.2.2: Electricity and heat produced from renewable sources (at least 14,310 MWh of electricity produced per year)			
		Total project costs		2,000,000	10,300,000

B. PROJECT FRAMEWORK

Project Objective: To reduce GHG emissions through promotion of investments and a market in the scale up and replication of integrated renewable energy solutions for productive uses and industrial applications in Cameroon

Project Component	Grant Type	Expected Outcomes	Expected Outputs	Trust Fund	Grant Amount ($)	Confirmed Co-financing ($)
1. Strengthening the policy and regulatory framework for renewable energy and its enforcement	TA	1.A renewable energy policy and regulatory framework in place, supporting a vibrant renewable energy sector with enhanced private sector confidence and participation in renewable energy generation	Output1.1: Renewable energy policy and regulatory framework enforced Output 1.2: Institutional capacity developed for the formulation and implementation of policy and regulations for promotion of biomass and small hydro projects for rural electrification and productive applications through private sector participation.	GEF TF	200,000	600,000
2. Developing mechanisms to promote and sustain private	TA	2.1: Investment mechanism strengthened to support a viable	Output 2.1: Guidelines, best practices, investment	GEF TF	400,000	1,000,000

Project Component	Grant Type	Expected Outcomes	Expected Outputs	Trust Fund	Grant Amount ($)	Confirmed Co-financing ($)
sector investments in renewable energy generation		renewable energy generation market 2.2: National institutions and key private sector market players have the financial and technical capacities, tools and support base needed to effectively promote and sustain a renewable energy market are developed.	incentives, standardised PPAs, tariffs, pricing mechanisms, risk management instruments and viable renewable energy generation business models developed and put in place Output 2.2: Training programmes implemented to strengthen the capacity of local banks and institutions in project finance and risk management instruments for renewable energy projects Output 2.3: Renewable energy investment fora held to sensitise investors and promote investor confidence Output 2.4: Targeted technical capacity developed for the design, operation and maintenance of integrated renewable energy systems Output 2.5: An investment guide/toolkit on			

Project Component	Grant Type	Expected Outcomes	Expected Outputs	Trust Fund	Grant Amount ($)	Confirmed Co-financing ($)
			renewable energy investment potential in Cameroon published to support investors and project developers. Output 2.6: Special window for renewable energy under CREF established and operational			
3. Demonstration of the technical and commercial viability of renewable energy mini grids	TA	3.1: Renewable energy mini grids are replicated and become an integral part of Cameroon's electrification program 3.2: Installed capacity of renewable energy systems increased.	Output 3.1: Four mini grids of a combined capacity of up to 2.825 MW and optimizing local renewable energy resources installed and operated to demonstrate the technical and commercial viability of renewable energy systems. Output 3.2: Existing and new productive uses identified and value chains promoted for renewable energy utilisation	GEF TF	1,120,000	8,100,000
4. Monitoring and evaluation	TA	4.1: Project deliverables are tracked and achieved and	Output 4.1: Demonstration projects monitored throughout project cycle and	GEF TF	100,000	100,000

Project Component	Grant Type	Expected Outcomes	Expected Outputs	Trust Fund	Grant Amount ($)	Confirmed Co-financing ($)
		4.2: Best practices learnt from this project prepared for future replication and scaling up of projects based on biomass and small	independently evaluated Output 4.2: Lessons learned are disseminated nationwide to relevant stakeholders to benefit further			
			Subtotal		1,820,000	9,800,000
			Project management Cost (PMC)[3]	GEF TF	180,000	500,000
			Total project costs		2,000,000	10,300,000

C. SOURCES OF CONFIRMED CO-FINANCING FOR THE PROJECT BY SOURCE AND BY NAME ($)

Please include letters confirming co-financing for the project with this form

Sources of Co-financing	Name of Co-financier (source)	Type of Co-financing	Co-financing Amount ($)
GEF Agency	UNIDO	In-kind	240,000
GEF Agency	UNIDO	Cash	60,000
National Government	AER	Cash	10,000,000
Total Co-financing			**10,300,000**

D. TRUST FUND RESOURCES REQUESTED BY AGENCY, FOCAL AREA AND COUNTRY[1]

NA

[1] In case of a single focal area, single country, single GEF Agency project, and single trust fund project, no need to provide information for this table. PMC amount from Table B should be included proportionately to the focal area amount in this table.

[2] Indicate fees related to this project.

F. CONSULTANTS WORKING FOR TECHNICAL ASSISTANCE COMPONENTS:

Component	Grant Amount ($)	Cofinancing ($)	Project Total ($)
International Consultants	680,000	340,000	1,020,000
National/Local Consultants	120,000	80,000	200,000

G. DOES THE PROJECT INCLUDE A "NON-GRANT" INSTRUMENT? No

(If non-grant instruments are used, provide in Annex D an indicative calendar of expected reflows to your Agency and to the GEF/LDCF/SCCF/NPIF Trust Fund).

[3] PMC should be charged proportionately to focal areas based on focal area project grant amount in Table D below.

PART II: PROJECT JUSTIFICATION

A. DESCRIBE ANY CHANGES IN ALIGNMENT WITH THE PROJECT DESIGN OF THE ORIGINAL PIF[4]

A.1 National strategies and plans or reports and assessments under relevant conventions, if applicabl i.e. NAPAS, NAPs, NBSAPs, national communications, TNAs, NCSA, NIPs, PRSPs, NPFE, Biennial Update Reports, etc.

The proposed project is fully consistent and well aligned with Cameroon's national development objectives, priorities, strategies and targets. The project was developed from the outcome of the Cameroon GEF National Portfolio Formulation Exercise workshops and was validated and endorsed at the final workshop held in Yaoundé in August 2011 as indicated in Cameroon's NPFD submitted to the GEF. The project is also in line with the Cameroon's new Growth and Employment Strategy Paper (GESP) document in 2009 (A reference framework for the government action over the period 2010-2020) as well as the national long term development goals (Cameroon Vision 2035). The GESP under its infrastructure development strategies for energy mentions that "*Studies carried out highlighted the existence in Cameroon of an enormous potential in renewable energy, as well as clear possibilities of developing and using these forms of energy (solar energy, micro and mini hydroelectric stations and biomass) to satisfy national energy needs. However, apart from firewood used following crude means likely to intensify environmental degradation, particularly in areas with delicate ecology, their contribution to national energy assessment remains marginal*. ***The Cameroon government will emphasize the use of renewable energy and rationalizing firewood consumption****".* This project will also be able to help the government in building its capacity for planning renewable energy projects and meeting this goal under the GESP.

The National Energy Action Plan for Poverty Reduction (PANERP) launched in 2005 sets the framework vision and strategy for poverty reduction and achievement of the Millennium Development Goals in the country through increased access to energy. The PANERP has a number of key strategic areas which include capacity building (of public and private stakeholders in planning, management, operation and maintenance of energy systems), rural energy, better access to productive uses of energy and promotion of private sector investments in rural energy generation and supply. This was followed by the creation of the Rural Energy Fund (REF) in 2009 to help promote and increase rural electrification rate. The REF is a mechanism created by the World Bank (WB) under the Cameroon Energy Sector Development Project (CESDP) with an objective to improve the planning financing and results orientation for rural electrification in Cameroon. Under the CESDP, the WB contributed US$40 million for creation of the REF. the financing mechanism proposed for this REF was to pool all funds under the foresight of a rural energy planning committee chaired by MINEE and Agence D'Electrification Rurale du Cameroon (AER) as the executing agency for REF. The REF is providing investment subsidies to private sector and community based operators which have to provide their share of co-financing to demonstrate their commitment and to leverage public funds by attracting private sector co-financing. Currently, the REF supports both grid extensions as well as decentralised electrification projects. It is technology neutral and selects a project based on the least-cost principle. The renewable energy technology projects being considered under REF includes mainly small hydropower up to 5 MW capacities, small solar PV systems such as home lighting systems and biomass energy systems etc. However practically there has been no movement in actual implementation of RE projects under REF, due to lack of adequate technical capacity

[4] For questions A.1 –A.7 in Part II, if there are no changes since PIF and if not specifically requested in the review sheet at PIF stage, then no need to respond, please enter "NA" after the respective question.

in AER and other agencies with respect to the identification, design and installation of renewable energy projects. During the meeting conducted as part of the PPG phase, the Director of REF mentioned that there is a urgent requirement for few demonstration projects and the capacity building at the national level for identification, planning and implementation of renewable energy projects to make the REF more effective in replication of RE projects in the country. Therefore, this GEF project intend to open a special window for renewable energy under the REF of Cameroon, which will facilitate the renewable energy project financing and also attracting funds from donor agencies as well as the private partners. This GEF project is thus very timely to strengthen and demonstrate the viability of such initiatives through the special window of RE under the REF.

All these key strategies and approaches highlight the importance of access to reliable modern energy forms for the economic development of the country. In this aspect, the renewable energy sources have a key role to play. Some of the country's planning tool documents such as the Rural Electrification Master Plan (PDER), the Electricity Sector Development Plan 2030 and the Hydroelectric Potential Inventory of Cameroon are now old and need updating. As per the discussions with the government officials during the PPG stage, it is learnt that the Cameroon government is in the process of re-visiting the rural electrification master plan and preparation of the electricity policy, which will include renewable energy but, in the absence of adequate technical capacity, no notable development has been made till now in this regard.

As on date, Cameroon has no specific renewable policy framework. Recently the Cameroon government finalized the Electricity Law of Cameroon 2011 which states that "*Rural electrification shall be carried out through connection to the interconnected network, or by distributed generation. They shall be bound to comply with the provisions within the framework of decentralized rural electrification and in view of constraints related to environmental protection; priority shall be given to distributed generation, from renewable energy sources, except in the event of scarcity, high cost or deficiency thereof*". In this context, this GEF project is very much in line with the rural electrification priorities defined under the Cameroon Electricity Law-2011. This project will help in demonstrating renewable energy such as small hydropower as well as the biomass power solutions for rural areas and building the confidence of the government officials, private stakeholders and local financing institutions developing projects to optimally utilise the locally available renewable energy resources, and meeting the desired national growth objectives through increased rural energy access and increased industrial activities.

A.2. GEF focal area and/or fund(s) strategies, eligibility criteria and priorities

The project is fully consistent with the GEF Climate Change Focal Area Strategic Objective CCM-3, namely: "Promote investment in renewable energy technologies", with the consequence of greenhouse gas emissions reductions and promotion of a green development pathway in Cameroon. It will increase the quantity of electricity generated from economically viable sources of renewable energy and promote adoption of policies promoting renewable energy utilization for basic electricity needs as well as productive applications through mini grids in rural areas. The project will help market development of renewable energy systems for productive applications through the successful demonstration of the pilot biomass and small hydropower projects.

A.3 The GEF Agency's comparative advantage

The GEF Council document GEF/C.31/5, Comparative Advantages of the GEF Agencies (2007), recognizes UNIDO's comparative advantage as: *UNIDO's comparative advantage lies in the ability to involve the industrial sector in GEF projects in the following areas: industrial energy efficiency, renewable energy services, water management, chemicals management (including POP and ODS), and biotechnology*. UNIDO also has extensive knowledge of small and medium enterprises (SME's) in

developing and transition economy countries. UNIDO's mandate covers three priority areas, namely: (i) poverty reduction through productive activities, (ii) trade capacity building, and (iii) environment and energy.

This project focuses on promoting the wide scale uptake of renewable energy generation in Cameroon for energy access and productive uses with a strong industrial focus i.e. renewable energy based mini grids for productive purposes, which is UNIDO's overall mandate. The project clearly is in line with UNIDO's energy strategy which aims at helping developing countries to achieve the following objectives:

- Enhance access to modern energy services based on renewables for the rural and poor population;
- Increase the competitiveness of their industries by reducing industrial energy intensity;
- Reduce their impact on climate change by decreasing the carbon emissions of their industries and by promoting renewable energy technologies; and
- Increase the viability of their enterprises, particularly in rural areas, by augmenting the availability of renewable energy for productive uses.

The context analysis, review of existing barriers, meetings with various stakeholder groups and discussions with the country government carried out during the project preparation phase, have shown strong relevance for the GEF-UNIDO project, its additionality and complementarity to ongoing and planned national and international programs to promote and support the RE based mini-grids in Cameroon. UNIDO has long-standing experience in the development and implementation of renewable energy projects for productive applications in developing countries and emerging economies including countries in central and western regions of Africa. It has strong understanding of how policy, normative, technical, market and financing variables can affect development of renewable energy technologies for a country. UNIDO is also globally recognized as a leading advocate and technical assistance provider for RE system application in rural areas for productive applications. UNIDO's explicit experience in successfully implementing such renewable energy based productive applications projects in many African countries further makes UNIDO most eligible for the implementation of this project in Cameroon. UNIDO is therefore especially well placed to implement this project, given its extensive experience and expertise in implementing renewable energy projects, a well-established cooperation with key stakeholders and its high standards of fiduciary responsibility.

A.4. The baseline project and the problem that it seeks to address

A4.1 The baseline scenario

A4.1.1: Context and Background

The Republic of Cameroon is located (between: latitude 2 & 13 degrees east and longitude 8 & 16 degrees north) in west of central Africa on the Gulf of Guinea. Cameroon has a total surface area of 475,650 km² and is triangular in shape. The country shares its border with Nigeria in the west, Chad to the north-east, Central African Republic to the east, and Equatorial Guinea, Gabon and Congo in the North. The total land boundary of Cameroon is 4,591 km; whereas the coastline extends up to 402 km. Yaoundé, which is also one of the largest cities in the country, is the capital of Cameroon and Douala is the business capital. The country is divided into 10 provinces (or regions), each headed by Governor, appointed by the Country President. These leaders are charged with the responsibility of implementing the policies and programs of the President, reporting on the conditions of the provinces, administering the civil service, maintaining the peace, and overseeing the heads of the smaller administrative units. The provinces are further subdivided into 58 divisions (French departments). The official languages spoken in Cameroon are French and English, although Cameroon is home to over 200 different linguistic groups.

Cameroon is a developing country whose economic development is based mainly on the primary sector. The country has a rich and diverse commodity based economy which is one of the best-endowed in the

sub-Saharan African region. The modest oil, agricultural and forestry resources in Cameroon, supports industrial base providing accelerated development of GDP ($25 billion, [2012 estimates]) in the country. Apart from these primary resources, the ship repair, textiles, light consumer goods and other few industries in the country are contributing to the GDP of Cameroon. The country exports crude oil and petroleum products, lumber, coffee, cocoa, aluminum etc., mainly to Spain (13.4%), China (11.4%) and Europe, whereas it imports machinery, electrical equipment, food etc. from China (16.8%), France (16.6%), Nigeria (12.3%) and small quantities from other countries.

Table A4.1: Demographic and socio economic profile of Cameroon

Sl. No.	Parameter	Value
1	Total area of the country (km^2)	475,650
2	Total population (2012 estimates)*	20,129,878
3	Land use (arable land) (%), 2005	12.6
4	Urban population, 2010 (% of total population)	58
5	Rate of urbanization (%)	3.3
6	Population below poverty line, 2000 (%)	70.2
7	GDP (PPP), 2012 (US$ billion)	50.32
8	GDP per capita - PPP basis, 2012 (US$)	2,300
9	GDP-real growth rate (2012), (%)	4.7
10	Literacy (%)	75.9
11	HDI[5]	0.495
12	Carbon dioxide emissions from consumption of energy, 2010 (million Mt)	7.361

Source: https://www.cia.gov/library/publications/the-world-factbook/geos/cm.html
* Source: http://www.indexmundi.com/cameroon/#Demographics

Cameroon has substantial quantities of biomass energy resources and very high potentials for small hydro (second largest hydro potential country in the central African region). Potential for solar energy also exist in the region. There are many agro processing activities in Cameroon including a palm oil mill, which has the potential to provide all the electricity needs of the country from energy generation using its biomass residues. At present such residues are reused in the plantations and the excess residue is burned in the open air, thereby releasing CO2 to the atmosphere and contributing to GHG emissions. In the Western Bakossi area, where most of Cameroon's cocoa is produced, there is very little access to electricity or heat except from fuel wood. Farmers depend on cutting large quantities of wood (in habitats that should be protected) for drying their cocoa, as well as palm oil production. The smoke from the burning wood reduces the quality of the cocoa. Also, the smoke gets released to the atmosphere, contributing to pollution and GHG emission. Apart from this, the in-efficient burning of wood is causing the increased GHG emission and un-sustainable utilisation of forest biomass resources. Demonstrating an integrated renewable energy based mini-grid at such sites would reduce GHG emissions and land degradation while increasing the productive capacity and quality of the commodities involved. With many such regions existing in the country, it follows that successful demonstration of the technical and financial viability of such renewable energy solutions for productive applications such as palm oil extraction, flour mills, coffee grinding, carpentry, cocoa processing, bakery etc. which are currently using diesel generators for their electricity need, has a very high potential for replication and scaling-up nationwide. At present, the government understand the importance of these renewable energy resources but no aggressive effort is being taken for the development of these sectors. This is primarily due to the lack of specific policies and capabilities available in the country. This project focuses to overcome both of these lacunas by demonstrating the SHP and biomass based mini-grids in the country.

[5] Source: http://hdrstats.undp.org/images/explanations/CMR.pdf; last accessed on 04-23-2013

A.4.1.2. Energy situation in Cameroon

It's well known that energy plays a central role in development and growth of a nation. Especially in the emerging markets, certainty about the energy availability provides an enabling environment for business growth and its proliferation. Energy and its availability are directly related to the growth of the people, plant and economy and its unavailability directly or indirectly affects all these and their associated components. Energy consumption can be categorized by purpose, source, and sector. In households, energy is used for cooking, lighting, transport, and improving living conditions.

In context to Cameroon, the total primary energy supply in 2009 was 6, 918 ktoe. The energy supply primarily comes from: bio-energy (64.1%) mainly firewood, oil (27.2%), natural gas (3.7%) and hydro-electricity (5%). It can clearly be seen, that the primary energy supply is predominantly coming from renewable energy resources. Biomass is the most important one and is primarily used as energy for domestic cooking and other residential purposes (accounting approximately 73% supply, Figure A4.1). For lighting purpose, the rural villagers and urban communities (in case of brownouts or load shadings) are dependent on the kerosene lamps or small diesel generators. Kerosene consumption for lighting is estimated to be around 3-4 liters per household per week. People are paying around FCFA 400 to 600 (USD 1 to 1.25) per liter of kerosene. According to the World Bank data, the energy use in the country is on the rise since 2008[6], whereas energy production is declining since 2003, causing an incremental deficit[7]. However, energy self-sufficiency in Cameroon is 127.9%[8]. Cameroon is an oil producing country, however, the proportion of imported petroleum products in national consumption increased considerably rising beyond the 56% in 2000, before dropping again in 2003. The total fuel import in Cameroon costs about 961 million USD (22.4% of total imports). Petroleum imports, which constitute the entirety of the country's energy imports, totalled 2,356 ktoe in 2007[9].

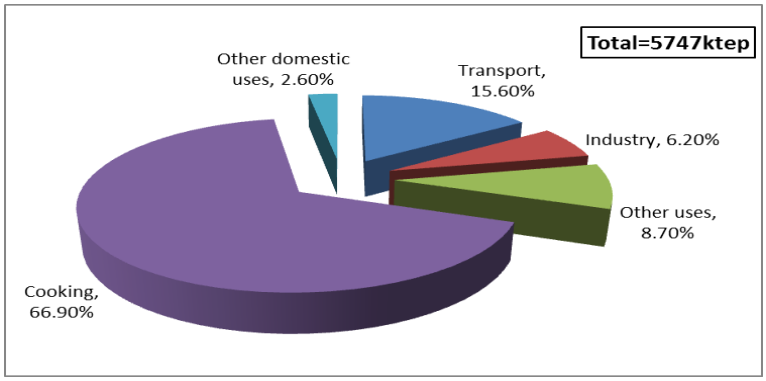


Figure A4.1: Distribution of the energy use in Cameroon by 2010
Source: Energy status report of Cameroon-2011

A.4.1.2.1. Electricity supply situation in Cameroon

[6] Source: http://data.worldbank.org/indicator/EG.USE.COMM.KT.OE/countries/CM?display=graph. Last accessed on 04-23-2013
[7] Source: http://data.worldbank.org/indicator/EG.EGY.PROD.KT.OE/countries/CM?display=graph; last accessed on 04-23-2013.
[8] Source: http://www.irena.org/REmaps/countryprofiles/africa/Cameroon.pdf#zoom=75; last accessed on 04-25-2013.
[9] Source: http://www.reegle.info/countries/cameroon-energy-profile/CM#sources; last accessed on 04-23-2013.

Cameroon has an installed power generation capacity of 1593 MW[10] (2011) (of which hydro power (large hydro) is 45%, and rest is thermal (natural gas, heavy oil and diesel) which include both public sector projects as well as auto generation projects). The electricity use per capita in Cameroon is 226 kWh[11], having majority share is of hydroelectricity (81.2%), biomass (15.4%) and then petroleum products (oil, natural gas). Importantly, this situation is observed both in rural as well as in urban areas. Out of this, Cameroon primarily relies on approximately 30 ageing diesel power stations as back-up facilities, the largest of which are located in Bamenda, Yaounde, Mbalmayo and Ebolowa[12] and one Natural gas run thermal power station, Kribi Power Station, with 216 MW of capacity, installed in the year 2011[13].

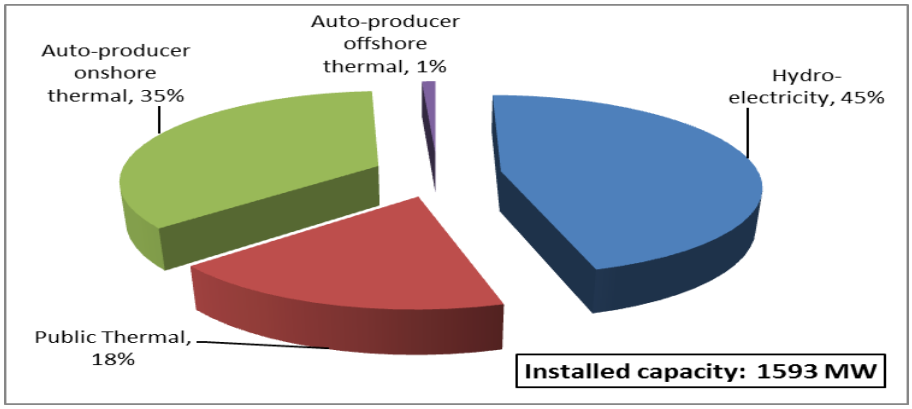


Figure A4.2: Power installed capacity in Cameroon
Source: AES-SONEL, SHO/BERNABE, ARSEL; produced by SIE-Cameroon

In 2010 the energy generation was only 3.9 TWh (AES SONEL, 2011), the majority of which was consumed by medium and high voltage customers. According to AES SONEL (2011) the transmission network consists of two main systems - the Northern Interconnected Grid (NIG) Network and the Southern Interconnected Grid (SIG) with 480 km of 225 kV, 337 km of 110 kV, 1,067 km of 90 kV, 11,450 km of 5.5 to 33 kV and 11,158 km of 220 to 380 kV lines. There also is an Eastern Isolated Grid (EIG). The electricity supply is unevenly distributed, as these sub-grids are not synchronized. These isolated grids need interconnection, forming a unified national grid because it not only helps in catering to the urban consumer, allow optimal use of generating capacity, modern management of interconnecting grid, but also is important for rural electrification. For a country the size of Cameroon, the grid length is such that most parts of the country are far off from the grid and have no access to electricity or depend on off-grid or self-generation from fossil fuels. Off-grid generation consists of a number of mini grids powered by remote thermal plants with a combined installed capacity of approximately 24MW.

The connected load, as per energy data released by International Energy Agency[14], is sufficient to meet by the current level of generation. However, those who have electricity and are connected to the national grid are often subject to brownouts[15]. AES SONEL's current connections are limited to mostly the urban and peri-urban areas with approximately 730,000 customers at present (AES SONEL, 2011). Although the company plans to add 60,000 connections each year, this is far short of what is required to address the energy access and poverty reduction agenda - particularly so in rural areas. Because of this energy supply gap and the low purchasing power of the majority of the population, firewood (often from trees and

[10] Report on Energy Situation of Cameroon, 2011, SIE-Cameroon
[11] Source: African Development Fund report: "Project to Strengthen and Extend the Electricity Transmission and Distribution Network", 2009
[12] Source: http://www.mbendi.com/indy/powr/af/ca/p0005.htm
[13] Source: http://en.wikipedia.org/wiki/List_of_power_stations_in_Cameroon
[14] Source: http://www.cne.es/cgi-bin/BRSCGI.exe?CMD=VEROBJ&MLKOB=636519601010
[15] Source: http://www.mbendi.com/indy/powr/af/ca/p0005.htm

forests) remains the main source of energy for a large proportion of the population (both rural and urban). This is particularly the case in existing off-grid agricultural areas where large quantities of wood fuel are being harvested to provide heat for drying and processing commodities such as cocoa, coffee, rice, timber and palm oil fruits, thus increasing the GHG emissions, posing a threat to natural habitats and sustainable land use. The opportunities for IPPs in Cameroon are therefore potentially enormous to fulfil the energy deficit in the country. IPPs are already actively participating in the Cameroon power sector as a result of the energy sector reforms between 1998 and 2006, but so far these actors are very few and limited to mainly affiliates or subsidiaries of AES SONEL and focus mainly of electricity generation from fossil fuels, and distribution in urban areas.

The current government electricity supply target is 5,000MW and 6,000 MW by 2020 and 2035 respectively. In 2010 the demand was approximately 1,200 MW and is projected to exceed 5,400 MW by 2020. Therefore, even with the ambitious energy supply targets the government has set, the energy gap will exist in Cameroon. Most of the existing energy generation capacity and targeted supply is from hydro sources mainly within the River Sanaga Basin which, like other water catchments in the region, is vulnerable to drought conditions, thus placing additional reliability burdens on Cameroon's energy security. The country therefore needs to diversify the national energy mix to ensure energy security and access. Distributed renewable energy generations - both grid-connected as well as off-grid can thus play an important role to achieve the energy access target in the country.

Recognising that energy is a critical input for its economic growth and sustainable development, and that the country cannot successfully develop its economy without access to reliable, secure and cost-effective energy supply and services, the Government of Cameroon (GOC) has given high priority to energy access in the country's Growth and Employment Strategy Paper (GESP). In the **baseline project**, as energy demand increases and the energy deficit widens, the GOC is promoting foreign investments in large hydropower systems for the long term, particularly with regards to development of the huge hydropower potential of the River Sanaga system. Such a strategy could be dangerous as it ties the long term energy security of the country to only one river system. To reduce the current energy deficit and that envisaged in the near future, as a short term strategy GOC's efforts in dealing with the energy deficit issue involve least cost emergency fossil fuel based thermal power plants with a combined installed capacity of about 300MW (86 MW Yassa plant from heavy oil and 216 MW Kribi plant from gas). Such solutions meet the urgent energy and economic development needs of the country, but are environmentally unsound when compared to renewable energy generation options. Even in the World Bank supported project on Cameroon energy sector development (2008 – 2013), the focus is mainly on providing technical assistance for least cost large-scale energy solutions for Cameroon (particularly large scale hydropower projects such as the Lom Pangar Hydropower Project-LPHP), water basin management, concession oversight and consumer protection, and development of the Rural Energy Fund (REF) managed by Cameroon's Rural Electrification Agency, which again is focussed on only the least cost solutions for rural electrification and no special focus on renewable energy. UNIDO project is trying to fill this gap by establishing a special window for renewable energy under the REF and building capacity of the government institutions as well as private sectors in planning, designing, implementing and operating renewable energy projects.

The other energy sector related initiatives (i) The joint European Union and CEMAC (economic and monetary union of central African states) intensive peri-urban electrification project (2008 -2013) aimed at adding 57,000 social connections to the national grid, and (ii) The African Development Bank project (2010-2015) to strengthen and extend the electricity transmission and distribution networks in Cameroon, with the aim of reaching 423 new locations in eight of the ten regions in Cameroon; too have focus on extension of centralised power distribution network through least cost large scale power projects, which will take longer time and large investment and may not be able to reach all areas of Cameroon. This

UNIDO project's target is to address these gaps and showcase the demonstration of the feasibility of mini-grid based on renewable energy projects for productive applications in rural areas.

A4.1.3. Renewable energy in Cameroon

The average solar irradiance over Cameroon is about 4.9kWh/m²/day; however in some region good solar resource with insolation up to 5.5kWh/day/m² is also available. These numbers represents that solar potential in the country is fairly good, and has also been indicated by IRENA[16]. In Cameroon, solar power is used for distributed generation systems with currently around 50 PV installations implemented under various programs. The country does not have very good wind energy resource except few pockets in north and in littoral region[17,18]. In case of biomass, the country has third largest biomass potential in sub-Saharan Africa, with 25 million hectares of forest covering three-quarters of its territory, with a potential to be used sustainably. Cameroon has few hot springs like Ngaoundéré region, Mount Cameroon region and Manengoumba area with Lake Moundou, which can potentially be used as geothermal energy source. However, no assessment studies have been carried out in this regard so far; and thus the potential is unknown. The country is having second largest hydropower potential in Africa with about 20 GW technical potential of hydropower. Since biomass and small hydropower systems are the technologies which have been proven sustainable and cost effective globally and the country has vast resources available in every region, the project focuses on these two technologies. The power potential of these resources in the country is discussed in some detail in the subsequent section.

A4.1.3.1. Cameroon's hydroelectric potential

Cameroon possess Africa's greatest hydroelectric potential after D.R. Congo, however, only about 5% of Cameroon's hydroelectric potential has been realised to date. Furthermore about 81% of the country's electricity is produced by hydropower using water from nine major river basins in the country. The total estimated potential of hydropower in the country is about 20 GW, which corresponds to around 115 terawatt hours per year of hydroelectric potential[19]. The potential for Small Hydro Power (SHP) installations (up to 1 MW) is estimated at 1.115 TWh, mainly in the eastern and western regions of Cameroon, however this potential is yet to be properly assessed and exploited[20]. Table A4.2 lists the existing hydropower plants capacity in Cameroon.

Table A4.2 Installed hydroelectric power plants of Cameroon[21],

Hydroelectric station (Year)	Capacity	River
Edea Power Station (1953)	267MW	Sanaga River
Song Loulou Power Station (1981 & 1988)	384 MW	Sanaga River
Lagdo Power Station (1982)	72 MW	Benue River
Total	**723 MW**	

Apart from already established plants, there are around eight big hydro power plants in the pipeline viz. Lom Pangar (30 MW), Nachtigal (250 MW), Memve'ele (201 MW), Birni á Warak (75 MW), Song

[16] Source: http://www.irena.org/REmaps/countryprofiles/africa/Cameroon.pdf#zoom=75; last accessed on 04-25-2013.
[17] Source: http://www.who-eatlas.org/africa/images/map/cameroon/cmr-windspeed-2.pdf; last accessed on 04-25-2013.
[18] Source: http://en.openei.org/wiki/Cameroon; last accessed on 04-25-2013.
[19] Source: http://www.worldfolio.co.uk/archivos/1317373811.pdf; last accessed on 04-22-2013
[20] Source: http://www.reegle.info/countries/cameroon-energy-profile/CM#sources; last accessed on 04-25-2013
[21] http://www.climateparl.net/cpcontent/pdfs/Kribi,%202010-03-27,%20Parlementarians.pdf last accessed on 04-26-2013

Mbengue (880 MW), Kikot (in 3 phases: 214 MW, 108 MW, and 108 MW)[22]. By 2020, total installed capacity in Cameroon is expected to reach 3,000 MW. Sanaga River which is 553-mile long up to all the way to the Gulf of Guinea has a potential to harness power capacity of 3886 MW. Figure A4.3 shows the identified hydro power potential sites, electricity grid lies and location of other energy resources in Cameroon.

Though Cameroon is using its abundant hydropower resources, hydropower is not available all the year round with its full capacity. The supply faces extremities during the dry season. For this reason, Emergency Thermal Power Program of 100 MW was embarked so as to subdue this uncertainty[23]. Further till now the government focussed on the large hydro projects only, which has the environmental and other issues and takes considerable longer time in project finalisation and implementation. Thus, the small hydropower potential that exist in the country has to be given a focus, so as to enable the country in developing these resources at a fast pace in decentralised manner so that the rural population can also benefit from the electricity from these sources. These small hydro systems can optimally be designed based on the water resource availability from a river, to generate electricity during most of the months in a year. This GEF supported project is focussed on these aspects of proper feasibility assessment and plant designing so as to showcase how the renewable energy systems are the viable and appropriate options.

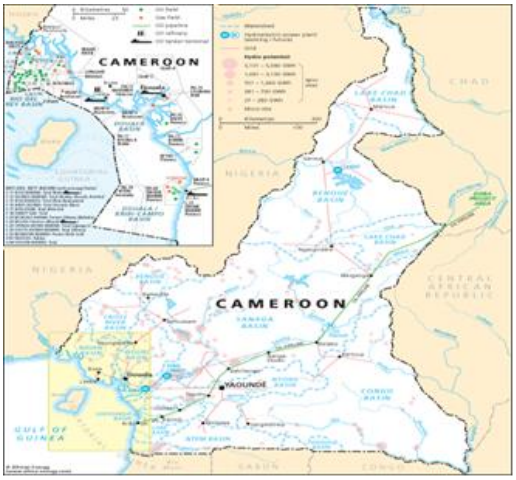


Figure A4.3: Hydro potential sites in Cameroon[24]

A4.1.3.2. Cameroon's biomass potential

In Cameroon about 90 % of population use traditional solid fuels such as fuel-wood and charcoal in residential sector for heating, light and cooking purposes. Within the industrial sector of Cameroon, more than 90 % of the overall energy requirements are being met using biomass as a fuel to meet the energy needs. The country has enormous biomass resources, with vast forest cover on south of the Adamawa, as well as other regions of the country. Thus there is great potential to generate surplus extractable biomass in a sustainable manner. Currently biomass is used in an inefficient manner mainly for primary household

[22] Source: http://www.afdb.org/fileadmin/uploads/afdb/Documents/Project-and-Operations/-%20Cameroon%20-%20AR%20Electricity%20Project%20-%5B1%5D.pdf; last accessed on 04-22-2013
[23] Source: http://www.worldfolio.co.uk/region/africa/cameroon/michael-ngako-tomdio-minister-energy-water-resources; last accessed on 04-25-2013.
[24] Source: http://www.geni.org/globalenergy/library/national_energy_grid/cameroon/cameroonnationalelectricitygrid.shtml; last accessed on 04-23-2013

energy resource, particularly in the rural areas, and for some industrial energy needs. The usable waste wood potential is estimated at 1 million m^3 per annum. As per the estimates (Emmanuel K. Ackom, Dieudonne Alemagi et al. 2013) Cameroon has the potential of producing about 1.11 million tons of bone dry biomass residues annually from its agriculture as well as forest cover.

Cameroon is also rich in agricultural produce. Some of the major food crops in Cameroon are maize, cassava, plantain, macabo, rice, millet, sorgho and groundnuts, etc. and cash crops cocoa, coffee, cotton, rubber, bananas, pineapples, etc. Apart from producing the food grains, the agricultural sectors also produce agro waste that can be used as fodder to the cattle, nutrients to soil and rest can be used as fuel to meet the energy needs. A number of saw mills in the country which need heat as well as electrical energy, is currently using diesel generators or heavy oil based power source. They produce lot of wood chips as waste which can be utilised to generate biomass based power generation as well as for the drying of the wet woods. Few mill owners have already planned for the setting up of MW-scale wood-waste based biomass power plants for their own need.

Even though Cameroon is rich in the biomass resources, these resources have not been tapped for power generation. Rather these biomass resources such as firewood from forest are being used for domestic cooking, heating in the local small and micro industries (palm oil production, bakery and other industries) and for meeting other heat energy requirement in a very inefficient manner. Locally people are unaware about the modern and efficient biomass energy technologies (such as biomass gasifier systems) which can help in the efficient utilisation of the available resources for various applications. Proper estimation of the surplus resource and assessment of suitable technology to convert these biomass resources to modern forms of energy will empower the local communities by providing access to modern technology to meet their industrial as well as domestic energy needs. Biomass based power plants through decentralised and distributed generation (DDG) mode can also increase the access to electricity in rural population. Hence, biomass is a potential resource to provide access to modern energy for people living in rural areas. This project will thus focus on creating awareness among the locals about efficient use of available biomass resources as well as the forest management for sustainable biomass harvesting and the technologies for biomass energy utilisation. Demonstration of biomass power technology under this project will help to improve knowledge about better utilisation of the locally available biomass quantities for power generation in the region. The demonstration project will not just only showcase the benefits and use of electricity from biomass gasifier, but will also help train the local people as well as the forest managers in controlled supply and use of biomass from the forest, as well as the need for continual growing of biomass for such projects. Rules may be set regarding the maximum limit of biomass to be collected by the individual or the community and the need for tree plantation ascertain limit of biomass taken out from the forest area.

The forest department allows the villagers to collect and take a certain limited quota (about 10 m^3 per day) of forest wood to meet their daily need, which is being used by the villagers very much in-efficiently for their domestic cooking. The forest managers and local leaders will be encouraged to use improved high efficiency cook-stoves for domestic and institutional cooking purposes in the project areas, so as to save on the daily biomass utilisation being made by the locals. The surplus/saved biomass can be sold by the villagers to the biomass power generation units thereby earning money and this will also be beneficial in making the project more viable and sustainable as the villagers/beneficiaries of the project will then become able to pay for the electricity used through the savings and earnings made from biomass. In this regard, the project will also attempt to link improved Rocket cookstoves suppliers in Cameroon to start promotion of their product in the project area and aim to convert all households to use the improved cookstoves from traditional 3 pot cookstoves. The knowledge of biomass gasification technology will also help villagers in using these technologies for meeting the heat requirement in small industries in an efficient manner.

A.4.1.4 Challenges and barriers in the renewable energy sector in Cameroon

The key constraints facing the electricity sector relate to the narrow geographic space and relative obsolescence of the transmission and distribution networks. Consequently, there is significant unmet demand. This situation is exacerbated by the fact that the country's three main transmission grids are completely isolated from one another and no exchange of available surplus energy can be made between the grids. Unreliable infrastructure, insufficient distribution networks, anti-competitive commercial framework, non-specific policy and regulatory environment for renewable energy as well as administrative bottlenecks and financial insecurity are the most significant risks and barriers[25] for the overall energy sector in Cameroon.

Renewable energy sources have a key role to play in addressing the energy demand and generation challenges that Cameroon currently faces, as well as they can contribute to:

i) The energy security of the country through diversification of the national energy mix, since the current power supply is over reliant on fossil fuels (which are vulnerable to volatile oil and gas prices) and hydro sources (concentrated on the River Sanaga system) which are vulnerable to droughts,
ii) Climate change mitigation through GHG emission reductions arising from displacement of diesel and heavy fossil foil generators, and
iii) Protection of ecosystems and reduction of land degradation through provision of modern energy forms in rural areas where there is traditionally over dependence on firewood for energy.

One of the key barriers for renewable energy utilization in rural electrification in Cameroon is that the reforms initiated since 1998 were guiding the energy sector of Cameroon, and it was not revised until recently when the Cameroon Electricity Law-2011 was enacted. The Rural Electrification Agency was formed with an objective to carry out the field survey and studies for finding out techno-economically viable solutions for rural electrification, was mostly confined into the Policy/Advisory service role which appears to defy all accepted international benchmarks of the role of such national agency. This was due to the non-availability of clear guidelines on the roles and responsibility of such agencies under the electricity laws and regulations, and also the lack of technical knowledge and capacity of AER personnel. The recently enacted Cameroon Electricity Law- 2011 has a separate chapter on renewable energy/rural electrification, but it too does not talk much about the role of rural electrification agency for this purpose, but recommends about the formation of Transmission Network Organization (TNO) and the Electricity Sector Regulatory Funs (ESRF). These agencies again will focus on overall energy sector and not specifically focus on renewable energy. Instead of specific legislation to promote renewable energy in general or specific cleaner technologies, there is rather a general legislation concerning the electricity sector. So there is a need to have specific renewable energy development policy and regulations in place and ensure their enforcement.

The activities that were carried out to design this project concentrated on the problems and issues affecting the wider utilization of the abundant small hydro and biomass energy resources in Cameroon. Realizing the huge benefits that can accrue, a thorough analysis of the barriers for renewable energy development in Cameroon was conducted. This included a series of consultations with appropriate stakeholders from the government, bilateral and multilaterals agencies that are convinced that tapping the potential of the indigenous renewable energy resources will result into increased level of electrification in the country as well as rural industrialization and thereby contributing to the national economic development. This will also help in building the local capacity for formulation and implementation of RE based rural electrification project.

[25] http://www.reegle.info/policy-and-regulatory-overviews/CM . Last accessed on 26 August 2013

Based on the assessments it is observed that the reason for poor utilisation of existing renewable energy resources are: (1) there are no specific policy and regulations existing for developing these renewable energy sources by attracting the interest of private sector; (2) Lack of government institutional capacity in developing policy and incentive mechanisms for these RE sources; (3) Lack of financial institutions interest and awareness; (4) Inadequate technical capacity of the government institutions as well as the private sector in terms of design, development, implementation and operation of the RE plants; and (5) Lack of skilled manpower for the management, operation and maintenance of such projects etc.
These barriers are discussed in detail below and the project activities are designed to remove these barriers through appropriate technology demonstrations and training programs:

A4.1.4.1. Institutional capacity and policy barriers

a. National Energy Policies are yet to be formulated with special focus on renewable energy along with the rules and regulations for its development, integration with the grid for rural electrification and productive applications.
No specific policies, laws and regulations related to renewable energy have been issued by the government except the common law of electricity which just defines the importance of renewable energy and mentions that rural electrification in either grid connected or distributed mode to be promoted and for which renewable energy may be considered on priority. It also mentions that renewable energy based projects less than 100 kW may be given easy clearances but as of now no further guidelines have come up which defines in detail about the promotional policies for renewable energy especially in rural electrification context. Further there are no specific incentive guidelines for private sector promotion in renewable energy sector. Also, technical standards and business procedures for engineering design, construction, and commercialized operation of systems are not well developed.

b. Inadequate national capacity to explore biomass and small hydro resources
Even though the country is having vast resource of renewable energy, and the national policies and laws, vision documents etc. considers promotion of renewable energy sources specially biomass and SHP to meet the national growing electricity demand, there exist very less technical capacity among government bodies as well as private institutions to explore the feasibility of these resources. This is due to the un-developed market and low awareness and low technical knowledge about these technologies. This project focuses to address these issues by enhancing the capacity of government as well as private sector stakeholders.

c. No agency has full capacity and capability to design the mechanism for promotion of renewable energy projects
There is a need for an agency/department where all key actors in the area of renewable energy specially biomass and small hydro development can seek assistance and explore opportunities in developing and implementing these projects. Either a new agency have to be created for development of renewable energy technology or the existing Rural Electrification Agency has to be strengthened to undertake relevant services such as awareness campaigns, training programs etc. on top of what it has been doing under a specific project.

A4.1.4.2. Market and technology barriers

a. Lack of effective technical support services for undertaking RE based mini-grid projects operation and maintenance
Technical support services for the operation and maintenance of RE based mini-grids are inadequate, which may lead to poor performance of any systems put in place. In addition, there is a shortage of capable designers. The local engineers and experts do not have enough experience with such systems. Further, there exists no government program focusing on the technical capacity building for these

renewable energy systems. Regular training programs are needed to improve the quality and quantity of small hydropower engineers and technicians.

b. No prior experience of implementation and management of small hydropower and biomass projects based mini grids for rural electrification and productive use
The country do not have any prior experience of implementing and managing small hydro power and biomass power based mini grid for creating electricity access in rural areas or for any productive applications. Till now all the electrification projects are focused on large scale power generation projects and distribution of electricity through centralized grid in different regions. This project focus to remove this barrier by successful demonstration of two such mini grids based on renewables.

A4.1.4.3. Financial barriers

a. Apprehension by the bank and financing institutions about inadequate returns on RE based power projects
Banks and other financing institutions are reluctant to get involved in RE based projects especially for rural electrification because of the apprehension about perceived low return on investment. The financial institutions, banks and local communities have little trust in biomass and small hydropower technologies and their associated benefits due to poor understanding of the technology, which is another challenge for the sector's development.

b. Lack of financing instrument and financial reserves
There is no specific financing agency or fund dedicated to renewable energy financing. To promote renewable energy financing there is a need to have special financial reserves for RE financing mainly for small rural electrification projects.

A4.1.4.4. Information barriers

a. Insufficient information and dissemination of policies and regulations
Limited information and dissemination about renewable energy projects specially the biomass energy technologies and non-availability of any national guidelines on SHP and biomass energy development greatly affect local government in preparing their general policies and implementing rules, hence hindering new business and community-driven initiatives.

b. Lack of awareness of the villagers about productive applications of electricity
The rural population is unaware about the entrepreneurship opportunities which may come up with the electricity availability, so there is a need to identify the type of applications and train the villagers on them.

The Project proposal:

This project focuses on the removal of these barriers through demonstration of biomass and SHP based mini-grid for the productive use of electricity in the rural area of Littoral region with an objective to (a) Strengthening the legal and regulatory framework for renewable energy; (b) Develop mechanisms to promote and sustain private sector investments in renewable energy generation; (c) Demonstration of the technical and commercial viability of integrated renewable energy based mini grids and (d) dissemination of the project results for wide awareness and capacity building within the country.

The decentralised mini-grids based on locally available sources of renewable energy are the most cost effective option for rural electrification. For instance, where hydropower resources exist, small hydropower based local grids could be established and serve a number of villages or towns. With the further development of other renewable energy based projects such as biomass, these could be converted

into mini-grids and with further expansion of mini-grids these could be integrated into the national grid. Since Cameroon has huge potential of both SHP and biomass this project considers the demonstration of mini-grid based on both these technologies.

Table A4.4 Barriers and the corresponding project outputs to remove those barriers.

Sl No.	Barrier	Corresponding project Output components
1.	**Institutional capacity and policy barriers**	
a.	*National Energy Policies are yet to be formulated with special focus on renewable energy along with the rules and regulations for its integration with the grid for rural electrification and productive applications.*	Output 1.1, Output 2.2
b	*Inadequate national capacity to explore biomass and small hydro resources*.	Output 2.4, Output 3.1
c	*No agency has full capacity and capability to design the mechanism for promotion of renewable energy projects*.	Output 1.1, Output 1.2 Output 2.2, Output 2.4
2.	**Market and technology barriers**	
a	*Lack of effective technical support services for undertaking RE based mini-grid projects operation and maintenance.*	Output 2.1, Output 2.4 Output 2.5
b	*No prior experience of implementation and management of small hydropower and biomass projects based mini grids for rural electrification and productive use*.	Output 2.1, Output 2.4 Output 2.5, Output 3.1
3.	**Financial barriers**	
a	*Apprehension by the bank and financing institutions about inadequate returns on RE based power projects.*	Output 2.2, Output 2.3
b	*Lack of financing instrument and financial reserves.*	Output 1.2, Output 2.6 Output 2.2, Output 3.2
4.	**Information barriers**	
a	*Insufficient information and dissemination of policies and regulations*.	Output 2.5, Output 3.1 Output 4.2
b	*Lack of awareness of the villagers about productive applications of electricity*.	Output 3.2, Output 4.2

A4.2. Project Baseline Scenario

In Cameroon, between 2008 and 2012 the access to electricity (% of population) was 48.70, as per the World Bank report, published in 2010[26], which was increased from 37% in 1996 to 46% in 2002, and is above annual average for Africa's resource rich countries. Most of this access is concentrated in the urban centres which means only half of the Cameroon's population has access to electricity. Further, 90% of urban households are electrified as compared to a mere 23% of rural households. The high rate of access to electricity in urban areas masks several regional and socioeconomic disparities. Around 35% of poor urban households and 88% of poor rural households do not have access to electricity, which suggests that the poorest strata in both the urban and rural areas are the most disadvantaged groups.

The project is proposed to be implemented in the potential sites in the Littoral region, which will cover the Kekem, Melong, Bare-Bakem and Manjo districts of the region. Littoral region is the most densely populated region of Cameroon with population of 2,865,795 (about 14.8% of country's population) and a population density of 141.5 people/km^2 area. This region is having high small hydro as well as biomass potential with lot of opportunities for agricultural and industrial sector development with creation of avenues for many income sources for rural as well as urban communities. Most of the rural population in

[26] Source: http://data.worldbank.org/indicator/EG.ELC.ACCS.ZS

Littoral region is engaged in agriculture and the main produces are palm, coffee, cocoa, plantain, cassava etc. People are also involved in the palm oil production through crude process, drying and grinding of cassava, coffee and cocoa etc. For these processes they use mainly the wood from forest for the heating purpose and for any motor driven equipment they use gasoline or diesel generators.

As part of the PPG activities, both baseline survey as well as stakeholder consultations at various levels were carried out with the objective to assess the current fuel usage pattern for lighting and productive use in the proposed project sites and potential of SMiEs (small and micro enterprises) that can be powewred through the demonstration SHP and biomass projects. The baseline survey and the stakeholder consultations highlighted the feasibility and need of both small hydro power as well as biomass power project in the region. The survey indicated that though the electricity has reached to some of the villages, the percentage of household connected through the distribution grid in each village is varying from 10 to 70% and also there are frequent power cuts. Also, the fuel used for generation of the electricity is predominantly thermal i.e. oil based generators. Most of the villages are non-connected due to the fact that these are very remotely located with very difficult access especially in the rainy season, and the high cost for the extension of grids to region also is constraint. Further the AES-SONEL, which is the agency taking care of these grids is not so much interested in extending these distribution lines considering the large losses and maintenance problems for these remote areas.A summary of the electrification status of the villages in these four identified districts of the region are given in Table A4.5.

Table A4.5 Electrification status of the districts to be covered under the project

District	No of villages	No of un-electrified villages	No of household per village	No of hh below poverty line (% of total hh)
Kekem	7	2	100 to 150	30%
Melong	41	25	50-150	60%
Bare-Bakem	22	18	100	50%
Manjo	33	25	100-200	52%

In the absence of electricity access, people are completely dependent on kerosene lamps, small diesel generators, and rechargeable batteries for lighting. Kerosene consumption for lighting is estimated to be around 3-4 liters per household per week. People are paying around FCFA 400 to 600 (USD 1 to 1.25) per liter of kerosene. This corresponds to about FCFA 10,000 (USD 20) per month of expenses for the lighting purpose in rural households. The households which are connected with electricity supply are paying between FCFA 5,000 to FCFA 30,000 per month depending on their use. For the heating applications villagers are totally dependent on the locally available biomass and wood from the forest. Villagers are allowed to collect about 10 m^3/day of wood from forest for their daily energy needs. This collected wood is being used for their daily cooking and other heating purpose. Apart from these various small scale agro processing applications like palm oil productions, coffee drying etc. are using wood very in-efficiently for all their heating applications. Further there is no knowlwdge and awareness among the villagers about sustainable harvesting and efficient utilisation of the forest biomass.

Industrialization based on modern techniques is lacking because of absence of electricity. As mentioned earlier the main source of income in the region are cocoyam, coffee, palm, cassava and plantain productions, there are small industrial segments such as palm oil extraction units, cassava grinders, coffee drying, de-husking and grinding, etc. are using the diesel powered generators for powering their equipment. It was observed from the discussion with these unit owners and villagers during the field visit that for a small palm oil extractor the diesel consumption is about 1 litre for 3-4 hours of a batch operation which produces about 20 to 25 litres of oil. Most of the grinding mills uses diesel generators to run 2 to 5 hp capacity motors. The average price of diesel is about 600 FCPA (About 1.3 US$) which in the village

areas most of the time are available at even higher price or the villagers need to travel to urban cities for purchasing the diesel. The survey and consultation indicated the great potential for food processing, palm oil production, coffee processing units, saw mills, rice mills and other agro-based industries in the region who could be probable beneficiaries of electricity apart from the thousands of households. There are many villagers who are interested to put more such agro processing units, but due to the high cost involved in running the diesel generators and the problems associated with the availability of diesel locally they are not able to do so. There are discussions that in case of absence of grid electricity, people and other agencies are talking about the use of fossil fuel (diesel) based power generation for local distribution. So it is important to demonstrate renewable energy projects to showcase the feasibility of such projects and promote RE based productive applications in rural areas and increasing the local level awareness about the utilisation of the available abundant indigeneous renewable energy resources.

Considering the population of the village and the possibility of productive ventures that can be setup in these villages, it is estimated that the biomass power plant capacity of about 50 kWe in Foyemtcha village and 75 kWe in Ekom-Nkam village will be sufficient to supply electricity to the households and the productive loads. Similarly the two small hydro projects (one 1.2 MW Manjo and the other 1.5 MW Moualeu) will be able to supply electricity for many of the potential SMiEs and rural households in Kekem and Manjo districts. The UNIDO-GEF project activity will promote efficient utilisation of the electricity from such projects for productive applications, build capacity of the government agencies and private sector in planning, designing and implementing such projects, train local engineers in operation and maintenance of these plants, train local villagers including women in sustainably growing and harvesting the biomass for the maintained supply chain of biomass resources etc.

A. 5. Incremental /Additional cost reasoning: describe the incremental (GEF Trust Fund/NPIF) or additional (LDCF/SCCF) activities requested for GEF/LDCF/SCCF/NPIF financing and the associated global environmental benefits (GEF Trust Fund) or associated adaptation benefits (LDCF/SCCF) to be delivered by the project:

A5.1. Introduction

The early exploitation of small hydro and biomass resources available in Cameroon are critical to augment generation of electricity and transiting to a more reliable, cheaper, sustainable and renewable source of supply. However, in order to maximize the benefits of the country's hydro power potential, significantly large investment is required, especially through public-private partnerships (PPP) as well as strong management systems for generation, transmission and distribution. Realizing the importance of small hydro power and biomass resources in Cameroon, UNIDO conducted preliminary investigation in various parts of the country and identified various sites in Littoral Region as good potential site for SHP and Biomass power installations for rural electrification and productive applications development through mini-grid and off-grid electrification. This led to the design and preparation of Project Information Form (PIF) and Project Preparation Grant (PPG) for the project titled'Promoting Integrated Biomass and Small Hydro Solutions for Productive Uses in Cameroon', which was approved by GEF in April 2012 (GEF project ID 4785). The project proposal has also been discussed with the GEF operational focal point at Ministry of Environment, Protection of Nature and Sustainable Development (MINEPDED) and the same has been endorsed by them. The design and formulation of the project proposal has been finalized through PPG resources made available by the GEF and additional co-financing through UNIDO resources.

The demonstration projects have been identified after conducting the preliminary techno-economic feasibility studies in all the initially identified potential SHP and biomass project sites and also by carrying out the socio-economic survey around the identified feasible project sites to understand the importance, willingness of the people and the sustainability aspects of the project. Based on the study of the resources, site conditions, development possibilities, approach roads, expected loads and other

important socio-economic parameters two SHP projects (1.2 MW Manjo SHP and 1.5 MW Mouakeu (Small Ekom-Nkam) and two Biomass projects (75 kW at Ekom-Nkam village and 50 kW at Foyemtcha Chefferie village) have been identified.

The brief of the project sites are given in Table below.

Table 5.1: Brief of selected project sites

Site no.	Site name	Type of Project	River name	District Council	Estimated power capacity	Nearest village	Estimated project cost (US$)	Remarks
1	Foyemtcha	Biomass power	NA	Kekem and Melong	50 kW_e	Foyemtcha	170,800	Village is completely un-electrified and also difficult to reach in rainy season. It has about 300 households.
2	Small Ekom-Nkam or Mouakeu	SHP	Ekom-Nkam	Bare-Bakem	1.5 MW_e	Ekom-Nkam/Mouakeu	4,746,064	This small Ekom-Nkam fall is near the large Ekom-Nkam fall which is a tourist place.
3	Ekom-Nkam	Biomass power	NA	Bare-Bakem	75 kW_e	Ekom-Nkam	263,092	Village is completely un-electrified. It has about 100 households.
4	Manjo	SHP	Essoue	Manjo	1.2 MW_e	Manjo	3,932,760	The site is very near to Manjo town and is also easily approachable.

A5.2. Incremental activities under the GEF project

The GEF funding will be utilised to remove the renewable energy (specifically small hydropower and biomass power) development related barriers through this project by well-defined and designed project components which includes the policy formulation and enforcement, capacity building and trainings, demonstration projects and appropriate monitoring and evaluation and the dissemination of the project success. The planned activities will cater to building the capacity of the government institutions and other relevant stakeholders in such a way that it will help the government achieving its sustainable development targets set under the new Growth and Employment Strategy Paper. The overall project activities and outcomes are framed under four Components with the objective to 'remove the institutional, technical, and financial barriers to the promotion of renewable energy based mini grids for rural electrification and productive applications in Cameroon and reduce GHG emissions from fossil based power by accelerating the development of biomass and small hydro resources'. The project intends to develop a market based approach, through public-private partnerships, for promoting RE based mini-grids to stimulate productive capacities in the country.

The overall project strategy is to demonstrate the viability of biomass and small hydropower based distributed mini-grid projects and assist in development of the institutional capacity for design of the

project along with the incentive mechanisms including tariffs, and developing tools for the financial institutions references and capacity building of the government institutions as well as banks and financial institutions in planning for investment in renewable energy projects. The project also target to attract private sector in developing these renewable energy projects by demonstrating the feasibility of RE based mini grids, and enhancing the technical capacity of private entrepreneurs in design, development, operation and maintenance of the RE based mini grid systems for rural electrification and productive applications. The project aims to provide rural economic and social opportunities through access to affordable and reliable electricity supplies, which synergistically results to better load management and operational viability of electricity distribution system.

The project consists of three technical components and the project monitoring component. The technical components are:

1. Strengthening the policy and regulatory framework for renewable energy and its enforcement
2. Developing mechanisms to promote and sustain private sector investments in renewable energy generation
3. Demonstration of the technical and commercial viability of integrated renewable energy mini grids

The technical components of the project and the expected outcomes are described below.

A5.2.1. Project Component 1 (PC1): Strengthening the policy and regulatory framework for renewable energy and its enforcement

This aim is to address the inadequacy of existing institutional capacity and enhance the private sector participation to effectively promote and support Renewable Energy (RE) development in the country by developing renewable energy specific country level policies. At present there is no specific renewable energy policy and regulatory framework in place in the country. Further, there is also no policy or regulation for biomass extraction and its sustainable utilisation for power generation, and the policy for use of water for power generation. The Rural Electrification Agency (AER), which is responsible for designing the rural electrification projects, have inadequate capacity in planning of renewable energy projects and its integration with the grid. Further in absence of any specific policy framework for renewable energy, this agency is working completely within the preview MINEE, and the national electricity law, which has a wider mandate of developing energy access either through fossil fuel or renewable energy resources. While renewable energy provides the ideal low carbon solution for decentralized rural electrification, Cameroon has no specific policy for their promotion. MINEE too has not been able to design specific policy on renewable energy development in the country. ARSEL, the regulatory body for electricity sector in the country, though thinking of preparing some guidelines for renewable energy promotion, but shown its lack of capability in designing some specific regulatory instruments for RE promotion such as tax benefits, fiscal incentives, tariff determination, plan or incentives to increase the renewable energy share in the national energy mix. The Cameroon Rural Energy Fund (CREF), which is setup under the Cameroon energy sector development project of the World Bank, and is being operated by AER has set some target of funding for renewable energy projects which include SHP up to 5 MWe, biomass power, solar PV and thermal, solar home lighting systems etc. but this funding amount is limited and as of now no mechanism has been prepared for the selection of the projects, sourcing and releasing of funds for these projects under REF. As per the Director of REF, there is a great need for capacity building and training of the government agencies as well as the private agencies for the preparation of policy for renewable energy and its implementation, and also for the evaluation of renewable energy projects for financing. This project aims to setup a special window for renewable energy financing under the CREF, and this component under its policy and regulatory

strengthening objective, will make sure that this special window for RE is legalized through the appropriate policy and regulatory guidelines for renewable energy promotion in Cameroon.

The focus of this component will particularly be on strengthening of the policy and regulatory environment required to promote private sector involvement in rural electrification through renewable energy in the country by developing and enforcing the policy and regulatory framework including setting up the Cameroon Renewable Energy Directive with quantifiable targets and specific timelines and sustainable biomass extraction and utilisation policy and water use policy for power generation, with the objective of assisting the government in the development of a market environment for promotion of biomass and small hydropower projects and related enterprise development for vibrant rural economy and improved livelihood in the country. These policy and regulatory guidelines will lead to the formulation of specific investment incentives such as power purchase tariff, financial support in terms of capital subsidy, tax incentives etc. (that will be developed under Component 2 of the project). Such a policy will make use of lessons and experiences in the development of policies for renewable energy technologies in the African region as well as other developing countries. The project will focus to get these specific policy formulations at the earliest for the adoption by the government of Cameroon and get the demonstration projects (identified pilot SHP and biomass based plants to be installed under Component 3 of this project) implemented under those policy and regulatory guidelines. This will be able to showcase the actual utilisation and benefit of such policies, and based on the lessons from the successful demonstration of the pilot project, government will be able to finalise the policy for acceptance and enforce the policy and regulations for the further promotion of renewable energy based power projects in Cameroon. Another objective of this component is to develop the capacity of the government departments for the development, enforcement and implementation of renewable energy related policies. Successful demonstration of the pilot projects with its successful management structure will help encourage the government to incorporate the renewable energy promotion objective in all its energy policies, and also in the regulatory frameworks developed for the promotion of overall energy sector development.

Under the project Component 1, GEF resources will be used to provide technical assistance to the Government of Cameroon in developing its policy and regulatory framework for renewable energy and specifically for small hydropower and biomass power based mini grid as well as isolated small distribution grid systems.

Outcome 1: A renewable energy policy and regulatory framework in place, supporting a vibrant renewable energy sector with enhanced private sector confidence and participation in renewable energy generation

Project Component 1 activities and outputs have been designed to strengthen the policy and regulatory framework for renewable energy with its enforcement and to improve the institutional capacity for formulation and implementation of policy and regulations for biomass and small hydro power projects for rural electrification and productive applications with an objective to attract private sector players in this sector. The policy and regulatory instruments for renewable energy will be to set the guidelines for supporting renewable energy projects, identification and approval of projects, mechanisms for setting up of financial incentives, information on financial incentives such as feed in tariffs, tax holidays, subsidies, regulations on import duty exemptions, sharing of intellectual property rights, product licensing agreements for renewable energy, biomass extraction and its sustainable management for energy generation purpose etc. that will ultimately help reducing the risks associated with government policies, approval processes, and finances etc. and attract the private sector investors. These policies will be developed in consultations with the private sector organisations, financing institutions and banks etc. apart from all the relevant government agencies and international/national experts so as to make the policy and regulations more implementable and adaptable. The implementation of the above activities will be primarily carried by UNIDO and MINEE will be the executing ministry for all policy and regulatory related things for renewable energy with the support from international and national experts.

Table A5.2: Outputs and Activities for Project Component 1

PROJECT COMPONENT 1: Strengthening the policy and regulatory framework for renewable energy and its implementation and enforcement			
Output	**Description**	**Activities**	**Responsible Agencies/Committee**
Output 1.1. Renewable energy policy and regulatory framework enforced	**The objectives** of this program during the implementation period of the GEF project are: Development and implementation of appropriate policy and regulatory framework including guidelines for subsidies, financial incentives, and tariff mechanisms, sustainable biomass extraction etc. for renewable energy projects promotion through private sector participation.	Planned and envisaged activities for Output 1.1 are: i. Development of renewable energy specific policy for the country including the specific targets, and the strategic implementation plan of the policy including the mechanism for operation of special window for RE under the REF etc. ii. Development and implementation of regulatory framework for private sector participation in renewable energy projects. This would include guidelines for RE project allocation, feasibility studies, land allotment guidelines and project approval process for renewable projects etc. iii. Development and implementation of policy for sustainable extraction of biomass from forest and other sources for power generation, including the pricing mechanism for supply of biomass resources for biomass based power generation projects. iv. Development of a system at a local level to monitor the sustainability of biomass extraction and to enforce restrictions if needed v. Development of strategic document and its implementation for enforcement of policy and regulatory framework for renewable energy promotion in Cameroon as developed under the project.	UNIDO PMU Ministry of Energy and Water Resources (MINEE) AER ARSEL MINEPDED ADEID International consultants
Output 1.2. Institutional capacity developed for the formulation	The objective of this is ✓ Develop the capacity of	Planned activities: i. Develop capacity building modules covering the policy	UNIDO PMU

PROJECT COMPONENT 1: Strengthening the policy and regulatory framework for renewable energy and its implementation and enforcement			
Output	**Description**	**Activities**	**Responsible Agencies/Committee**
and implementation of policy and regulations for promotion of biomass and small hydro projects for rural electrification and productive applications through private sector participation.	government institutions to enable them in formulating appropriate policy and regulations ✓ To attract the private sector investment for the development of biomass and small hydro power projects in the country.	frameworks, managerial and legal aspects of renewable energy projects for these stakeholders. ii. Develop training modules for government stakeholders in important aspects of renewable energy such as setting up the implementation models of RE in off-grid/mini-grid modes, sustainable biomass extraction and its utilisation for power generation etc. iii. Conduct/implement capacity building programs on policy and regulations formulation for renewable energy systems for the government stakeholders, i.e. MINEE, AER, ARSEL etc. iv. Conduction of training program on sustainable extraction, transportation and utilisation of biomass resources for power generation as well as sustainable water use for power generation . v. Capacity building of private sector and other relevant project stakeholders in understanding the policy and regulations for RE in place and being implemented under the project and their benefits to them.	PSC International Consultant , MINEE Financial Institutions ARSEL

A5.2.2. Project Component 2 (PC2): Developing mechanisms to promote and sustain private sector investments in renewable energy generation

At present the private sector involvement is weak for the investment in the renewable energy based (both Biomass as well as SHP) projects in Cameroon. This is due to lack of government policies specific to renewable energy, low capability and capacity at local level for planning, design, implementation, operation and maintenance of such projects. Lack of financing instruments, low interest of financing agencies and low awareness etc. too are the challenges for RE development in the country. There is a need of implementing the financial instruments to support the renewable energy projects for attracting private sector investments and the capacity building of government agencies for developing and implementing such instruments like feed-in tariffs, fiscal incentives, pricing mechanisms for biomass,

rural electricity supply tariff from mini-grid/off-grid projects etc. for renewable energy promotion in the country. This project component focuses on removing all these barriers by (a identifying, developing and implementing appropriate financing instruments for renewable energy projects (b) building capacity of government institutions through the demonstration project, capacity building and training programs; (c) training financing institutions including banks in evaluating renewable energy projects and assessing the risks and its mitigation measures for leveraging the financing from these institutions for RE development in the country; (d) sensitizing private investors and developers about renewable energy project feasibility to build their confidence by organizing RE investment forums; (e) training local engineers and technicians for designing, implementing, operation and maintenance of biomass and small hydropower plants and (f) operationalizing special window for renewable energy project financing under rural energy fund. All these trainings will be provided by the international as well as national experts and the local universities will be involved in such training programs to build the renewable energy knowledge base of the country.

In the absence of prior experience of development, operation and management of decentralized biomass and small hydro power project in the country, the GEF support is crucial to develop the financing instruments that will be put in place under this project and for the multi stakeholder training and capacity building activities. The GEF funding will mainly be required for carrying out all these soft activities of capacity building, sensitization and training and involving the investors, financing institutions, government agencies, local people together for promotion of renewable energy projects and a small investment funding component from GEF resources will be utilized for initial support of renewable energy projects through the special window of RE, according to the financing instruments set up under the project. About 10 to 15% of the amount from both GEF funding as well as the co-financing received under the component 2 and 3 of the project will be kept as seed money to support the initial operatioalisation and functioning of the special Window of RE and to ensure the sustainability of the special window till the time it becomes well recognized and capable enough to make itself self-sustainable through the services being provided by the window. The activities will include identification of stakeholders, developing training and capacity building modules, development and implementation of tariff and pricing mechanisms for demonstration projects, financial incentives, organization of the training and capacity building programs and dissemination of the outputs.

For the special window under REF, based on the discussion with the Director REF, currently there is some mechanism for renewable energy funding under REF. However, they are done at random basis and no specific mechanism has been evolved for achieving long term financing of RE under REF. The Rural Energy Fund (REF) mechanism is created with a funding amount of US$ 40 million, under the Cameroon Energy Sector Development Project by the World Bank with an objective to immediately respond to the low level and limited success of the rural electrification projects in country, so the focus was on least cost rural electrification projects. REF at present is being executed by AER based on transparent operational and fiduciary procedure. Under its operational mechanism it was proposed that a Rural Electrification Planning-and Programming Committee (REPPC) will be created by decree where all institutions currently engaged in rural electrification (Ministries of Energy, Finance, Economy, AER, ARSEL, FEICOM, EDC, representatives of municipalities, donors, private sector, consumer associations, NGOs, the bank administering the fund etc.) come together to agree on a well-defined yearly program of rural electrification and rural energy projects on the basis of an updated rural electrification master plan of MINEE in collaboration with all sector stakeholders and to be adopted by the REPPC. AER is an executing agency for REF and is providing technical assistance at all levels to REPPC, ARSEL, private sectors, municipalities etc. in conducting feasibility studies, environmental assistance, business plan preparations etc. The Directorate of REF has been created to monitor the execution of REF. Financing for REF includes contributions from general budget, bilateral and multilateral donors etc. Under REF the implementation modalities were proposed with two complimentary approaches Rural Electrification

Priority Programs (REPP) and Local Project Initiatives of Rural Electrification (LPIRE), which are to be implemented in parallel, based on an annual planning process which defines geographic connection and coverage targets, taking into account the available financing envelope. Under REPP, it was proposed to be operational with private sectors that will provide co-financing for the rural electrification projects. Wherever private sector does not take any interest, the LIPRE approach will be followed, which include the project implementation and operation through community participation or rural electrification cooperative.

It is clear that the REF was not mainly focusing on RE but the least cost solutions. Further, although the RE sources has been included in the framework of REF, but practically there has been no movement in the development of RE under REF. Based on the discussion with the Director of REF, it has been found that this was because of lack of exposure and inadequate capacity for development of renewable energy projects in the country. The GEF resources will be utilized to develop a mechanism for creation of the special window for RE financing under the REF in discussion with the World Bank, MINEE, and MINEPAT. Discussions with the Director REF and the officials at MINEE also clearly indicate the immediate need of such special window and both the departments expressed their full support for the implementation and operatioalisation of such initiative.

To enhance the confidence and interest of the private sector investors and to reduce the risk of investment, the Government of Cameroon would be advised to provide the fiscal incentives such as tax incentives, interest subsidies and other financial incentives. Financing sources would further be identified at the time of project execution. Some options that could work as long term options for the financing of renewable energy projects are loans from local banks/financing institutions, equity investment partners and financing from REF etc. There could be special negotiations either with financers, financing institutions, donors, bilateral or government organisations to strengthen the financing and bearing/minimization of the risk of investment. Additionally part of the GEF financing could be used as a guarantee for covering first losses if any, in order to support lending from local banks. Such models could help in such projects to overcome the finance access barrier by assuaging local banks engage in lending to RE investors with less risk than usual.

It is proposed that based on the policy/regulations setup under Component 1 for this special window of RE under REF, the special window facility will be established with the GEF fund. At the initial stages this special window of RE will be supported through the co-financing provided by AER as well as a small investment component from GEF fund will be setup to initially support the special window and the financing instruments identified and put in place through this project. The GEF investment fund will support the initial stages of the operationalization of the special window till it become self-sustainable (by charging fees) through providing appropriate and reliable services to the investors/project developers and establish its credibility among the stakeholders. The fund available through REF will be provided on a percentage basis of the total project cost and will be gradually decreased in coming 3-4 years so as to ensure development of a market based model (and not dependent on subsidy only). The initial support from GEF to operationalize the window is important to ensure that the window can assist the investors and project developers to develop viable projects through proper designing of RE projects. The detail operational model will be planned in detail during the initial year of project installation to target additional capacity of power generation by investor with certain percentage of the cost per kW provided through REF. The special window will provide the technical assistance for renewable energy projects and the functions of this special window will mainly be identifying appropriate feasible renewable energy projects for rural electrification, providing services in terms of feasibility assessment, project implementation plan/business models, coordination and arrangement of funds for RE projects, facilitating the routing of funds from multiple donors focusing on renewable energy projects for productive applications and rural electrification etc. Funds through this special window of REF will also be utilized to create awareness, training and capacity building of both government and private sector stakeholders

regarding both policy as well as technical aspects of the renewable energy projects. The mechanism for this special window for RE will be developed in such a way that it should become self-sustainable by charging fee for its services etc. (in terms of percentage of project cost or in lump-sum) from the beneficiaries like private sector, donors, etc. For this, the existing REF's capacity will be enhanced with inclusion of new technical and financial experts who will provide technical assistance support for renewable energy project support related activities. The existence of such window will help enhance the confidence of the investors' as they will get the reliable and unbiased services from this window at a reasonable cost from the pool of experts for the initial work related to study and designing of the project. Further in case the REF provides financing for the renewable energy projects, it also becomes a partner in investment that is expected to ensure the viability and sustainability of the project (both financially and economically) with all technical quality assurances and appropriate follow-ups. The supportive approach will be continued beyond the project period till the capacity and involvement of the private sector is adequately developed to implement projects. The special window of RE being also linked with AER subsequently will also facilitate single window clearance for project implementation by private sector. This window will also facilitate the project contract formulations, help private sector investors and manufacturers etc. on securing intellectual property rights, product trading agreements etc. so as to improve the local supply of renewable energy project components etc. The Intellectual Property Rights is expected to be secured though current regulations prevalent in Cameroon. In case such regulations are not available in the country, care would be taken during project implementation on this aspect and necessary clauses and rules will be included in the contract design between project implementers and investors as per international best practices.

The special window will also help in identifying the project specific best suitable business models which will make the projects more viable, well operational and sustainable. For example under this GEF project the two business models envisaged are i) SHP based mini grid projects in which main ownership will be of a single entity like AER which will operate, maintain and manage the project (by sub-contracting to private sector) and the tariff will be collected from the consumers at the rate fixed by ARSEL as per the tariff regulations of Govt. of Cameroon and ii) the off-grid biomass gasifier based electrification in which the ownership may be with the community for operation maintenance and management of the plant by deploying trained local engineers and technicians and the tariff collection would be through pre-paid meters to make the collection system more effective or the other option for the off-grid biomass gasifier system will be the operation, maintenance and management by AER itself on single ownership basis and collection of tariff through pre-paid meters. These business models will be finalized based on the discussion with the government and local communities/beneficiaries. Based on the success of such models the new projects may adopt appropriate business models.

The GEF project will also encourage the exposure visits of the national consultants, technical experts, operators and managers of the project to some of the similar successful projects developed and functional under UNIDO-GEF initiatives in Western and Central African countries such as Sierra Leone, Liberia, etc. Paid training programs will be organized as part of the GEF project and also through government generated resources for ensuring the sustainability of the project as well as for the future developments. The project will also attempt to involve the local technical universities/engineering institutes in the country to build their capacity so that they can provide required training to engineering students on renewable energy and able to create a pool of technical resource persons in the country.

Outcome 2:
2.1: Investment mechanism strengthened to support a viable renewable energy generation market
2.2: National institutions and key private sector market players have the financial and technical capacities, tools and support base needed to effectively promote and sustain a renewable energy market.

Project Component 2 activities aims to establish the support mechanisms such as amount for fiscal incentives, tariffs and fuel pricing, best practice manuals, risk management instruments and investment

guidelines, tools for evaluation of RE projects and training and capacity building of financing institutions etc. including the setting up of special window for renewable energy under CREF for promotion of financing and investment in renewable energy systems in the country with private sector participation. It also focuses on the development of technical capacity for design, implementation, operation and maintenance of biomass and small hydropower based mini-grid projects. The activity of creation of special window for renewable energy funding under CREF will focus on creating a mechanism in which the routing of all renewable energy related support funds will be through that special window. The the window will mainly be providing the technical assistance for renewable energy projects, and at initial stages of the project small percentage of the project cost as financing/TA through the funds being made available to the REF as Investment funding from GEF under this project. This financing/TA will be decreasing every year till the time this special window and private sector renewable energy project financing become self-sustainable.

Table A5.3: Outputs and Activities for Project Component 2

PROJECT COMPONENT 2. Developing mechanisms to promote and sustain private sector investments in renewable energy generation			
Output	**Description**	**Activities**	**Responsible agencies/committee**
Output 2.1: Guidelines, best practices, investment incentives, standardized PPAs, tariffs, pricing mechanisms, risk management instruments and viable renewable energy generation business models developed and put in place.	This output has an objective of developing and implement the mechanisms for attracting the private sector investment through creation of pricing mechanism and tariff structures for renewable energy based electricity generation and developing best practice manuals, standardized PPAs and RE investment instruments.	i. Setting up and implementation of technical, social, environmental, economic and other parameters , as per the policy guidelines set under Component 1.1, for biomass and SHP development in Cameroon, that will be used for evaluation of the project viability. ii. Setting up and implementation of incentive amounts (such as tax benefits, feed in tariff etc.) to be provided for private sector investment in renewable energy systems. iii. Setting up and putting in place the tariff rates and power purchase agreements for purchase of renewable energy. iv. Identify partners with adequate experience in guarantee schemes and banks interested in entering the scheme to lend to RE projects. v. Establishing funds under REF for providing the guaranteed financing up to certain percentage (say about 10%) to support lending from local	UNIDO PMU International Consultants National Consultants ARSEL AER ADEID

PROJECT COMPONENT 2. Developing mechanisms to promote and sustain private sector investments in renewable energy generation			
Output	**Description**	**Activities**	**Responsible agencies/committee**
		banks for few initial projects. vi. Development of viable and acceptable business models for renewable energy projects for implementation of projects both by private sectors and/or the community.	
Output 2.2: Training programmes implemented to strengthen the capacity of local banks and institutions in project finance and risk management instruments for renewable energy projects	The objective of this is to conduct training and awareness programs for financing institutions about the risk involved and its assessment, and the instruments available (such as feed in tariff, tax incentives, subsidies) etc. for making the RE projects viable to attract financing.	i. Identifying the financing risk reduction instruments which are available in the country and also developed under this project as part of policy and regulatory instruments to be developed and implemented under Component1. ii. Organization of the capacity building programs for financing institutions including REF and private banks for sensitizing them about RE project viability and project risk management instruments.	UNIDO MINEE AER ARSEL International and national consultants
Output 2.3: Renewable energy investment fora held to sensitise investors and promote investor confidence	Objective of this is to organize an investment forum where all the fund managers and financing institutions, private sector investors, government bodies, industry associations and other potential stakeholders will come together and the importance and benefits of investment in renewable energy will be discussed.	i. Sensitizing important stakeholders which include government bodies, industries, private sector investors and project developers, financing institutions including national banks and international funding agencies etc. regarding renewable energy projects. ii. Development of the agenda for the investment forum to be organized at country level with both national and international participation. iii. Organization of the investment forum.	UNIDO PMU MINEE MINEPDED AER CREF National and International Consultants
Output 2.4: Targeted technical capacity developed for the design, operation and maintenance of integrated renewable	Objecting of this is to develop the technical capacity of the institutions, private sectors and local technicians for design,	i. Development of a detailed work plan for the execution of the capacity building program (Schedule, roles and responsibilities, milestones etc.).	UNIDO PMU

PROJECT COMPONENT 2. Developing mechanisms to promote and sustain private sector investments in renewable energy generation			
Output	**Description**	**Activities**	**Responsible agencies/committee**
energy systems	implementation, operation and maintenance of the biomass and small hydropower based mini grid systems. Ultimate aim will be to create a pool of trained government officials, private sector service providers, engineers and technicians who can be used for providing guidance and training to more people in the country for developing and managing similar projects.	ii. Identification of the appropriate candidates from various stakeholders which include the government institutions, agencies, private sector (manufacturers, project developers and service providers), technicians and engineers at community level etc., who can be trained for biomass and small hydropower plants based mini grid. iii. Development of training modules for a. Training of private sector, service providers and engineers for assessing the feasibility of biomass and small hydropower projects. b. Training of engineers and field personals in assessing the biomass and small hydro resources. c. Training of engineers and project planners in carrying out environmental and social impact assessment related studies associated with the SHP and biomass projects development d. Training of technicians for plant operation and maintenance activities. e. Training of engineers and technicians for managing and maintaining the electricity distribution system. f. Training of government institutions in identifying the potential sites for biomass and small hydro power projects and preliminary assessment of its feasibility for inclusion	EDC AER National and International Consultants

PROJECT COMPONENT 2. Developing mechanisms to promote and sustain private sector investments in renewable energy generation			
Output	**Description**	**Activities**	**Responsible agencies/committee**
		in the energy development plan. g. Training of private sector service providers and community persons in management and operation of RE based mini grid projects in rural areas. h. Setting up of tariff collection mechanism and training of management team in efficient management under that mechanism. iv. Organization of training programs. v. Exposure visit of the technical experts, consultants and project managers to the similar successful projects operational in west and central African countries. vi. Project also will develop a future training and capacity building schedule for government officials and technicians on things such as technical advancements in the biomass and SHP projects, efficient project operation and maintenance techniques etc. These trainings may be the paid training programs conducted under the project budget or organized through the government resources or under the CREF allocations for training and capacity building.	
Output 2.5: An investment guide/toolkit on renewable energy investment potential in Cameroon published to support investors	Objective is to develop a toolkit for private sector investors, which will help in evaluating the benefits and returns from investment in	i. Development of the toolkit for assessing benefits of investment in renewable energy. ii. Publication and dissemination of the usefulness of the toolkit through awareness program.	PMU CREF

PROJECT COMPONENT 2. Developing mechanisms to promote and sustain private sector investments in renewable energy generation			
Output	**Description**	**Activities**	**Responsible agencies/committee**
and project developers.	renewable energy projects in Cameroon.		UNIDO
Output 2.6. Special window for renewable energy under CREF established and operational.	Objective is to create a dedicated fund for financing renewable energy under CREF	i. Assessment of present fund structure and financing priorities under CREF. ii. Estimation and utilisation of the approximate fund needed to support renewable energy projects to meet certain targets. iii. Development of mechanism which will create a special window having dedicated fund for renewable energy investment in the Cameroon. iv. Developing detailed guidelines for the activities and roles to be performed by special window to make it self-sustainable. v. Operationalisation of special window under REF. vi. Execution of financial and TA services of special window of RE for demonstration project as well as for few other projects.	UNIDO PMU MINEE REF ADEID World Bank and other donor agencies

A5.2.3. Project Component 3 (PC3): Demonstration of the technical and commercial viability of integrated renewable energy mini grids

This primarily focuses on addressing the issue of non-confidence of the financial institutions, private sectors, local communities, as well as the government institutions about the sustainability of biomass and small hydro power projects by demonstrating the pilot scale projects of 2.825 MW (1.5 MW SHP (Bare-Bakem) +1.2 MW SHP (Manjo) + 50 kW biomass (Kekem) +75 kW biomass (Bare-Bakem)) capacity in the Littoral region (covering mainly the Kekem, Bare-Bakem and Manjo districts). The technical support will involve the activities such as detailed project report preparation, plant design, bid document preparation and tendering, bid evaluation, training and capacity building of local suppliers and plant operators and maintenance service providers, identification of productive application projects and creating awareness and training locals on developing and operating such projects etc. The technical support through GEF fund would be provided to prepare the detailed project reports for each project, establishment of the above mentioned plants and the development of the management, operation and maintenance plans for each projects to be operated in either mini-grid or off-grid mode. Various entrepreneurs which are existing and also interested to set-up productive applications units such as cassava processing, palm oil production, coffee drying and grinding, flour mills, rice mills, bakery units, and various other applications will be identified and the electricity will be supplied for such productive

applications, and the plant design and distribution scheduling will be in such a way that the surplus electricity will be provided to the rural households for lighting and other household applications. Villagers would be sensitized and trained for various such productive applications in terms of their benefits, efficient operations and proper use of available electricity from biomass as well as SHP projects. An appropriate tariff collection mechanism will be prepared for collection of revenue from users of the electricity generated from the plants. Learning from the experiences of AES SONEL in distribution of electricity, pre-paid meters will be used for supply of electricity to the beneficiaries. The project management team will be trained in dealing with consumers for collection of tariff and efficient management of electricity supply. The successful implementation of one pilot mini-grid based on biomass and SHP system by trusted partners like UNIDO and GEF will be the key for generating in-country experience to convince the central government, local communities and potential investors that such RE based mini-grids can bring tangible benefits to their communities, and at the same time, can be financially viable.

As part of the PPG activity the feasibility study for the pilot projects have been carried out in the potential sites for small hydro as well as biomass power projects in the Littoral region of Cameroon. Two SHP projects (1.2 MW Manjo SHP in Manjo district, and 1.5 MW Mouakeu (Small Ekom-Nkam) SHP in Bare-Bakem district) and two biomass based electrification projects (75 kW at Ekom-Nkam village in Bare-Bakem district and 50 kW at Foyemtcha Chefferie village in Kekem district) have been proposed as pilot projects under this component. The summary of the pre-feasibility analysis and the loads to be catered by the pilot projects are given in Annexure-E and detailed technical pre-feasibility analysis reports of the small hydro and biomass projects are provided as Appendix A1 and Appendix A2 respectively. Brief of the project sites are given in Table A5.3.

Table A5.4: Brief of selected project sites

Site no.	Site name	Type of Project	River name	Council	Estimated power capacity	Nearest village	Remarks
1	Foyemtcha	Biomass power	NA	Kekem and Melong	50 kW_e	Foyemtcha	Village is completely un-electrified and also difficult to reach in rainy season. It has about 300 households.
2	Small Ekom-Nkam or Mouakeu	SHP	Ekom-Nkam	Bare-Bakem	1.5 MW_e	Ekom-Nkam/ Mouakeu	This small Ekom-Nkam fall is near the large Ekom-Nkam fall which is a tourist place.
3	Ekom-Nkam	Biomass power	NA	Bare-Bakem	75 kW_e	Ekom-Nkam	Village is completely un-electrified. It has about 100 households.
4	Manjo	SHP	Essoue	Manjo	1.2 MW_e	Manjo	The site is very near to Manjo town and is also easily approachable.

Outcome 3:

3.1: Renewable energy mini grids are replicated and become an integral part of Cameroon's electrification program and

3.2: Installed capacity of renewable energy systems increased.

Project Component 3 activities supported under the projects will be implemented through agreed collaboration and financial support from GEF, UNIDO, and AER, Govt. of Cameroon. The demonstration projects will be implemented under the policy and regulations for RE that will be put in place as per Component 1 of this project to showcase the benefits of such policies and their wide adaptation. The demonstration project is also planned in a way that it will make use of financial incentive instruments and the business models that will be developed and implemented under Component 2 of this project. The International Experts would be appointed for the preparation of detailed project report, identification of technological requirements, preparation of site development plan and the plant erection and commissioning, contract conditions preparation and contract finalization etc. National experts would be involved with the international experts during the site survey, DPR preparation studies and plant erection & commissioning works so as to get the hands-on practical training on renewable energy, especially on SHP and biomass based technologies, apart from providing support to international experts for the coordination and implementation of the work as per the desired schedule. These trained local experts and selected trained faculty member from technical universities/ engineering institutes, will then become the future trainers, so that the number of trained person and trainers will increase and more such services for training will be facilitated in the country on benefit sharing basis through the Special window for RE established under CREF. Project will target to utilize the services of Program Development and Technical Cooperation (PTC) division of UNIDO for technology related assistance and capacity building of the local institutions and the villagers for building local technical capacity, increasing awareness on proper utilization of the electricity and motivating entrepreneurships with promotion of environmentally sustainable techniques.

All the soft costs mainly for technical assistance will be supported under GEF resources, major costs of plant including the equipment and machineries, distribution line etc. will be supported through the co-financing from AER. PMU would coordinate for all the project development activities and its monitoring. The project contract will be finalized through a well-defined process and guidelines as per UNIDO and Govt. of Cameroon standards. Project contract will define the scope and responsibilities of the contractors clearly. Contracts will also cover the quality standards, and quality protocols to be maintained by the suppliers, contractors and service providers. The project will be implemented under the PPP mode in which AER as the main co-financing agency will take the ownership of the projects and can sub-contract the project management work to any private sector agency (energy service provider). At community level, community will act more as local regulator to oversee and ensure that private contractors are performing as per the contract and the locals are equally being benefited from the project as per the community and government standards. Table A5.4 below provides a description of the elements of Project component 3.

Table A5.5: Outputs and Activities for Project Component 3

PROJECT COMPONENT 3: Demonstration of the technical and commercial viability of integrated renewable energy mini grids			
Output	**Description**	**Activities**	**Responsible agencies/committee**
Output 3.1: Four integrated electricity mini grids of a combined capacity of up to 2.825 MW and optimising local renewable energy resources installed and operated to demonstrate the	The objective is to install and commission a 2.825 MW renewable energy based mini grid (two SHP projects- 1.2 MW Manjo SHP and 1.5 MW Mouakeu	Planned and envisaged activities under this are: i. Evaluation and planning of pilot project implementation plan as per the policy and regulations developed under Component 1. ii. Availing possible benefits for the demonstration project from financing risk reduction instruments set up under	UNIDO MINEE/AER EDC PMU ADEID

PROJECT COMPONENT 3: Demonstration of the technical and commercial viability of integrated renewable energy mini grids			
Output	**Description**	**Activities**	**Responsible agencies/committee**
technical and commercial viability of renewable energy systems	SHP and two biomass based electrification projects- 75 kW at Ekom-Nkam village and 50 kW at Foyemtcha Chefferie village) projects so that the benefits of such projects may be demonstrated and a replication of the same could be achieved through public-private participation model to enhance electricity access for rural electrification and productive applications in Cameroon	component 2. iii. Development of a detailed working plan including monitoring schedule for the execution of the project for successful installation of the plant. iv. Preparation of detailed project report covering engineering design, description of the electromechanical equipment and civil works, and all other necessary details for 2 SHP plant and 2 biomass power plant. v. Identification of route for mini-grid distribution network. vi. Selection of vendors and technology providers. vii. Selection of electromechanical equipment providers. viii. Selection of civil works and electrical contractor. ix. Installation of equipment and commissioning of the project. x. Preparation of log book for recording the plant performances. xi. Preparation of good practices and training manual for plant operation and maintenance. xii. Adoption of the operation and management plan for the sustainability of the power plant as per the best suitable business model identified under Component 2. xiii. Setting of operating performance targets for the projects.	International Consultants National Consultant
Output 3.2: Existing and new productive uses identified and value chains promoted	Objective is to identify existing and new productive	Planned and envisaged activities under this are: i. Identification of the possible productive applications which	

PROJECT COMPONENT 3: Demonstration of the technical and commercial viability of integrated renewable energy mini grids			
Output	**Description**	**Activities**	**Responsible agencies/committee**
for renewable energy utilisation	applications and create value chain for project sustainability including awareness creation and training of entrepreneurs in using electricity from RE mini-grid for their enterprises	can be benefited from such RE projects. ii. Creating awareness for productive applications of biomass and small hydroelectricity. iii. Motivating these entrepreneurs in utilisation of RE electricity so as to create more demand for RE projects and hence increase sustainability and replicability. iv. Creating a supply chain of biomass for sustainable operation of biomass power projects.	UNIDO MINEE/AER PMU ADEID EPC contractor

A5.2.4. Project Component 4 (PC4): Monitoring and evaluation

This component primarily focuses on the monitoring and evaluation activities of the project implementation and its expected outcomes. The activities included are the preparation of semi-annual progress report, mid-term and final evaluation, preparation of project terminal reports, assessment of the project results and preparation of learning, good practice and case studies for dissemination of the benefits of renewable energy based mini-grid for rural electrification and productive applications achieved through this projects. GEF resources will be used for technical assistance and hiring expert's for evaluation of the project.

Outcome 4:
4.1: Project deliverables are tracked and achieved and
4.2: Best practices learnt from this project prepared for future replication and scaling up of projects based on biomass and small

Project Component 4 activities will be carried out through well-defined responsibilities of project management unit (PMU) as described under the Section B1.2 in Part II of this document. The outputs and activities of this component are as follows.

Table A5.6: Outputs and Activities for Project Component 4

PROJECT COMPONENT 4: Monitoring and evaluation			
Output	**Description**	**Activities**	**Responsible agencies/committee**
Output 4.1: Demonstration projects monitored throughout project	The objective is to properly monitor the project execution and	Activities under this will be i. Formation and operationalization of Project Management Unit	 PMU UNIDO

PROJECT COMPONENT 4: Monitoring and evaluation			
Output	**Description**	**Activities**	**Responsible agencies/committee**
cycle and independently evaluated	track the desired deliverables and outputs.	ii. Preparation of the monitoring and Evaluation plan and its acceptance iii. Semiannually progress report preparation iv. Mid-term evaluation v. Final evaluation vi. Project Terminal Report preparation	Independent Consultant
Output 4.1: Lessons learned are disseminated nationwide to relevant stakeholders to benefit further	Objective is to record the best practice and evaluation results from the project and disseminate the learning from this project	Activities are i. Preparation of the learning from the overall project ii. Preparation of dissemination materials (pamphlets, project success report, Case study etc.) and its dissemination.	PMU UNIDO MINEE MINEPDED

A5.3 Expected Global Environmental Benefits

Small hydro systems and the biomass based energy generations are said to be environment friendly as they do not contribute to the Carbon dioxide (CO_2) production, which as a GHG, contributes globally to climate change. Therefore, being indigenous and renewable as an energy resource, they can be developed and utilized in an environmentally, socially and financially sustainable manner. The experience and knowledge base that can be built from the project can be used for replication of such projects in Cameroon as well as passed on to other African countries for biomass and small hydro power development and environmentally sound power supply for rural communities. The global benefits of the project are in terms of the reduction of GHG emissions brought about by the displacement of fossil fuels for meeting the power and energy needs in Littoral region of Cameroon. It is estimated that the existing diesel and heavy oil based generators and kerosene consumers, which will be replaced by the electricity from the demonstration small hydropower and biomass power based mini grid with aggregated demonstration capacity of 2.825 MW capacities would be equivalent to around 70% of the electricity generated[27]. Thus the demonstration projects will ultimately help in the direct GHG emission reduction of 163656 ton CO_2 considering useful life time of 20 years for small hydro and 15 years for the biomass power system. In addition, considering that significant barrier removal work that will be done under UNIDO-GEF project, it is deemed that the GEF influence will result in indirect emission reduction due to growth in the implementation of renewable energy (Biomass and SHP) projects in Cameroon. The indirect project CO_2 emission reductions have been estimated at 597 ton CO_2 during the 10 years influence period of this project. The lessons and experience gained will be useful in coming up with application of better international standards and develop eventually the local capability. Also there would be a global significance in terms of Cameroon opening its market for international players and investors after some concretization in the policy framework for renewable energy development in the country.

[27] The survey in the project site indicates that while the un-electrified households are using small diesel generators or kerosene based lighting , the electrified households are supplied electricity predominantly thermal (i.e. oil based) generators. Thus, replacement of about 70% has been considered on a conservative estimate.

A5.4 Sustainability and replicability potential

A5.4.1 Sustainability

The project strategy treats 'removing barriers' as promoting sustainability. The project acknowledges the creation of the special window under CREF (Cameroon Rural Energy Fund) for the renewable energy financing. CREF is an option of the Global REF understood as a mechanism, and in that mechanism, CREF is a Fund. The REF has been created by the World Bank for the Government of Cameroon under its energy sector development project with an objective to improve the planning, financing and results orientation for rural electrification in Cameroon. Under this the WB contributed US$40 m for creation of REF. Financing Mechanism proposed for this REF was to pool all funds under the foresight of a rural energy planning committee chaired by MINEE and AER as the executing agency for REF. The REF is providing investment subsidies to private sector and community based operators which have to provide their share of co-financing to demonstrate their commitment and to leverage public funds by attracting private sector co-financing. The REF at present support grid extensions as well as decentralised electrification projects, and is technology neutral by focusing on the least cost project. The CREF is in charge to insure sustainably rural energy projects and programs financing. It is a financial mechanism set in place to promote private – public partnership in the goal to attract private operators in the rural energy sector. The proposed special window for renewable energy under this GEF project will complement these projects by, wherever feasible, "bolting on" renewable energy components. The GEF project, working with the REF could aim to target up to 50% of the funding for RE projects in rural areas. Through the discussions initiated by UNIDO with the WB and the Director of REF it is observed that the renewable energy project have already been made a part of REF and few targets have been set for the renewable energy financing under this REF mechanism, however there is no movement in this direction due to lack of capacity and non-focus on RE, instead the REF still focuses on rural electrification only through the least cost solutions. This project will strengthen renewable expansion under the CREF by setting up targets, plans and all required coordination with financing agencies, institutions, communities and other relevant stakeholders. The rules of operation of the mechanism for CREF's special window for RE defined under this project will be incorporated in the demonstration component to demonstrate their functionality. Thus, both government co- financing as well as GEF funding will be utilized accordingly to the principles of the new special window for RE, which in long term will help ensure sustainability of this mechanism. Project screening manual, design booklet, survey and check list, managing guidelines, economics and financing guide and several other tools and mechanisms will be developed to ensure sustainable support for renewable energy development. The initiatives proposed under the GEF project will not just be limited to the demonstration projects but will focus on strengthening the existing REF with required capacity building to make it function smoothly for more replication of RE in the country. Moreover, through the policy and regulations the activities and functions of special window for renewable energy in the country will be legalized. This special window will facilitate for the arrangement of funds for renewable energy projects under the CREF by attracting the funders through identified projects, its preliminary feasibility, project implementation model design, monitoring, and operation and maintenance activities. It will charge a reasonable amount as fee for the technical assistance in terms of renewable energy production and distribution design, operation, implementation and maintenance provided through this special window and this will make the window sustainable even after the GEF project completion.

This project is also focused on training government agencies for creating conducive policies with incentive mechanisms to make the investment feasible to the end-user. This is premised by the possibility that the subsidy will only be provided for initial investment on equipment and no subsidy will be provided for consumption. Hence, the tariff should at least support life cycle operating and maintenance costs. The project will involve studies on how tariff will be set and provide strategies and plans for the metering and billing at the standard grid-connected tariff prevalent in Cameroon. Among others, the project will also

focus on establishing the appropriate environment that will enable national and local policy to integrate the renewable energy in their development plans.

During the implementation of the project local expertise would be involved and trained for the execution of the project and also training program would be organised for the engineers and other technical persons from local community, and private institutions to train them for sustainable operation and maintenance of the plant. There will be training programs for local technical service providers such as mechanics and electricians etc. to provide their services for the maintenance/repairing of the biomass and small hydropower plant components including the electricity distribution systems. Institutional strengthening for managing interventions will include leadership development, setting in place local monitoring systems and establishing performance indicators for programme evaluation. Such systems will help in defining intervention design and implementation process, which can be replicated to other areas as well. Such capacity building measures will go a long way in ensuring the sustainability of the project. Locals would be sensitized for the efficient use of electricity for productive applications and managing biomass resources in a sustainable way.

It is estimated that a 50 kWe biomass gasifier system operating 8 hours a day and 300 days per year will consume about 145 tons of biomass fuel per year. The energy plantation can yield about 10 to 15 tons of biomass per hectare per year. The forest surrounded by the village is natural grown under the control of the forest department and are matured forest that can yield more biomass as compared to energy plantation. As per the Global Forest Resource Assessment Report (FAO 2005) the growing forest stock in Cameroon is estimated at 62 m^3/ha which is equivalent to about 21.7 tons/ha. So considering a factor of 0.5 for the extractable forest biomass from forests of Cameroon atleast 10 tons per day of wood can be extracted per hectare of land area. So About 15 hector of land need to be earmarked for sustainable operation of the 50 kW biomass gasifier based power generation system. Similarly A 75 kWe biomass power plant will need to be allocated with an area of about 23 hectare for sustainable harvest and supply of biomass. Even if we consider the 24 hour power supply the biomass needed per year for 50 kW and 75 kW gasifier system will be respectively about 450 tons and 675 tons which corresponds to the biomass to be collected from the forest coverage of about 45 hectare and 68 hectare. At both the identified project sites for biomass power plant it is observed that the access to these villages from main road is through the 2-3 km mud roads passing through the forest and its difficult to reach there in rainy season. These villages are surrounded by dense forest and if we take an area of 25 km^2 (5 km x 5 km), there is a potential for sustainably harvesting about 24000 tons[28] of biomass per year. This much of biomass is enough to produce about 20,000 MWh of electricity which is equivalent to about 3 to 4 MWe of installed biomass power capacity. The proposed biomass power plants of 50 kWe and 75 kWe capacities would need only a very small fraction of this large biomass potential available there. Since there are many such villages surrounding with dense forest, the sustainable harvesting of the biomass residue with appropriate forest management gives huge opportunity for the sustainably developing and operating the biomass power systems. To ensure better sustainability, guidelines and rules on optimum and scientific extraction and utilization of biomass will be framed as part of this project and the villagers as well as forest managers will be trained so that they follow the rules/ guidelines to ensure optimum utilisation of the biomass. Also, proper contracts will be designed for signing between power plant operator and biomass suppliers (villagers and forest departments) with adequate binding clauses so as to ensure regularity in supply of biomass. In this regard, village cooperative can also be formed, comprising of the project beneficiaries, to sustainably supply biomass, by local collection and savings from their current domestic use, to the project. This model may enhance the overall benefit deliveres to the project beneficiaries, as they will not benefit only from the electricity supply but may also derive income through the supply of

[28] Calculated as 25 km^2 (2500 ha) area having potential of forest stock 54250 tons per year (21.7 tons/ha/year as per FAO 2005 data). Considering about 50% biomass as extractable for the village it comes around 24000 tons biomass per year from the considered forest area.

biomass. This model is expected to engender active interest of villagers in sustainably supplying biomass. Any enhanced income through sale of biomass to the project will also help in regularity of payment against electricity used thereby further enhancing the project sustainability. However, to ensure that there is no undue pressure on the local forests because of any extraction of forest biomass for the electricity project, the project will define the type (such as forest residues) and quantity of biomass to be consumed for the demonstration plant and how much biomass will be required on a weekly basis, and also will train the operators in minimum utilisation of the fuel. When the demand for electricity increases sustainable forest management concept may be adopted, as every village is surrounded by thick forest. Depending on the increase in load demand the forest area for sustainable harvest can be ear marked, to ensure sustainable biomass supply. To ensure sustainability, guidelines on optimum and scientific extraction and utilization of biomass will be framed as part of this project. The forest managers along with the community members will be made aware about the consequences of un-controlled biomass consumption and burning, and will be trained in setting some rules like afforstation area/tree plantation needed for evert metric ton of biomass being collected from the forest specially for the power generation purpose, so as to ensure the long term availability of biomass and sustainability of the project without affecting the local climate. The village energy committee and forest ranger together will be able to ensure the sustainable fuel supply and sustainable forest management. This type of fuel management process will ensure the sustainable fuel wood supply to biomass gasifier power plant and to have a sustainable forest management system in place.

It is estimated that the generation cost from SHP project would be about US$ 0.05/kWh[29] of electricity produced, and from biomass power project the cost of production of electricity would be around US$ 0.15 to 0.20/kWh (From Figure A6.1 it is seen that weightage average cost of generation from biomass gasifier is about 0.05 US$/kWh). As per the information received from the representatives of ARSEL and AER, the cost of generation from thermal power plants in Cameroon is about 0.25 to 0.3 US$/kWh. Also the present consumers of electricity from the grid of AES SONEL are paying at the rate of 0.16 to 0.30 US$/kWh depending on the consumer category, total consumption range and rural/urban areas. This means that the cost of electricity from the mini grid may even cheaper if the plants were efficiently operated and managed so as to give the long term electricity supply to the proposed beneficiaries.

The project also has a strong focus on provisioning of electricity services for productive load in micro enterprises and intends to serve at least 50 micro enterprises. As mentioned in the previous sections, at present the entrepreneurs such as coffee grinders, palm oil producers, bakers, rice mills etc. are using either raw wood for heating operations and diesel generators for electrical operations, which costs them much higher. Thus these micro enterpries will be ready consumer of the proposed micro grids based on renewable energy. As they are currently paying high prices for electricty, these micro enterprieses, who are expected to pay regularly for consumption of electricity, can also be charged a little higher than the residential tariff thereby increasing the revenue for the micro-grids to run sustainably. Further, supporting micro enterpries being the core agenda of UNIDO, the project is clearly matching the UNDO's core strength.

This project will thus also collaborate with the activities of the Business, Investment and Technology Service Branch (PTC/BIT) and Agri-Business Development Branch (PTC/AGR) of Programme Development and Technical Cooperation Division of UNIDO in assisting the government of Cameroon and the beneficiaries in the project area in the domain of technology know-how improvement, capacity building on entrepreneurship, bridging investment gaps for new productive technology applications,

[29] Estimated based on the Project cost and generation details and based on European Small Hydropower estimation http://www.esha.be/index.php?id=50. Also from Figure A6.1 it is clear that the weightage average cost of LCOE for SHP as well as Biomass projects are about 0.5 US$ per kWh

valuing the outputs of the agriculture sector, creating linkages between the markets and agro-produce through local industrial units and hence improving the employment and income generation opportunities.

The use of fosil fuel for energizing productive load also increases the country's dependence on fossil fuel. According to a research paper published by Tamo, Kemajo and Diboma in the Journal Energies, Volume 3 in 2010, self-generation (from fossil fuels) in Cameroon has increased from 92 MW in 1997 to 160 MW in 2007 (which as per Table A4.2 is about 574 MW by 2011) at a typical cost of USD 0.9 per kWh compared with USD 0.16/kWh grid supply tariff. That clearly shows how the increasing numbers of people in Cameroon are adopting individual fossil fuel based electricity generation systems to cater their energy needs, even at the higher cost. Considering these facts it is estimated that the consumers can afford to pay for the reasonable tariff that would be enough to financially sustain the project.

A5.4.2 Replicability

The proposed project has been conceived as a demonstration activity with consequent benefits of spreading awareness regarding the utility and advantages of biomass and small hydro power for productive applications. The project will lead to innovative and concrete experiences towards increased replication of biomass and small hydro based mini grid in Cameroon as the country is having vast potential for both, small hydro as well as biomass resources. This is possible through energy competitiveness when applied to productive uses apart from the usual residential electrification only. The primary objective is to bring biomass and small hydro energy in the mainstream of sustainable energy supply systems by demonstrating successful project experiences, which should induce government's sustained development program and financial support policies, national plans and local district level development plan including these resources in their priority and increased private sector's investment support.

Replicability will be ensured through the documentation and widespread dissemination of the project demonstration results. The dissemination of the results of the various capacity building and barrier removal activities will also provide a better understanding on the success/failure factors and issues regarding such projects. Likewise, the pilot project will showcase the ownership and management structures employed for consideration by the future project. Guidelines, best practices, investment incentives, standardized PPAs, tariffs, pricing mechanisms, risk management instruments etc. developed under this project can be used for future project development. Replication factor will also be enhanced through more informative exchange, public participation, demo and site visits. Those sites selected were having these features as they are located at easily approachable places so as having the potential to showcase the benefits of RE based mini grids and hence improving the replication possibilities of such projects.

This project would create the opportunities for the trained engineers for designing of the project, and the equipment repair and service providers to expand their business to provide the services to other projects of such nature. Development of local expertise would enable the government and local communities to easy and self-planning of the new projects, and would require less international technical supports and hence making the new projects more economically viable. Successful demonstration of the pilot project and appropriate capacity building efforts, with creation of conducive policy environment will create confidence in the financers and investors about the financial sustainability of biomass and SHP project and remove the barrier of awareness and confidence by investors and banks. This will increase the replication opportunities in the magnitude to optimally develop the biomass and small hydro power potential available in the country.

A.6 Risks, including climate change, potential social and environmental risks that might prevent the project objectives from being achieved, and measures that address these risks:

The risk assessment and mitigation action for achieving the desired GEF project results have been discussed in detail here. The following risk categories had been identified 1) Institutional risk 2) Technology risk 3) Implementation risk 4) Economic and financial risk 5) Market risk 6) Regulatory risk 7) Sustainability risk 8) Climate Change risk and 9) Social risk. All these risks have been evaluated as low or medium level risk with their impact mainly ranging around medium scale. The mitigation actions for these risks have been discussed in the table below.

Table A6.1: Risks in Biomass and SHP based mini-grid development in Cameroon and its mitigation options

Risks	Potential impact	Level of Risk	Action
Institutional Risks			
In the absence of institutional capacity for renewable energy planning the replication expected from this project may not be achieved.	Low	Medium	This project envisages involving government agencies, private sector as well as NGOs since the inception of the project. Project activities are designed to build the capacity of government institutions for planning and designing appropriate policy and schemes for renewable energy projects and their implementation.
Technology Risks			
No demonstrated project in the country for distributed generation using RE based mini-grids.	Medium	Low	SHP and Biomass based mini-grids for rural electrification have been demonstrated successfully in many developing countries. Technology know-how and experience from these installations will be used while designing and implementing the project.
Some renewable energy technologies (e.g. gasification) may not be technically/ economically viable for electricity generation. Also there may be competition with other renewable energy technology	Medium	Low	The project focuses on locally relevant and matured technologies with a proven track record in other projects and countries with similar conditions. Also the report on "renewable energy cost of generation 2012: an overview' by IRENA shows that biomass gasification based electricity generation is very much competitive with diesel electricity generation as well as some other renewable energy generation (Figure A6.1)
Low awareness about biomass based energy technology may hinder the project development.	Low	Low	Sensitisation of the government as well as private sector and user communities about biomass energy technologies has already been done during the project preparation stage and it will further be carried out with cases from successful implementation in other developing countries during the project implementation.
Implementation Risk			
There is a delay in implementation of the project impacting the project success.	Medium	Low	UNIDO has long-standing direct experience in the development and implementation of SHP and biomass based projects and it has a strong knowledge of the key variables that determine the success and the failure of project implementation. UNIDO will mitigate this risk through detailed

Risks	Potential impact	Level of Risk	Action
			development of activities plans in close cooperation with in-country project partners, stakeholders and developers. The government and the other stakeholders including the NGO such as ADEID, Halleson Dureen Nzene (Global Village Cameroon, Cameroon), Evangelischer-Entwicklungsdienst (EED), CDCV, GREEN STEP, NCIG etc. are regularly being updated and appraised by UNIDO about the progress being made, and the importance of their involvement in this project which is well appreciated by the government. The cooperation and the involvement of the government agencies will be made sure for the timely clearances and the implementation of project activities. Agreed and transparent modus operandi and the well planned monitoring activities will be defined before the start of the project implementation.
Economic and Financial Risks			
SHP and biomass based mini-grid may not become economically viable in rural areas.	Medium	Medium	Focus will be on use of the renewable energy for productive purposes where the energy generated is used to create value/service for the communities so that they can use the income generated to pay for the electricity received. During the preparatory studies it has been identified that there are existing as well as new potential productive applications such as palm oil extractor, coffee grinder, flour mill, bakery units, saw mill etc. which can use the electricity from the proposed plants. Though the preliminary socio-economic survey indicates about willingness and paying capacity of villagers for electricity services, proper mechanism for revenue collection will be developed while designing and implementing the project.
Financial/credit constraints and high capital costs that prevent the private sector from investing in renewable energy projects.	Medium	Low	The renewable energy project focuses on productive uses where there are real economic benefits and value chains to encourage private sector participation. Selected demonstration projects have been design considering the optimal utilisation of electricity. Stakeholders including financial institutions have been appraised about the project and its status in order to ensure buy-in by stakeholders and promotion of a transparent and systematic framework for project development and delivery. The co-financing for the pilot projects have already been secured and project demonstration will make sure of attracting investors for replication and scale-up opportunities identified under the project.
Market/Financing Risks			
Lack of post project market environment to attract growth in	Low	Low	The project involves working with the government and financial institutions in the early stages to help

Risks	Potential impact	Level of Risk	Action
renewable energy generation replication and scale up of investments.			promote the development of the enabling policy and regulatory framework to encourage private sector investments in RE. During the preparation of feasibility studies, apart from the selected demonstration project, the technical feasibility and demand assessment for such kind of projects have also been carried out in the region as well as overall country and it is observed that once successfully demonstrated, this type of project can be replicated with appropriate policies and financing structures. Project preparation team took care of these things and had discussions with the ministry and CREF officials to identify what kind of capacity development needed for them to develop conducive policies and financing mechanisms for creating large market of RE. Project proposes to establish a special window under CREF with the help of government and partners to accelerate the RE expansion. That would strengthen CREF working for electrification in general with one additional specialised window to support RE sector in the country. This will help to ensure funds available or mechanism to receive benefit and funding beyond the GEF funded project. Also, the project will help to build expertise of project developers in designing and structuring bankable renewable energy projects that together with the impact of the policy and regulatory framework should help to ensure a good degree of post GEF project replication and scale up of renewable energy generation investments.
Regulatory Risk			
Regulatory framework to promote renewable energy based mini-grid for rural electrification has not been enacted	Medium	Medium	The Government will play a central role in this project and hence the chances of the proposed policy and regulatory framework not being enacted are low. Also, the recently released National Electricity Law of Cameroon focuses on the promotion of rural electrification projects through easy clearances and less complicated processes for licenses and concessions. This will create good regulatory environment for the promotion of renewable energy.
Proposed regulations not implemented due to government change etc.			No significant government policy changes are expected over the life time of the project design and implementation as the government is mostly stabilised in the country. Development of transparent tariffs and project implementation involving all stakeholders at the early stages of the project will help to mitigate against this.
Sustainability Risks			

Risks	Potential impact	Level of Risk	Action
Failure to achieve project outcomes and objective after successful delivery of outputs	Medium	Low	Establishing a monitoring, tracking and benchmarking program, the project would create the conditions to produce and sustain a policy driven push for renewable energy development for rural electrification. In parallel, by making local and national government, industry chamber, electricity users and civil society fully aware of the economic potential of the project and equipping them with capacity and tools to realize and reap the benefits of such potential, the project would generate a self-reinforcing market pull for renewable energy development.
The international price of oil may fall to level where fossil fuel power generation will be more cost effective than renewable sources	Medium	low	Assessment of externalities and life cycle cost approach place renewable energy on a comparative advantage to fossil fuels. The fundamentals of global oil prices indicate that in the long-term the price of oil is expected to grow. Further the fact that RE projects help reduce the GHG emissions gives an advantage for the government to promote these through various incentives.
Availability of biomass may be a concern due to climate change and other issues.	Medium	Medium	The biomass resource at the site is estimated based on the sustainably harvestable woody biomass from the forest area. While estimating the biomass availability the nearby approachable forest area is considered with the biomass extractability factor of 0.5, from the rate of its growing stock and it is also estimated that the required biomass consumption for the proposed capacity will be too less as compared to the estimated extractable biomass, so the proposed project will surely be sustainable as well as there would a possibility of replication of similar project in the area due to the availability of the abundant biomass (See Section A5.4.1). Further to make project more sustainable sensitisation and awareness creation will be done for locals about efficient utilisation of the biomass and growing short rotation trees etc. It will also create employment generation for the locals specially women who could be involved in the growth and collection of biomass from forest.
Climate Change risk			
Climate change could change Cameroon's hydrological systems sufficiently so as to render SHP projects economically unviable during their lifetime. And also the biomass availability may be impacted.	High	Medium	Keeping in mind that this adverse situation might arise, the project is designed and developed with more safety and sustainability factors, considering the monthly and annual variability of water flow in the river. The technical feasibility study report of the project (Refer Appendix-A1) considers the lean period flow too while calculating the designed SHP capacity as well as the power generation estimates.

Risks	Potential impact	Level of Risk	Action
			Further the climate change database from World Bank[30] indicates that in Cameroon The average annual precipitation (1961-1990) is 1604 mm and the projected annual percentage change (2045-2065) in precipitation is ranging from -71 mm to +115 mm which indicates Cameroon will not be much effected in terms of change in precipitation and will have sufficient water availability to sustain the projects for longer period. Literature and meteorological data indicates the country is having significant trends in precipitation at Kribi and Douala in the coastal region, and Batouri in the forest savanna; marginally significant trends occur in Mamfe in the rainforest and Bafoussam in the Guinean savanna zone. This indicates country is having good rainfall distributed all over its territory, except in northern region where the rainfall is comparatively lesser than the other regions. However the current projects are not located in the northern region. To avoid any possible risk of climate change, the trainings will also cover this particular aspect so that national consultants and trained experts can do appropriate designing of any future project capacity and better management of the plant Further, as explained above, the rainfall in Cameroon is not much being affected, and hence the impact on vegetation too is expected to be minimal. In case draught situation arises, then the plant may look for an option of integrating it with other mini-grids running on biomass based plant. Globally smart technologies are available to do necessary integration of different mini-grids.
Utilisation of biomass from forest may cause forest degradation and hence impact the climate of the site.	Medium	Medium	It is proposed that only the woody biomass from the forest area which can be sustainably harvested from forest will be utilised. Further the project will take care in sensitising and creating awareness among the people in sustainably collecting the biomass and also train them on the short rotation plants which can be grown in the region to maintain the climatic parameters.
Social risk			
The SHP project can affect the other water uses downstream such as irrigation and may also face competition with water uses by large hydro up-stream	Medium	Low	The projects envisaged to be developed as run of the river project without creating any large dam. Further, integrating small hydro development in the local development planning through capacity building and harmonization of programs by government agencies along with local participation will be focussed to

[30] http://databank.worldbank.org/data/download/catalog/climate_change_download_0.xls

Risks	Potential impact	Level of Risk	Action
			enhance local level adaptation of SHP projects. The project site has been identified considering these factors and the project is so designed that there will be no impact on the availability of water downstream for irrigation purpose and hence no specific competition. Only impact will be in the northern region of Cameroon where the rainfall is comparatively less than the other part, so there will be a need of careful designing of the plant capacity and operational guidelines for the renewable energy projects in those regions.
Project implementation could result in environmental impacts such as habitat impact, water basin hydrological as well as land use changes and conflict in demand for natural resources. Where biomass residues from plantation scale agricultural activities is involved there is the long term risk of plantation operators expanding plantation acreage to enhance production, thus possibly competing with land for food and other uses.	Medium	Medium	Both biomass as well as small hydro project is considered as environmental friendly projects. The biomass project is designed considering the residual woody biomass availability in the forests project areas and it will not have any competition with food resources, thereby not any negative impact on the pattern of food crop production. The project will focus on providing training on sustainable use of biomass resources for reducing the fear of unsustainable land use practices. The project design trainings will include the sustainability as its important criteria in the evaluation of biomass project for approval. Biomass projects design will ensure reduced pollution, and emissions will be monitored accordingly. Where projects are located in forest areas, coordination with the appropriate departments and use of environmental safeguards approach of the GEF will ensure sustainable project development and implementation.

The implementation of the project will involve the monitoring of the potential risks as well as other factors that may hinder the delivery of the expected project outputs during its execution. The monitoring and evaluation of activities and outcomes will anticipate political, financial and institutional factors that may have potential impacts to the success of the project.

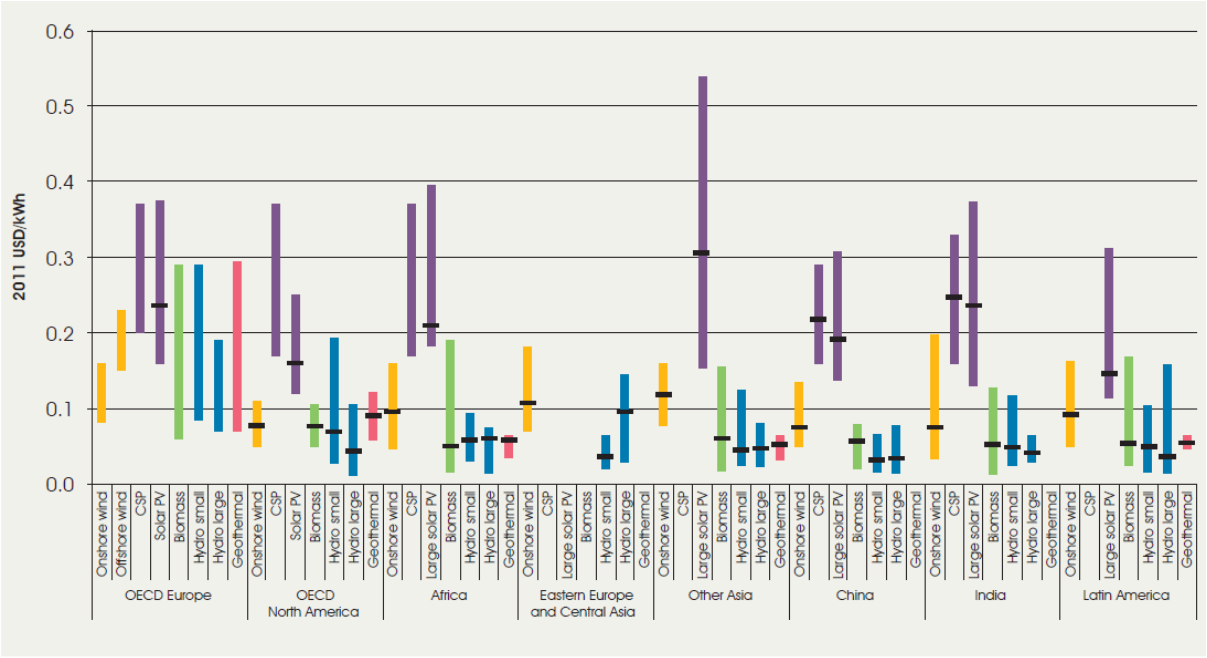


FIGURE ES.1: TYPICAL LCOE RANGES AND WEIGHTED AVERAGES FOR RENEWABLE POWER GENERATION TECHNOLOGIES BY REGION, 2012

Note: *The bars represent the typical LCOE range and the black horizontal bars the weighted average LCOE if enough individual project data are available. Figures assume a 10% cost of capital and biomass costs of between USD 1.3 and USD 2.5/GJ in non-OECD countries and between USD 1.3 and USD 9/GJ in OECD countries.*

Figure A6.1: Typical range of cost of generation of various renewable energy sources in different regions

Source: Report on renewable power generation costs in 2012: an overview' by IRENA

A.7. Coordination with other relevant GEF financed initiatives

(i) The joint European Union and CEMAC (economic and monetary union of central African states) intensive peri-urban electrification project (2008 -2013) aimed at adding 57,000 social connections to the national grid, (ii) The African Development Bank project (2010-2015) to strengthen and extend the electricity transmission and distribution networks in Cameroon, with the aim of reaching 423 new locations in eight of the ten regions in Cameroon, and (iii) The World Bank project (2008 – 2013) on Cameroon energy sector development. The later project focuses mainly on providing technical assistance for least cost large scale energy solutions for Cameroon (particularly large scale hydropower projects such as the Lom Pangar Hydropower Project - LPHP), water basin management, concession oversight and consumer protection, and development of the Rural Electrification Fund (REF) to be managed by Cameroon's Rural Electrification Agency.

All these ongoing related projects have no specific focus on promoting renewable energy in the national mix. Indeed the World Bank project emphasizes least cost solutions and the REF is also based on least cost options for rural electrification, although the REF in its present form aims to target 20% of the funding to renewable energy projects in rural areas. The proposed GEF project will complement and supplement these projects by, wherever feasible, "bolting on" renewable energy components. In particular, early discussions with the World Bank indicate a good opportunity for donor collaboration where the GEF project enables special financing window, for a renewable energy projects in Cameroon. There are various Reducing Emissions from Deforestation and Degradation (REDD) projects in Cameroon. The proposed project will liaise with these projects in ensuring that protected land issues are addressed and in helping provide alternative renewable energy based solutions where protected land areas

are threatened by lack of access to energy. In this context the project will also synergies with upcoming projects such as the UNEP's GEF-4 project on biodiversity and protected areas in the country

B. ADDITIONAL INFORMATION NOT ADDRESSED AT PIF STAGE:

B.1 Describe how the stakeholders will be engaged in project implementation.

B1.1 Stakeholders engagement

The project's key stakeholders are the Ministry of Energy and Water Resources (MINEE) for and the execution of the project and the institutional coordination of demonstration projects, and policy and regulatory framework; Ministry of Environment, Protection of Nature and Sustainable Development (MINEPDED) for GEF focal point endorsement, the Rural Electrification Agency (AER) for administrating and funding of rural energy projects and facilitating for creation of special window for RE under REF (the Rural Energy Fund created by the World Bank and the Government of Cameroon in 2009);; and the other possible stakeholders which can be engaged for various activities are the Electricity Development Corporation (EDC) for infrastructure development; the Cameroon Electricity Sector Regulation Agency (ARSEL) for policy and regulatory framework development and enforcement; national, regional and multilateral development banks for funding and operationalization of the financial mechanism; private sector companies (including members of GICAM, the association of Cameroon industries) for project development and financing; the Ministry of Industries, Mines and Technological Development (MINIMIDT); Ministry of Economy, Planning and Regional Development (MINEPAT) and various other ministries for funding and other strategic supports; Civil Society Organisations (such as ADEID) universities, technical training colleges, research institutions and district councils for community participation, awareness promotion, capacity development and knowledge management. As a recipient or final beneficiary of the project, local and indigenous people involvement in the project from the beginning is most important.

The Ministry of Energy and Water (MINEE) and Rural Electrification Agency responsible for implementing rural electrification policies and promoting rural access to electricity services were consulted by project consultants to ensure a broad, participatory approach for defining project objectives, identifying key drivers/obstacles, and developing the Project Document. In particular, the technical, and socio economic consultants worked closely with governmental agencies, private sector and civil society/representative villagers to assess the baseline situation and define the operational modalities that would ensure the greatest possible success for the project. The project team also did good consultations with the forest officer in charge in the district, GEF operational focal point and other important persons from the MINEPDED to understand the environmental and forest clearance concerns for the projects as the project site identified are in the forest areas, and also it is related to the utilization of biomass residue from the forest. Meeting with all key and appropriate stakeholders was held with the aim to apprise the stakeholders about the project, inform them about the technology and its benefits, and collect relevant information required for developing the project brief and also to explore co-financing for the project.

The discussions were held at 3 different levels, a) local village level b) district council level and c) National level. At village level the participants were household owners, youth leaders, village chief and local NGOs and self-help group working in the area. At district level the discussions were held with the Mayor, forest officer and other representatives from the district council office. At national level the participants were mainly from the various ministries, REA, ARSEL and multilateral donor agencies. Apart from this consultative workshop individual discussions were held with the representatives from AES-SONEL, ARSEL, GEF operational focal point and ADEIED etc. to take their views on the project planning and the institutional management and operational infrastructure for the project implementation. Details of the national level stakeholders' consultation workshop are given in Annexure F and the details of interactions with all stakeholders individually are given in Appendix B.

Based on the stakeholder analysis, the primary target beneficiaries identified for the project are mainly the local small and micro enterprises, rural households, health and educational institutions including technical training college, government agencies responsible for energy policy-preparation and implementation, local entrepreneurs interested in manufacturing sector for RE as well as other products such as agro processing, operation and maintenance personals and the financing institutions. Based on various interactions it also came out clearly that there is a great need for capacity building of private sector for development, operation and maintenance of the projects and also for the government departments and ministries in defining roles, responsibilities, incentives etc. for the project development by private sector.

The project implementing agency is UNIDO, which will be responsible for the overall command for project implementation, monitoring and reporting to GEF about project progress and the results achieved as per the standard formats of GEF and UNIDO. Other important stakeholders are various government ministries, departments, NGOs and CSOs, district councils, local village communities, private sector etc. The major stakeholders identified along with their roles are given in the table below.

Table B1.1: Key stakeholders and their expected roles

Key stakeholder	**Expected roles in the project**
Ministry of Energy and Water Resources (MINEE)	Responsible for overal execution of the project, doing all coordination with other ministries and government agencies for easy movement and development of the project. MINEE will house the project management unit (PMU) and a senior representative from MINEE will work as the National Project Director (NPD) for the execution this project.
Ministry of Environment, Protection of Nature and Sustainable Development (MINEPDED)	For providing environmental clearances for the demonstration projects. MINEPDED will designate a representative who will be in the steering committee for monitoring the implementation of this GEF project and also will guide in the evaluation and assessment of the desired results, specially the GHG emission reductions.
Rural Electrification Agency (AER) and Rural Energy Fund	Will be involved for arranging and administrating the funding of rural energy projects and for facilitation of establishing the special window for RE development under REF.
AES SONEL	As the main utility company can be be involved for providing local technical supports forproject commissioning, training and capacity building of technicians at village level for the operation and maintenance of the mini-grid based local distribution systems.
The Electricity Development Corporation (EDC)	Will be involved for infrastructure development, and also for the training and capacity building of villagers in the project development worls.
The Cameroon Electricity Sector Regulation Agency (ARSEL)	Will be involved for cooperation with International Experts on preparation of renewable energy regulatory framework, tariff structures, standard PPAs etc. and its implementation.
National, regional and multilateral development banks such as WB, AfDB and other public and	Will be involved for funding of the renewable energy project and operationalisation of the financial mechanism. They will take part by sending their candidates to attend the training and apacity building prohrams to be organised under the project.

Key stakeholder	Expected roles in the project
private sector banks	
World Bank	For approval and support for setting up special window for financing RE under the Rural Energy Fund created by the World Bank and the Government of Cameroon in 2009.
Private sector companies including members of GICAM, the association of Cameroon industries	Can be involved for project development and financing.
The Ministry of Industries, Mines and Technological Development (MINIMIDT)	For supporting the promotion and funding of productive entreprises in rural areas.
Ministry of Economy, Planning and Regional Development (MINEPAT)	For routing of donor funds for renewable energy through the special window under CREF.
Civil Society Organisations (such as ADEIDD, Halleson Dureen Nzene (Global Village Cameroon, Cameroon), Evangelischer-Entwicklungsdienst (EED), CDCV, GREEN STEP, NCIG etc.) universities, and research institutions	For community participation, awareness generation and capacity development programs. ADEIDD has been involved since the preparation of project document, as they have good idea about the potetial sites and already working with some other institutions in renewable energy related activities for identification of potential sites, helping international consultant in understanding the project area and accompanying them for site assessment, creating awareness among rural community about various clean energy initiatives etc. ADEIDD's continued involvement will be there for smooth facilitation of the project commissioning activities, and also this NGO along with other NGOs will get trained for carrying out the site identification and pre-feasibility study for both small hydro as well as the biomass based mini grids for electricity generation and use in productive applications.
District councils	For promoting and supporting the entrepreneural activities through council development funds under their district development plans
Village chiefs	Responsible for providing the land for any developmental project in the village, so the village chief and village community will be involved in the project for getting land and they may also take the responsibility of operating and maintaining the biomass based small off-grid plants in their village as proposed under this project.

Also as the recipient or final benificiery of the project, local and indigeneous people involvement in the project from the beginning is most important. The project involves them from the conception of the project, different level of study and discussion, participation as entrepreneur for productive utilisation of electricity, decision making, their views on different aspects like equity, risk, adverse effect, settlements and similar other needs. Also their capacity enhancement in terms of project acceptance, participation, sustainably running and managing the system is very important so the villagers and district councils have been taken in the loop with appraising them about the project, its benefits and requesting their active participation during the project execution. The project will be delivered through guidance of High Level Steering Committee with participation from various key stakeholders. It is envisaged that the Steering

Committee will be chaired by MINEE and the other representatives in the committee will be from MINEPDED, MINEDAP, ARSEL, UNIDO and other relevant national and local level agencies and will have atleast one female member in it.

B1.2 Project management arrangement

The project will be implemented by UNIDO in collaboration with Ministry of Energy and Water Resources (MINEE) as the local execution partner *(GEF Local Executing Agency).*

UNIDO Cameroon office will take the lead in ensuring adequate implementation monitoring and exchange of experiences with the project team and other relevant institutions. In addition, the project will seek to coordinate its actions with other UNIDO and UN energy and climate change activities in central African countries in general and Cameroon in particular to ensure maximum synergies and overall impact of climate change related technical assistance to Cameroon. The project will closely collaborate with the Ministry of Economy, Planning and Regional Development (MINEPAT) Cameroon, African Development Bank, UNDP, EU and other donor and financing institutions/agencies. The MINEPAT is responsible for preparing and implementing the economic policy of the nation, as well as planning regional development. Similarities in the strategy of the proposed project may extend an opportunity to share lessons and exploit synergies, in particular in the areas of harmonization and mutual recognition. Also, the proposed project will also seek to coordinate actions with other existing government commitments and non-government initiatives.

The project management team would comprise the followings:

1. UNIDO- The implementing Agency
2. MINEE- The executing Agency
3. Project Steering Committee
4. Project Management Unit- Housed at MINEE and comprise of National Project Director, Project Manager and other national and international technical staffs

Structure of the Project Management is given in Figure B1.1

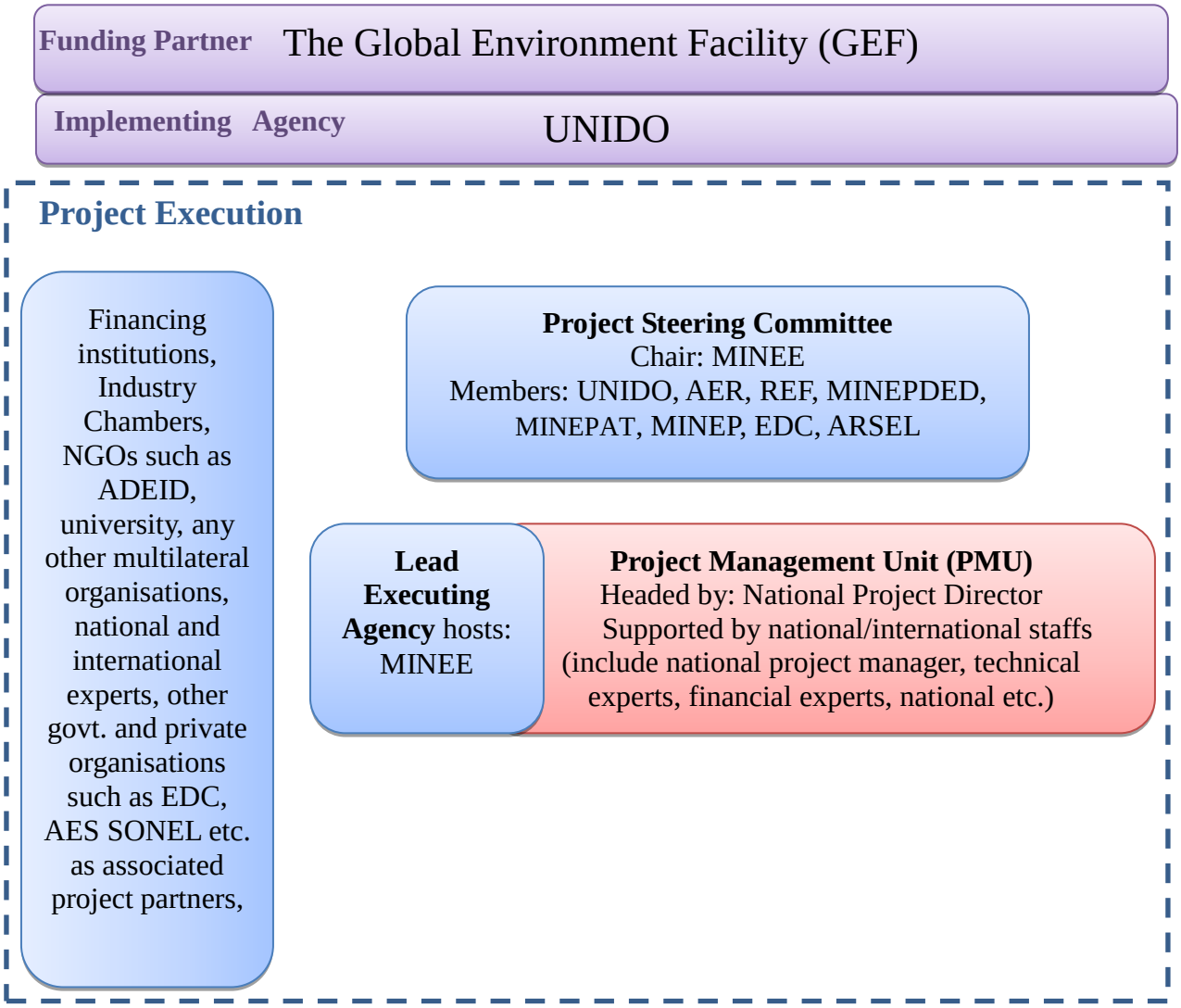


Figure B1.1: Project Management Chart

The roles and activities of these are described below.

Table B1.2: Key agencies and their expected roles in project management

UNIDO **Implementing agency**	UNIDO is the implementing agency for the proposed project and a member of PSC. UNIDO will provide overall management and guidance from its Cameroon Country Office and the Headquarter in Vienna and is responsible for the delivery of the planned outputs, the achievement of the expected outcomes, monitoring and evaluation of the project as per standard GEF and UNIDO requirements. The UNIDO project manager will be responsible for tracking overall project milestones and progress towards the attainment of the set project outputs, and will follow up with the NPD for assessing the overall project progress and will give him

	advises wherever necessary. The UNIDO project manager will be responsible for narrative reporting to the GEF. Further, wherever necessary, UNIDO will guide/assist the PMU in properly executing the activities and during preparation of periodic reports, audits, project evaluation etc. for presentation to GEF.
Ministry of Energy and Water Resources (MINEE) Executing Agency	MINEE will be the national executing agency for this project, responsible at the policy level for updating the policy, regulation and its implementation for renewable energy and rural electrification. The MINEE as executing agency would have overall responsibility for most of the substantive work to be performed under Project Components. MINEE will be responsible for hosting the Project management Unit (PMU) and to designate a senior official as the National Project Director (NPD) for the project. MINEE through the NPD will ensure coordination with various ministries and agencies, review reports and to look after administrative arrangements required under the Government of Cameroon and UNIDO.
Project Steering Committee (PSC)	The *Project Steering Committee (PSC)* will be composed of UNIDO, MINEE, MINEPDED, AER, ARSEL, and EDC; Other members such as financing institutions, regulators, industry chambers, research institutes, private sector/technical partners, regional governors/district mayors etc.[31] could be invited as co-opt members by the decision of the PSC on as-needed basis; however, by taking care that the PSC remains operational by its size. The PSC will be chaired by the MINEE and will include at-least one female member as the gender focal point. PSC will be responsible for making management decisions for the project in particular when guidance is required by the NPD. The PSC plays a critical role in project monitoring and evaluations by quality assuring these processes and products, and using evaluations for performance improvement, accountability and learning. It ensures that required resources are committed and arbitrates on any conflicts within the project or negotiates a solution to any problems with external bodies. NPD will sign the budgeted AWP with UNIDO on an annual basis, as per UNIDO rules and regulations. Based on the approved AWP, the PSC will consider and approve the quarterly plans and also approve any essential deviations from the original plans. PSC will operate in accordance with the GEF and UNIDO policies.
Project Management Unit (PMU)	*Project Management Unit* (PMU) will be hosted at MINEE to execute the project. The PMU shall be headed by a National Project Director who will be responsible for implementing day-to-day activities in coordination with UNIDO. Efforts shall be made to mobilize the project team for the full project tenure to ensure the availability of experts and consultants until the end of project. The NPD will be responsible for overall project execution, including adherence to the Annual Work Plan (AWP) and achievement of planned results as outlined in the project components activities and outputs result framework, and for the use of UNIDO-GEF funds through effective management and well established project review and oversight mechanisms. NPD along with UNIDO will also be in charge of procuring the international expertise needed to deliver the outputs planned under the four

[31] Beneficiary: individual or group of individuals representing the interests of those who will ultimately benefit from the project

	project components. It will manage, supervise and monitor the work of the international teams and ensure that deliverables are technically sound and consistent with the requirements of the project. NPD will report to UNIDO about all progress work of the projects for effective overall implementation monitoring by UNIDO. The PMU will be supported by technical, administration and a finance staff. As needed, adequate numbers of technical experts in different disciplines and project management consultants with expertise in project, finance, legal matters etc. will be associated on long-term or short-term basis depending upon the work load. In close collaboration with the UNIDO, MINEE and MINEPDED, the PMU will coordinate all project activities being carried out by project national and international experts and project partners. It will also be in charge of the organization of the various workshops and trainings to be carried out under project components. The PMU will be funded by the GEF Project budget. During the whole implementation period of the project, UNIDO will provide PMU the necessary management and monitoring support. The PMU will be responsible for the overall operational and financial management in accordance with financial rules and regulations imposed by UNIDO/GEF for nationally executed projects. It will prepare progress reports, which are to be submitted to UNIDO, Austria. It will hold semi-annual meetings with UNIDO, Cameroon to discuss the progress report, work plan, budget and any other relevant issues. At the end of the project, the PMU will produce the project terminal report, which is to be submitted to the advisory group at least two weeks before the Terminal meeting.
Technical partners	AER as the co-financing agency will have important role in owning and managing the project. AER would be responsible for providing the local technical support for the preparation of technical reports and selection of the contractor through their technical evaluation as per UNIDO –GEF guidelines, power plant development, providing candidates for getting training during the project implementation etc. Along with AER, EDC also will be the important stakeholder as they can provide their first hand inputs on the issues that may be faced for the implementation of policy and regulatory guidelines derived under the component 1 of the project. The district councils and the beneficiary village chiefs would be responsible for providing sufficient labours, at low rate, office spaces, lands and other facilities under their capacity for the completion of the pilot projects within the stipulated timeframe.

B.2 Describe the socioeconomic benefits to be delivered by the Project at the national and local levels, including consideration of gender dimensions, and how these will support the achievement of global environment benefits (GEF Trust Fund/NPIF) or adaptation benefits (LDCF/SCCF):

The national benefits of the project are in terms of electrification of rural areas, promotion of local small scale industries such as palm oil extraction, cassava processing, coffee grinding units,, carpentry and wood works, etc. and improvement in the local livelihood opportunities, education and health. With the small hydro and biomass based mini grid contribution to the electricity supply in the target areas, the rate of village and household electrification will be enhanced at a reasonable level. There would also be a capacity development within the MINEE, AER and other relevant ministries and government bodies for the planning and implementation of SHP and biomass based projects. The success of the pilot projects will also encourage the investors to develop local resources and exploit the available biomass and small hydro potential thereby facilitating development of local market. It is expected that from the demonstration project itself about 40 palm oil extraction units, about 5 coffee processing units, about 5 carpentry shops, one technical college and about 20 health facilities and schools in the project areas will be benefited from electricity, which ultimately will contribute towards the improvement of economy, health and education in the region. The project also will help developing awareness among the rural communities about the efficient and sustainable utilisation of biomass resources for their energy needs.

The GEF project will catalyze investments in the productive sector and promote awareness of value chains linked to renewable energy generation, particularly with regards to the agro processing sectors, while helping SME and investors to realize the economic opportunities associated with renewable energy generation and energy services in an enabled environment and market sector. The project will lead to economic and social benefits in the project area by ensuring that an important share of the electricity produced is used for productive, income-generating activities, and the local communities will get benefit through employment opportunities for operation and maintenance of the projects, and becoming a part of value chain for supply of biomass resources for the project. The education quality of the schools and technical college would improve as there are computers and other lab equipment remains non-operated in the absence of electricity in the existing technical college and many schools. Women and children who traditionally bear disproportionately the burden of lack of access to energy will especially benefit from the project. Due to access to modern energy services the toxic indoor pollution and fire hazards cause by traditional use of biomass for cooking and lighting will be reduced. Subsequently the women and children will not have to spend their time looking for and fetching firewood. Local community, specially women will be benefited through the training and awareness programs to be conducted under the project for the efficient and sustainable biomass utilisation. Women could be given priority for the employment in biomass collection and resource management and also in the collection of tariff etc. Moreover, the children's studying conditions will improve through clean lighting.

At present the local villagers have to travel to the town side for purchase of gasoline/diesel and Kerosene for their diesel generators and household lightings, which costs them extra for travel and material handling, and sometime it becomes very difficult for them specially in rainy season when the routs get closed. The biomass and small hydro based mini grid will help them reduce their fossil consumption and hence dependency on it. Additional national benefits from reduced release of CO_2 from the diesel-based power generation plants and reduced use of firewood as well as kerosene are also evident from the proposed project.

The use of electricity from biomass and small hydropower projects for productive entreprises will avoid the usage of diesel generators, and also the electricity from these projects will reduce the kerosene and wood consumption in households, which ultimately will result in the GHG emission reduction. The project will monitor and evaluate the extent of impact on the number of households electrified and the small and medium scale entrepreneurship on productive applications benefiting from this project. The

project will monitor and evaluate the extent of impact on the number of households electrified and the small and medium scale entrepreneurship on productive applications benefiting from this project.

B.3. Explain how cost-effectiveness is reflected in the project design:

GEF resources are required to remove barriers which are preventing development of clean renewable energy based projects. Therefore the GEF resources requested for the project will be targeted at establishing a market based enabling environment through creating conducive policy and regulatory initiatives for renewable energy which ultimately will promote investments in renewable energy based mini-grids in Cameroon thereby facilitating the realization of the global benefits that can be derived from the displacement of fossil fuels for power generation in the country. The enabling environment that would be created as a result of the barrier removal activities will ensure the realization of the social, economic and environmental benefits of biomass and small hydro power for the current project mentioned in this document as well as probable projects which may come up in future in Cameroon based on the success of the pilot projects and the enabling environment and market for renewable energy created through the barrier removal.

Without the GEF project, the "business as usual" scenario will involve very low increases in rural electrification in general and renewable energy based electrification in particular, and the country will continue to rely on thermal power generation sources which include heavy oil, gas and diesel based power generation and large hydro power generation for centralized electricity supply and small/medium size diesel power generators to produce and supply electricity in rural areas. Economic development in rural Cameroon would continue to be based on fossil fuel energy sources, and GHG emissions would accelerate in line with the level of development if the RE based interventions have not been promoted from today. Under this scenario, the renewable energy from the biomass and small hydro resource in the country will continue to remain underexploited and also the commercial development of small hydro sector, sustainable utilization of abandoned biomass wastes and establishment of a market based enabling environment for promoting investments in renewable energy based mini-grids for productive applications in Cameroon will take time. Consequently, the growth rate of electricity access and rural industrialization will be hampered. Information dissemination and capacity development in renewable energy sector in general and biomass and small hydro sector in particular will remain hampered with potential investors, developers and financing institutions still remaining ignorant of the feasibility and potential of these technologies.

GEF funding will overcome barriers to more widespread use of biomass and small hydropower technology and mini-grids, simultaneously establishing a source of sustainable community income by direct participation of the population in the operation and maintenance of the new facilities. GEF assistance will catalyze market based scale up and replication of renewable energy in rural areas by addressing barriers related to awareness, concerns of financing institutions about technical and financial feasibility, lack of conducive policy and regulatory regime, incentives, training and capacity building etc. The activities proposed under the project will contribute towards GHG emission reduction through displacement of the current use of fossil fuels and economic and social development in rural areas of Cameroon. GEF involvement, therefore, adds value in taking the development of renewable energy based energy services several steps further.

The total cost for the 2.825 MW (2.7 MW SHP and 0.125 MW Biomass) project is estimated at US $ 12,300,000 which includes the funding from GEF, co-financing support from UNIDO and the Government of Cameroon etc. The share of GEF finance at US $ 2,000,000 is about 16.26% of the total project cost. The GEF funding will primarily be used to support the following project activities: (i) development of biomass and small hydropower based mini-grid; (ii) assistance for reducing technical,

policy and capacity development related barriers; (iii) sustainability of the project through end use / productive use of energy leading better local economy and rural livelihoods; and (iv) projects management.

Major global benefit of the project would be the GHG emission reduction. The GEF support is expected to result in annual direct GHG emission reductions of 8.26 kilo ton of CO_2 ($ktCO_2$) (7.98 $ktCO_2$ from SHP plants and 0.28 $ktCO_2$ from biomass power plants). The cumulative reductions achieved over a 20 year of project life would be 163.56 $ktCO_2$ of CO_2. Considering the total avoided GHG emission reductions that are attributable to the project, which amounts to 163.65 $ktCO_2$, the corresponding unit abatement cost (UAC) (i.e. GEF$ per tCO_2) is US$ 12.22/tCO_2 and $ 75.16/tCO_2 considering the total project cost. This considers the estimated direct GHG emission reductions from the pilot projects over its useful life of 20 years for SHP and 15 years for biomass power project. The emission reductions that are attributable to the project are calculated using the "Manual for Calculating GHG Benefits of GEF Projects". Details of GHG emission calculation are given in Annexure G.

The estimated cost considering only electro mechanical equipment and civil structure for SHP and the equipment and accessories cost for biomass power system (excluding transmission and distribution line cost) is US$ 6,977,610[32]. The other alternative for electricity generation is through diesel generators, in the absence of electricity grid in the district and any other sources of power generation. The estimated equipment cost[33] of setting up a diesel generators of equivalent capacity (2.825 MW) is US $ 1,977,500. Thus the incremental cost for the biomass and SHP project is estimated at US$ 5,000,110 which translates to US $ 30.55/tCO_2 for the incremental amount.

Further, considering that significant barrier removal work that will be done under UNIDO-GEF project, it is deemed that the GEF project influence will result in indirect emission reduction due to growth in the implementation of biomass and SHP based power plants in Cameroon. The indirect project CO_2 emission reductions are calculated on a conservative basis considering the GEF causality factor of 60% and are estimated at 597 kton CO_2. It is estimated that the overall CO_2 unit abatement cost considering both direct as well as indirect cost will be US$ 2.25/tCO_2 considering the GEF Funding only and US$ 14.02/tCO_2 considering the total project cost.

Table B3.1: Project cost per cumulative ton of CO_2 reduction

Narration	Lifetime direct reduction in CO_2 (t CO_2)	Project cost ($)	Project cost/cumulative ton of direct CO_2 abatement ($/t CO_2)
2.825 MW project capacities (2.7 MW of small hydro and 0.125 MW biomass power) installed with mini grid for distribution of electricity in identified areas.	163,656	12,300,000	75.16

Table B3.2: GEF finance per cumulative ton of CO_2 reduction

Narration	Lifetime direct reduction in CO_2 (t CO_2)	Project cost ($)	GEF finance / cumulative ton of direct CO_2 abatement ($/t CO_2)

[32] This cost is considered only for the purpose of incremental analysis of biomass and small hydro projects vis a vis diesel generator based project. Further this cost does not include the erection and commissioning cost.
[33] Considering cost/MW of US $ 700,000/MW (Source: Based on discussion with genset suppliers; http://www.solarbuzz.com/DistributedGeneration.htm; and http://www.china-power-contractor.cn/10-units-of-MAN-12V32-40-hfo-diesel-generator-power-plant-technical-proposal-quotation.html;)

2.825 MW project capacities (2.7 MW of small hydro and 0.125 MW biomass power) installed with mini grid for distribution of electricity in identified areas.	163,656	2,000,000	12.22

Table B3.3: Incremental cost per cumulative ton of CO_2 reduction

Narration	Lifetime direct reduction in CO_2 (t CO_2)	Incremental cost ($)	Incremental cost / cumulative ton of direct CO_2 abatement ($/t CO_2)
2.825 MW project capacities (2.7 MW of small hydro and 0.125 MW biomass power) installed with mini grid for distribution of electricity in identified areas.	163,656	5,000,110	30.55

More details on the emission reduction calculations are provided in Annexure G.

C. DESCRIBE THE BUDGETED M &E PLAN:

Project monitoring and evaluation (M&E) will be carried out in accordance with established UNIDO and GEF guidance and procedures. According to the Monitoring and Evaluation policy of the GEF and UNIDO, follow-up studies like Country Portfolio Evaluations and Thematic Evaluations can be initiated and conducted. All project partners and contractors are obliged to i) make available studies, reports and other documentation related to the project and ii) facilitate interviews with staff involved in the project activities.

The overall objective of the monitoring and evaluation process is to ensure successful and quality implementation of the project by: i) tracking and reviewing project activities execution and actual accomplishments; ii) providing visibility into progress as the project proceeds so that the implementation team can take early corrective action if performance deviates significantly from original plans; and iii) adjust and update project strategy and implementation plan to reflect possible changes on the ground, results achieved and corrective actions taken.

A Project Inception meeting will be held within the first 2-3 months of project start with the participation of the representatives from various stakeholder organizations those have been assigned roles in the project organization structure, UNIDO, appropriate/feasible regional technical policy and program advisors as well as other key actors. This inception meeting is crucial in building ownership for the project results and to plan the first year AWP and detail monitoring plan. The meeting should address a number of key issues including:

- Understand objectives of the project including the outputs and activities.
- Clearly understanding and defining the roles and responsibilities of each partner organisation for timely and proper delivery of the project.
- Assist all partners to fully understand and take ownership of the project. Detail the roles and responsibilities of UNIDO Cameroon and HQ staff 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.
- Based on the Project Results Framework and the relevant GEF Tracking Tool if appropriate, finalize the first AWP. 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 and set an agreement on the M&E work plan and corresponding budget.
- Discuss financial reporting procedures and obligations, and arrangements for annual audit.

- Plan and schedule PSC meetings. Roles and responsibilities of all project organization structures should be clarified and meetings planned. The first PSC meeting should be held within the first 6 months of the project start, following the inception workshop.

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

C.1. Semi-Annual and Annual Review

The semi-annual and annual review should take into account 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 practice records;
- AWP and other expenditure reports;
- Risk and adaptive management;

UNIDO Project Manager will conduct visits to project sites based on the agreed schedule in the project's Inception Report/AWP to assess first hand project progress. Other members of the PSC may also join these visits. A Field Visit Report (FVR) will be prepared by the UNIDO and will be circulated no less than one month after the visit to the project team, PSC for their reference.

C.2. Mid-Term and Final Evaluation

The project will undergo an independent Mid-Term Evaluation (MTE) at the mid-point of project implementation. The MTE will review the 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.

An independent Final Evaluation will take place three months prior to the final PSC meeting and will be undertaken in accordance with UNIDO 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. During the last three months, the project team will prepare the Project Terminal Report (PTR) 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. The Terminal Report will specifically report on any accomplishments in relation to:

a) Energy savings and GHGs emission reduction directly generated by the UNIDO GEF project.
b) Productive applications supported by the UNIDO GEF project, directly and indirectly.
c) Development of policy programs and normative instruments for the biomass and small hydro projects promotion in the country
d) Level of policy and regulations enforcement for renewable energy development in Cameroon.
e) Level of awareness and technical capacity increase for operation and maintenance of the biomass and small hydro power based mini-grid components.

The UNIDO project manager will be responsible for tracking overall project milestones and progress towards the attainment of the set project outputs, and will follow up with the NPD for assessing the overall project progress and will give him advises wherever necessary. The UNIDO project manager will be responsible for narrative reporting to the GEF. Further, wherever necessary, UNIDO will guide/assist the PMU in properly executing the activities and during preparation of periodic reports, audits, project evaluation etc. for presentation to GEF.

Table C1.1: Monitoring plan and budget

Type of M&E activity	Responsible Parties	Budget USD ($) Excluding project team staff time	Remarks	Time frame
Inception meeting	▪ PMU	NA	It will be a part of PMU activity.	Within 2-3 months of project start.
Measurement of means of verification of project results (baseline and end-of-project impact study)	▪ NPD will oversee the hiring of specific studies and institutions, and delegate responsibilities to relevant team members.	10,000	Indicative cost	Start, mid and end of project (during evaluation cycle) and annually when required.
Measurement of means of verification for project progress on output and implementation	▪ Oversight by NPM ▪ Project team	10,000	Indicative cost (to be determined more precisely) as part of the Annual Work Plan's preparation.	Annually prior to ARR/PIR and to the definition of annual work plans
Annual project review / project implementation reports	▪ NPD, NPM and project team	2,500	Indicative cost	Annually
Steering Committee (SC) meeting	▪ PMU	NA	Indicative cost	Annually coinciding with the annual project review and whenever urgent and important decisions need approval of SC
Periodic status/ progress reports	▪ NPD, NPM and project team	2,500	Indicative cost	Semi annually
Mid-term Evaluation	▪ NPD, NPM and Project team ▪ Consultants (i.e. evaluation team)	25,000	Indicative cost	At the mid-point of project implementation.
Final Evaluation	▪ NPD, NPM and Project team, ▪ Consultants (i.e. evaluation team)	30,000	Indicative cost	At least three months before the end of project implementation

Type of M&E activity	Responsible Parties	Budget USD ($) Excluding project team staff time	Remarks	Time frame
Project Terminal Report	▪ NPM & team	5,000	Indicative cost	At least three months before the end of the project
Audit of the fund utilisation for GEF project	▪ National/International audit expert	10,000	Indicative cost/ year: $2,500 for 4 years	Yearly
Visits to field sites	▪ UNIDO Cameroon ▪ UNIDO HQ (as appropriate) ▪ Government representatives	5,000	For GEF supported projects, paid from IA fees	Yearly or on as needed basis
Total Indicative Cost Excluding project team staff time and UNIDO staff and travel expenses		**100, 000**	About 5.0% of Total GEF fund	

Legal Context

"The present project is governed by the provisions of the Standard Basic Cooperation Agreement between the Government of the Republic of Cameroon and UNIDO, signed on 24 April 1989 and entered into force on 28 October 1991."

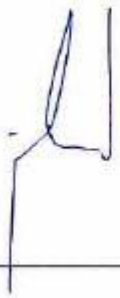
PART III: APPROVAL/ENDORSEMENT BY GEF OPERATIONAL FOCAL POINT(S) AND GEF AGENCY(IES)

A. RECORD OF ENDORSEMENT OF GEF OPERATIONAL FOCAL POINT(S) ON BEHALF OF THE GOVERNMENT(S) :): (Please attach the Operational Focal Point endorsement letter(s) with this form. For SGP, use this OFP endorsement letter).

NAME	POSITION	MINISTRY	DATE *(MM/dd/yyyy)*
Mr. Justin Nantchou	GEF Operational Focal Point	MINISTRY OF ENVIRONMENT AND PROTECTION OF NATURE	1/09/2012

B. GEF AGENCY(IES) CERTIFICATION

This request has been prepared in accordance with GEF/LDCF/SCCF/NPIF policies and procedures and meets the GEF/LDCF/SCCF/NPIF criteria for CEO endorsement/approval of project.

Agency Coordinator, Agency Name	Signature	Date (Month, day, year)	Project Contact Person	Telephone	Email Address
Philippe Scholtès Officer-in-Charge Programme Development and Technical Cooperation Division, UNIDO		07/15/2014	Rana P. Singh, Industrial Development Officer, Rural and Renewable Energy Unit, Climate Change Branch UNIDO	+43 (1) 26026-3819	R.P.Singh@unido.org 

ANNEX A: PROJECT RESULTS FRAMEWORK

GEF project ID	4785
Project Title	Promoting Integrated Biomass and Small Hydro Solutions for Productive Uses in Cameroon.
GEF Strategic Program	GEF Climate Change Focal Area Strategic Objective CCM-3, namely: "Promote investment in renewable energy technologies".
Implementing Agency	UNIDO
Project Objective	To reduce GHG emissions through promotion of investments and a market in the scale up and replication of integrated renewable energy solutions for productive uses and industrial applications in Cameroon
Applicable GEF expected outcomes	Removal of technology, policy, finance and capacity related berries for renewable energy and increased number of biomass and small hydropower projects for productive uses, developed through public private partnerships and market based approach, in Cameroon.
Applicable GEF outcome indicators	(a) Tonnes CO_2eq avoided. (b) Electricity units (kWh) generated from adoption of biomass and small hydro power and best practices of electricity uses for rural electrification and productive applications.
GEF Tracking Indicator	**Indicator 1.** ***Extent to which RE policies and regulations are adopted and enforced*** Current Score - 1 (There is currently no specific policy framework in place for biomass and small hydro power development in Cameroon). Target Score - 5 (policy/regulation/strategy adopted and enforced). **Indicator 2.** ***Electricity production in the reporting period from grid-connected renewable energy installations installed under the influence of the project (MWH/year)*** Current Status- None. Target- Estimated annual electricity production from all the installed demonstration project capacity under this project is – 14,310 MWh. **Indicator 3.** ***Number of business and households served by renewable energy beyond those receiving service at the time of project inception*** Current - No household/business establishments connected with renewable electricity. Target - On commissioning of the project, the following establishments will get connected to mini grid. i. Micro and small industrial units (mainly agro processing) - about 50 nos. ii. Rural households- About 7000 households with 200 W connection in the Kekem, Bare-Bakem and Manjo districts. iii. Other sectors- 20 schools, 20health clinics, one technical college etc. **Indicator 4.** ***Establishment of financial facilities (e.g., credit lines, risk guarantees, revolving funds)*** Current Status: None specific to renewable energy except some funding outlined under the CREF. Target: Establishing and operationalising a special window under CREF which will be dedicated to provide the technical assistance for renewable energy project and facilitate the financing through various agencies.

	Indicator 5. ***Capacity building*** Current Status: The capacity of government bodies, private sector, financing institutions etc. are weak about renewable energy projects in terms of policy formulation, setting financing assistance, design and implementation, operation and maintenance etc. Target: i) At least 2 training programs for government institutions for building their capacity on renewable energy policy formulation and implementation. ii) At least 2 training programs for financing institutions to make them understand the renewable energy projects and developing financing mechanisms. iii) 2-3 investment fora to bring together all the stakeholders important for renewable energy development in Cameroon. iv) At-least 5 training programs for private sector in designing and implementation of biomass and small hydropower plants in mini grid mode. v) At-least 5 training programs for the operator and maintenance service providers of biomass and small hydropower plants in Cameroon. vi) One exposure visit of national consultant, technical expert and managers to similar successfully functional plants in neighbouring countries of Cameroon in Western/Central African region.

Project Strategy	**Objectively Verifiable Indicators**				
	Indicator	**Baseline**	**Target**	**Sources of Verification**	**Assumption**
Goal: Promoting productive application and reduction of GHG emissions from fossil fuel based power generation by implementing renewable energy projects.	Number of productive enterprises getting electricity supply from the project and cumulative amount of GHG reduced in kilo tons of CO_2 by year 1 of biomass and small hydropower project commissioning.	At present local entrepreneurs are dependent on diesel generators. No small hydropower and biomass based mini grid projects for rural electrification and productive usage of electricity.	8,252 tCO_2 emission reduction annually.	Monitoring report/log sheet of demonstration power plants indicating units of energy generated (estimated at 14,310 MWh/year).	Government of Cameroon remains committed in the medium and long-term to promote biomass and small hydro power to improve energy scenario in the country. M&E system is in place and fully implemented. Pilot plant installation gets all local supports for its timely completion.
Purpose: Promotion	• Average annual	• No biomass and	2.7 MW SHP pilot	Commissioning	Government of

Project Strategy	Objectively Verifiable Indicators				
	Indicator	**Baseline**	**Target**	**Sources of Verification**	**Assumption**
of investments and market in the scale up and replication of integrated renewable energy solutions for productive uses in Cameroon.	growth rate of installed biomass and small hydro power station in Cameroon. • Average increase (%) in electricity demand in the areas served by biomass and small hydro plants. • Number of households electrified using biomass and small hydro power. • Number of productive enterprises established and using electricity	small hydropower based mini grid/off-grid projects for rural electrification and productive usage of electricity. • Low interest of the private sector in the biomass and small hydropower development.	project and 0.125 MW Biomass based power plant installed. At least 70 MW of SHP projects and at-least 14 MW of biomass power projects by end of 10 year of commissioning of pilot project, installed in Cameroon through the influence of successful demonstration of pilot projects. About 7000 households and 50 small enterprises get benefitted from the project.	certificate of the pilot plant. List of households and small industry electrification data Information about the new projects on SHP and biomass that will be planned in Cameroon after this project.	Cameroon remains committed in the medium and long-term to promote biomass and small hydro power to improve energy scenario in the country. Appropriate policy and regulations in place and is well accepted by all stakeholders. Rural electrification and affordable cost of electricity for productive usage is the key priority for government. The market demand for biomass and small hydropower systems will rise and attract relevant target players.
Project Component 1: Strengthening the policy and regulatory framework for renewable energy and its enforcement.					
Outcome1: A renewable energy policy and regulatory framework in place, supporting a vibrant renewable energy sector with enhanced private sector confidence and participation in renewable energy generation. Indicator: Policy and regulatory framework for renewable energy is well accepted among all stakeholders and the increased number of private sector players applying for renewable energy development under that framework.					
Output 1.1: Renewable energy policy and regulatory	i. Appropriate policy and regulatory framework for	• At present there is no specific policy and regulations on	• Policy and regulatory guidelines	• Policy and regulatory guidelines	Government of Cameroon remains committed to

Project Strategy	Objectively Verifiable Indicators				
	Indicator	**Baseline**	**Target**	**Sources of Verification**	**Assumption**
framework enforced.	renewable energy promotion in Cameroon is developed and enforced. ii. Biomass extraction and utilisation policy and water use policy for power generation is developed and adopted. iii. System at local level developed to monitor the sustainability of biomass extraction	renewable energy. • There is no policy for sustainable extraction and utilisation of biomass or water use for power generation in the country.	developed within 1 year of the project start • Policy adopted within 2 year of project approval (Q4, year 2). • Biomass extraction and utilisation policy and water use policy developed and adopted by Q4 year2. • Local level monitoring tool and system to check biomass extraction sustainability and enforce restriction developed and enforced by Q4 year 2	document. And its strategic implementation plan. • Policy document on sustainable biomass extraction and utilisation.	promote biomass and small hydro power to improve energy scenario in the country. Different government department and agencies appreciate, support and adapt the renewable energy development policy and regulations. Relevant government department, (specially the ministries handling forest, agriculture, energy and environment departments) agrees on the need and importance of such policy.
Output 1.2: Institutional capacity developed for the formulation and implementation of policy and regulations for promotion of biomass and small hydro projects for rural electrification and productive applications through	i. Documented capacity building modules for government stakeholders related to policy, regulation and RE project implementation. ii. Number of capacity building programs conducted successfully on policy and regulations	• Low capability and capacity of government institutions for formulating appropriate policy and regulatory guidelines for RE promotion in country.	• List of candidates received from each stakeholder by 1st year of the project. (Q2, Year1). • Capacity building modules developed within 1 year of project start (Q4, Year1). • Two to three capacity building	List of stakeholders. Note on stakeholders need assessment Proceedings of capacity building programs. List of government officers trained from each stakeholder	Central government remains committed towards development of renewable energy in the country. Relevant stakeholders show interest and take part in the capacity building programs.

Project Strategy	Objectively Verifiable Indicators				
	Indicator	**Baseline**	**Target**	**Sources of Verification**	**Assumption**
private sector participation.	formulation for renewable energy systems and its implementation. iii. Number of government officers trained and given responsibility of preparation and implementation of RE related policies and regulations. iv. Number of stakeholders trained on sustainable biomass extraction policy and the biomass power projects following the guidelines of the policy.		programs for the government agencies conducted during the second to fourth year of the project. • Two capacity building programs on policy for sustainable extraction and utilisation of biomass resources for power generation.	organisations.	
Project Component 2: Developing mechanisms to promote and sustain private sector investments in renewable energy generation.					
Outcome2: 2.1 Investment mechanism strengthened to support a viable renewable energy generation market 2.2 National institutions and key private sector market players have the financial and technical capacities, tools and support base needed to effectively promote and sustain a renewable energy market. Indicator: Number of financing institutions and private sectors come forward to finance and invest in renewable energy projects.					
Output 2.1: Guidelines, best practices, investment incentives, standardised PPAs, tariffs, pricing mechanisms, risk management instruments and viable renewable	i. Project developers and investors making use of experiences highlighted in the collected case studies and best practices of investment in renewable energy specially biomass and small hydropower	At present the financing instruments and tariff structure for making renewable energy projects viable in country are not available.	• Best practices prepared by end of 1 year from project start. • Parameters for project evaluation identified and developed by end of 1st year of the project.	Document on best practices. Incentive and tariff structures. PPA document. Project evaluation framework.	The Cameroon government, MINEE and ARSEL cooperate in the formulation and adoption of the guidelines and various implementation mechanisms.

Project Strategy	Objectively Verifiable Indicators				
	Indicator	**Baseline**	**Target**	**Sources of Verification**	**Assumption**
energy generation business models developed and put in place	projects. ii. Project viability evaluation framework developed and adopted. iii. Number of projects availing financial/fiscal incentives set under this project. iv. Number of power purchase agreement signed as per the standard PPA and tariff rates for renewable energy Number of renewable energy projects being implemented as per developed viable business models under the project. v. Number of local banks that accepted guarantee schemes vi. Number of RE investments supported by local banks thanks to the loan guarantee scheme		• Incentive structure including tax benefit guidelines are developed by end of 1.5 year of project start and put in place by end of year 2016 • PPA documents including tariff rates developed and adopted by at least 5 developers by end of 2nd year of the project. • Viable business models developed and explained to various stakeholders (at least 10by end of 2nd year of the project start. • Identify partners with adequate experience in guarantee schemes and banks interested in entering the scheme to lend to RE projects • Established guarantee schemes for banks interested to lend to RE projects • Start of implementation of at least 10 numbers	Document on business models.	Private sector finds the incentive structure defined attractive. .

Project Strategy	Objectively Verifiable Indicators				
	Indicator	**Baseline**	**Target**	**Sources of Verification**	**Assumption**
			of renewable energy projects utilizing the business model(s) developed and availing financial/ fiscal incentives by the end of the project.		
Output 2.2: Training programmes implemented to strengthen the capacity of local banks and institutions in project finance and risk management instruments for renewable energy projects.	i. Financing risk reduction instruments which are available in the country are put in place for renewable energy project financing. ii. Number of private sector projects availing benefits of the developed financial risk management instruments and the amount of financing received by such projects. iii. Number of capacity building programs organized for financing institutions for sensitizing them about RE project viability and project risk management instruments are.	• At present financing institutions do not consider renewable energy projects in their priority. They also have less capacity in understanding the RE projects and risk mitigation options for financing.	• At least 5 local banks and other financing institution's capacity assessed by end of the 1st year. • Financial risk management instrument identified and put in place for the RE projects in country by end of 1.5 year of the project. • Two capacity building programs organized during year 2 and 3 of the project.	List of financing institutions and their assessment findings. Information on financial risk management instrument. Proceedings of capacity building program.	Financing institutions take interest in participation for capacity building on financing for renewable energy development
Output 2.3: Renewable energy investment fora held to sensitise investors and promote investor	i. Important stakeholders which include government bodies, industries, private sector investors and	• At present there is less awareness, confidence, and linkages among various stakeholders	• Candidate's list from identified stakeholders received within 6 months of the start	List of stakeholders. Proceedings of the investment foras.	Private entrepreneurs and local stakeholders are interested in the participation in such

Project Strategy	Objectively Verifiable Indicators				
	Indicator	**Baseline**	**Target**	**Sources of Verification**	**Assumption**
confidence.	project developers, financing institutions including national banks and international funding agencies etc. giving commitments for RE financing. ii. Number of investment forums organized, and the funding committed by the stakeholders. iii. Amount of funding leveraged from various investors/financers.	for renewable energy development and its benefits. • There are no funding/investment commitments for renewable energy projects.	of the project. • Agenda and discussion points for investment fora developed by end of 1.5 year of the project start • At least 2 numbers of investment foras organized during the year 2 and 3 of the project start.	Funding declarations/MoU signed if any.	foras. Government of Cameroon remains committed for development of RE through private sector participation.
Output 2.4: Targeted technical capacities developed for the design, operation and maintenance of integrated renewable energy systems.	i. Number of training programs organised on the design, operation and maintenance of integrated renewable energy systems and number of people trained. ii. Number of trained people engaged in different activities of RE project implementation, operation and management. iii. Number of people making use of the training	• Lack of technical capacity for RE design, installation and operation.	• Work plan developed by Q1 of the first year of the project start • Stakeholders participant's list received within 6 months of project start. • Training modules developed within 1.5 year of the project start • 2 training programs for turbine manufacturers organized during 2nd and 3rd year of project and at least 5 number of people/prospective turbine	List of stakeholders which include the government institutions, agencies, private sector (manufacturers, project developers and service providers), technicians and engineers at private sector institutions and community level etc. trained for biomass and small hydropower plants. Training modules. Proceedings of training programs.	Sufficient number of stakeholders exists in the country with interest in renewable energy sector. Good participation expected from all category of the stakeholders.

Project Strategy	Objectively Verifiable Indicators				
	Indicator	**Baseline**	**Target**	**Sources of Verification**	**Assumption**
			manufacturers trained • 2 training program on designing and implementation of renewable energy projects for private sector organized during 2nd and 3rd year of the project. (also the in-plant training during commissioning of the plant) and at least 10 number of people trained • 2-3 training programs organized for the operation and maintenance service providers during 3rd and 4th year of the project and at least 15-20 number of people/service providers trained • Two training program organized for the management of RE mini-grid distribution projects in rural areas by the Q2, Y4 and at least 15-20 number of people trained • 30-40 People making use of the		

Project Strategy	Objectively Verifiable Indicators				
	Indicator	**Baseline**	**Target**	**Sources of Verification**	**Assumption**
			trainings • Future training plan developed by the end of the project.		
Output 2.5: An investment guide/toolkit on renewable energy investment potential in Cameroon published to support investors and project developers.	i. Developed toolkit for assessing benefits of investment in renewable energy. ii. Growth in number of interested private sector investors/financiers utilizing the toolkits to assess the investment potential in the country.	• At present no such toolkit available in the country.	• Toolkit developed by end of 2nd year of the project (This will be based on the need assessment and various policy and incentive mechanisms developed under different output activities). • Dissemination of the toolkit through workshop to at least 10-15 persons by 2.5 to 3 year of the project. • At least 5-10 numbers of Private sector investors/financiers using the toolkit to assess the investment potential in renewable energy projects in Cameroon.	Documentation on toolkit and toolkit itself. Proceedings of the dissemination workshop. List of interested private sector investors and financing agencies for renewable energy development in Cameroon.	Private sector actively takes part and mentions their expectations from government and benefits from RE projects. Private sector finds the tool useful and takes part in its use effectively.
Output 2.6: A special window dealing with renewable energy established and operational within CREF.	i. Estimated amount of fund needed to support renewable energy projects to meet certain targets, and the amount of such fund established within	Present CREF have no specific arrangement or mechanism for long term financing resource for renewable energy projects.	• Assessment of present CREF and interaction with relevant stakeholders completed within 6 months of the	Assessment and fund estimation reports. Report on the mechanism for special window under CREF for RE	All the ministries responsible for energy sector and financial arrangement work in coordination.

Project Strategy	Objectively Verifiable Indicators				
	Indicator	**Baseline**	**Target**	**Sources of Verification**	**Assumption**
	REF to support the RE projects. ii. Special window having dedicated fund for renewable energy investment in the Cameroon under REF is established and made operational. iii. Number of projects receiving support and services from the special window till the end of the GEF project period. iv.		project start. • RE capacity projection and Fund requirement estimated within 1 year of project start. • Mechanism for special window under CREF developed within 1.5 Year of project start. • One training for the implementation of the mechanism of operation of special window under RE organized and at least 5 number of people trained by Q1 Year2. • Operation and services of the special window starts immediately after its establishment and at least 20-30 number of projects approach the window for support	funding. Existence of the special window. List of projects and services provided by the special window.	Donor agencies accept the approach of routing RE financing through the single window. Private investor find services of special window reliable within reasonable cost.
Project Component 3: Demonstration of the technical and commercial viability of integrated renewable energy mini grids.					
Outcome 3: 3.1 Renewable energy mini grids are replicated and become an integral part of Cameroon's electrification program **3.2** Installed capacity of renewable energy systems increased. Indicator: 1. Increase in installed renewable energy capacity and the number of more private sector players taking part in such project.					
Output 3.1: Four integrated electricity mini grids of a	i. Functional commissioned demonstration	• NA	• Work plan developed by Q1 of year 1 of the	Detailed Project Report.	Best practices and standards are applied during preparation of

Project Strategy	Objectively Verifiable Indicators				
	Indicator	Baseline	Target	Sources of Verification	Assumption
combined capacity of up to 2.825 MW and optimising local renewable energy resources installed and operated to demonstrate the technical and commercial viability of renewable energy systems.	projects. ii. Amount of financing or incentives utilized by the demonstration projects through the financing risk management instruments put in place under component 2 of this project.		project. • DPRs for all projects prepared within 9 months of the project start, with the identification of electricity distribution route and financial closure achieved clearly indicating the share of financing/investment by different stakeholders • Selection of all the vendors and technology providers completed within 1 year of the project start. • EPC contract awarded within 1 year of the project start. • Projects commissioning completed within 2 years of the EPC contract award. • Plant O&M training modules ready within 2 year of the project start. • Operation and management plan adapted within 2.5	EPC contract. Project commissioning reports. O&M manuals. Management plans. Operating parameter guidelines.	DPRs. Global vendors and service providers take part interestingly in providing their technology and services for plant commission in Cameroon. Government of Cameroon as well as local authorities and villagers provide full support during the commissioning of the project. Local technicians and engineers get well trained for the operation and maintenance of the plant, by the time of plant commissioning.

Project Strategy	Objectively Verifiable Indicators				
	Indicator	**Baseline**	**Target**	**Sources of Verification**	**Assumption**
			year of the project start. • Operating parameters set by the time of the commissioning of the plants.		
Output 3.2: Existing and new productive uses identified and value chains promoted for renewable energy utilisation.	i. Number of Identified productive applications being powered through the demo project. ii. Number of people sensitized and trained about productive applications of biomass and small hydroelectricity. iii. Number of entrepreneurs which would show their interest to get power from any such future mini grid project.	• NA	• Existing and future productive applications and interested users identified. Estimated target is - About 40 palm oil extraction units - About 5 cassava processing units - About 5 coffee processing units. • Two awareness and training programs for productive usage organized among villagers in the project area by the end of 2nd year of the project start.	List of interested villagers for entering into micro enterprise business through biomass and small hydroelectricity. Proceedings of the awareness program.	Enough number of villagers takes interest in productive use of electricity. Government support financing for the productive ventures such as machineries and other equipment.
Project Component 4: Monitoring and evaluation.					
Outcome4: 4.1 Project deliverables are tracked and achieved and 4.2Best practices learnt from this project prepared for future replication and scaling up of projects based on biomass and small hydropower. Indicator: Timely implementation of the project and number of printed material from the learning of the project.					
Output 4.1: Demonstration projects monitored throughout project cycle and	i. List of all the progress report prepared ii. Number of review meetings and	• NA	• Project Management Unit Formed and operational within 1 month of the start of the project.	PMU structure. M&E plan document.	Government of Cameroon provides full support in the immediate formation of the PMU.

Project Strategy	Objectively Verifiable Indicators				
	Indicator	Baseline	Target	Sources of Verification	Assumption
independently evaluated.	steering committee meetings.		• M&E plan ready within 3 month of the project start. • Mid-term evaluation completed by end of the year 2 of project start. • Final evaluation completed by end of project closing time. • Project Terminal Report completed by end of the project.	Quarterly Progress Reports. Mid Term Evaluation Report. Final Evaluation report. Project Terminal Report.	Appropriate capability of the Project Manager and Project Directors exist for proper management and monitoring of the projects.
Output 4.2: Lessons learned are disseminated nationwide to relevant stakeholders to benefit further.	i. Number of dissemination materials (pamphlets, project success report, case study etc.) and its printed for dissemination.	• NA	• Lessons learnt from the project drafted by the 3.5 years from project start. • Dissemination materials ready by the end of the project.	Copies of dissemination material for lesson learnt. (about 500 copies)	Project gets commissioned successfully and the expected outputs achieved sustainably. Government and private sector accepts the facts and figures produced from this project's experience.

ANNEX B: RESPONSES TO PROJECT REVIEWS (from GEF Secretariat and GEF Agencies, and Responses to Comments from Council at work program inclusion and the Convention Secretariat and STAP at PIF).

Comment	Response	Reference
STAP comments 04 May 2012/ Germany comments		
Demonstrations: Installing two or three projects around the 1 MW scale using renewable energy generation to supply mini-grids for off-grid rural areas is a commendable approach. However, it is not clear how the locations will be selected and the different technology systems will be integrated. Using local renewable resources is sensible, but the different renewable energy resources available will determine whether generation can easily remain balanced with the varying demand or not. How this will be achieved in practice for the 2 to3 systems and who will act as the system operator should be explored during project preparation. The targeted capacity building plans for technical expertise are needed to ensure suitably skilled people are available. External technical expertise will be needed initially to design the systems and it's not clear how this capacity will be fulfilled. Note the proposal states "2 or 3" demonstrations are planned, but then it states "the sites will focus on" four regions each producing different commodities. Whether hydro resources are also available in all 4 regions is not clear, nor is the basis on which the locations will be finally selected. How will the distribution lines from the generation plants be funded? How will customers pay through pre-paid meters or other means? How the off-grid demonstration systems will be funded and operated is not clear either. These questions require further explanation before CEO endorsement.	The project locations have been selected based on the pre-feasibility study of 3-4 small hydro sites and the socio-economic conditions in the selected region for the study. The plant capacities chosen and the load areas selected are such that all the generated electricity from the plants will be consumed. For the load balancing proper training will be given to the operator of the plant. The sites for the demonstration are finalised based on the initial pre-feasibility studies and the implementation mechanism is such that the distribution will be by a distribution licensee who will follow the Cameroon electricity laws and will perform its function under the laws and regulations defined in the country.	Annexure E (Summary of feasibility studies and loads to be catered for pilot projects)
Removal of barriers: Providing technical and investment assistance to offset the incremental costs of renewable energy generation systems is the reason why GEF funding is being sought. Overcoming the barriers to renewables is imperative. The costs of fossil fuel thermal generation have traditionally been low and several other projects are in place to support these least cost options, regardless of any related increase in GHG emissions. A cost/supply curve of the various renewable energy generation options listed would be useful for further project development. It is not clear	The technology selected for the projects demonstration are based on the most suitable local resource availability and the potential for replicability. Further it has been seen that the renewable energy technologies with their technological advancements are becoming equally competitive and economically viable now a days.	Barrier analysis section under A4 and Figure A6.1 of RCE.

Comment	Response	Reference
Whether the technologies selected for this project (hydro and bioenergy) are more cost-competitive than others (e.g. solar PV or geothermal), or indeed how much of the projected future electricity demand they could meet. STAP recommends detailed analysis of these barriers during project preparation.		
Baseline: Assessing the baseline when so many other initiatives are in place will be difficult. Determining the additional generation through GEF funding for the new renewable mini-grid projects will be the key indicator. Little replication is likely to happen during the 4 years of project implementation. GHG baseline information is requested at the next stage.	GEF project targets to streamline various initiatives on renewable energy through the special RE window under REF in Cameroon, and hence will definitely contribute to further development of the renewable energy systems in the country. Baseline analysis and the GHG emission reduction calculations are carried out in detail as per the GEF manual for calculating GHG emission reduction for renewable energy	Annexure G
Climate change abatement and risks: Only relatively low levels of CO2 emissions will be avoided by the demonstration projects (0.15 Mt) but this will be offset by gaining energy access for a greater share of the population. Drought conditions are already affecting the hydro schemes along the main rivers, so any mini-hydro schemes using small streams in the demonstration regions could also be affected. Seasonal variations may also exist and affect the reliability of the system. Competition for water by crop producers could also impact hydro generation potential. Deforestation is a major problem that can be reduced by lowering the demand for fuel wood.	Project capacity is designed based on the study of rainfall pattern and also the availability factor of water during dry season has been taken into consideration in the feasibility study. The lean period water flow conditions has been taken care while designing the plant capacity, so the project is expected to be less affected due to such draught conditions and further the rainfall pattern of the region shows low probability of such draught conditions. The region has naturally grown forest areas as well as agriculture lands, and the rainfall patterns is such that the agricultural land need comparatively low amount of water so no stiff competition is envisaged. The planned biomass project	Annex E and Appendix A1- Pre-feasibility study of small hydropower plants

Comment	Response	Reference
	capacity is considering the surplus biomass that can be sustainably be harvested from the region. The knowledge of biomass technologies would also help in efficient utilisation of present wood consumptions. Further the villagers awareness creation activities would ensure reduction in de-forestation activities.	
Monitoring and evaluation: This is an important component of this "leapfrogging" project and will be critical for ensuring replication occurs as anticipated, not only in Cameroon but, if successful, also elsewhere.	Detailed monitoring and evaluation plan is given in this project document with a view to properly and regularly monitor the project implementation and expected results through appropriately formed PMU.	Section C of Part II of RCE
Germany comments		
Germany largely agrees to the recommendations given in the STAP Review. It remains unclear how the location of the three pilot activities will be chosen and what kind of renewable energy will be applied. The PIF indicates that combined heat and power and/or small hydropower would likely be used. No indication is given, however, what the assumptions are to achieve GHG mitigation as high as 150,000 t using US$ 2,000,000 of GEF funds. These numbers suggest a certain pre-selection of technologies and regions that have not been made transparent.	1. Sites are selected with consideration of several factors like feasibility of RE technologies, access to site, local interest and readiness, market and demand, institutional supports available, handling capacity of communities / beneficiaries, co-financing availability, government preference, replication potential, NGOs and civil society support etc. accordingly the sites were listed, reviewed, discussed, short listed, visited, nominated and finally selected in cooperation with various stakeholders including government and UNIDO. 2. Regarding the capacity and nature of project, during PIF and PPG stage, based on the country information and interests received from various stakeholders, it was proposed to develop biomass based gasification	Section A5.1, Appendix B1, B2

Comment	Response	Reference
	and small hydropower plants. With available co-finance the total target estimated was 2-3 MW of Hydro and few hundred kW of gasification system. For this GEF financing will be partly utilized to mobilize resources, partly covering investment and majorly funding the technical assistance of the project including awareness, training, capacity building, exposure, institutional establishment, policy strengthening etc. 3. The GHG emission calculations have been made based on the identified demonstration project and its potential to replace and save the diesel consumption to meet the same power need as is expected to be generated from the identified projects.	
The selection of a certain region and technology has implications on the replicability of the demonstration projects. Some technologies might be more suitable for a certain region than others. It should be clarified how this will be taken into account both while selecting site and technology for the pilots and for the conceptualization of information campaigns/materials for the replication.	The technologies have been selected based on the potential distribution across the country. Demonstration sites have been selected with consideration of several factors like feasibility of RE technologies, access to site, market and demand, community interest, co-financing availability, government preference, replication potential, NGOs and civil society support etc. accordingly the sites were listed, reviewed, and finally selected in cooperation with various stakeholders including government, local NGO and UNIDO.	Appendix B1, B2
GEF SEC Review		
Review point no. 13 dated April 6, 2012		

Comment	Response	Reference
Comparative costs between renewable or non-renewable energy production for investments of the private sector in rural areas will have to be provided at CEO endorsement stage.	Figure 6.1 shows that the levelised cost of electricity generation from SHP is well below 0.1 US$/kWh and for biomass power is ranging from about 0.05 US$/kWh to less than 0.2 US$/kWh. And the weighted average LCOE for both the technologies are about 0.05 US$/kWh which fairly compares with the power generation cost from a diesel generator which is about US$ 0.27 per kWh and the LCOE from the thermal power plant based on fossil fuel are around US$ 0.05/kWh[34]. (Ref. Para 4 of Section A5.4.1)	Figure 6.1and Para 4 of SectionA5.4.1 (Sustainability)
Review point No. 14, dated 12 April 2012		
The activities of component 1 and 2 will have to be described detailed at CEO endorsement stage with specific attention devoted to their complementarity.	The outcome and outputs under component 1 and 2 have been clearly identified and are described in detail under section A5.2.1 and A5.2.2. The complementarity is described with the fact that under component 1 main focus will be on creating the policy and regulatory environment for attracting private sector investment in renewable energy sector and component 2 will focus on creating financial support mechanisms, training and capacity building of govt. institutions as well as private sector to help them get benefit of such policies and creating the larger market for renewable energy utilisation for productive applications.	Section A5.2.1 and A5.2.2

[34] Paper titled 'Design and development of a business model for biomass power plant using data development analysis' P. Raman and T. Nambirajan, Review of Business Research, Volume 10, November 2010.

ANNEX C: STATUS OF IMPLEMENTATION OF PROJECT PREPARATION ACTIVITIES AND THE USE OF FUNDS[35]

A. PROVIDE DETAILED FUNDING AMOUNT OF THE PPG ACTIVITIES FINANCING STATUS IN THE TABLE BELOW:

PPG Grant Approved at PIF:			
Project Preparation Activities Implemented	***GEF/LDCF/SCCF/NPIF Amount ($)***		
	Budgeted Amount	***Amount Spent Todate***	***Amount Committed***
Stakeholder consultation	5,000	4,000	1,000
Identification of project demonstration sites	16,000	15,000	1,000
Assessment of linkages and synergies with related activities	4,000	2,500	1,400
Preparation work for the establishment of a renewable energy window.	5,000	5,100	0
Detail project design, implementation, monitoring and evaluation plan	30,000	25,000	5,000
Total	60,000	51,600	8,400

[35] If at CEO Endorsement, the PPG activities have not been completed and there is a balance of unspent fund, Agencies can continue undertake the activities up to one year of project start. No later than one year from start of project implementation, Agencies should report this table to the GEF Secretariat on the completion of PPG activities and the amount spent for the activities.

ANNEX D: CALENDAR OF EXPECTED REFLOWS (if non-grant instrument is used**)**

Provide a calendar of expected reflows to the GEF/LDCF/SCCF/NPIF Trust Fund or to your Agency (and/or revolving fund that will be set up)

NA

ANNEX E: Summary of feasibility studies and loads to be catered for pilot projects

As per the project preparation activities, the feasibility study of the implementation of demonstration small hydro power and the biomass power projects have been carried out in the potential sites in Kekem, Bare-Bakem, Melong and Manjo district council areas of the Littoral Region in Cameroon. Based on the study of the resources, site conditions, development possibilities, approach roads, expected loads and other important socio-economic parameters two SHP projects (1.2 MW Manjo SHP and 1.5 MW Mouakeu (Small Ekom-Nkam) and two Biomass projects (75 kW at Ekom-Nkam village and 50 kW at Foyemtcha Chefferie village) have been identified.

Brief of the project sites are given in Table below.

Table E1: Brief of selected project sites

Site no.	Site name	Type of Project	River name	District Council	Estimated power capacity	Nearest village	Remarks
1	Foyemtcha	Biomass power	NA	Kekem and Melong	50 kW_e	Foyemtcha	Village is completely un-electrified and also difficult to reach in rainy season. It has about 300 households.
2	Small Ekom-Nkam or Mouakeu	SHP	Ekom-Nkam	Bare-Bakem	1.5 MW_e	Ekom-Nkam/Mouakeu	This small Ekom-Nkam fall is near the large Ekom-Nkam fall which is a tourist place.
3	Ekom-Nkam	Biomass power	NA	Bare-Bakem	75 kW_e	Ekom-Nkam	Village is completely un-electrified. It has about 100 households.
4	Manjo	SHP	Essoue	Manjo	1.2 MW_e	Manjo	The site is very near to Manjo town and is also easily approachable.

E1: Pre-feasibility of the Small Hydropower projects

The pre-feasibility of the small hydropower projects had been carried out for four identified sites and after assessment it is found that out of 4 sites 2 sites are recommendable project sites for the demonstration under this GEF project. This study was carried out by the International Center on Small Hydro Power (ICSHP), China. The report considered the rain precipitation data (1901-2009) of the Climatic Research Unit of the University of East Anglia. The precipitation values show that the mean annual precipitation is 1562.3mm and concentrates in rainy season. The precipitation from April to October accounts 85% of the total annual rainfall and in dry season particularly in January and February every year the rainfall is extremely less. Thus the distribution of annual rainfall precipitation is not even. Based on the rainfall data information, measurement of flow at site and other information such as estimated head availability, percentage water availability, runoff coefficient etc., the possible plant capacity of SHP has been estimates and the information of the two selected sites are given in the tables below.

Table E1.1: Comparison of installed capacity and energy estimates of Manjo SHP site

Site	**Unit**	**Manjo**		
Installed capacity	kW	3×300	**3×400**	3×500
Generating head	m	22.5	**22.5**	22.5
Generating flow	M3/s	5.22	**6.96**	8.70
Theoretical mean annual output	10,000 kWh	598.2	**721.4**	757.6
Practical mean annual output	10,000 kWh	538.4	**649.2**	681.9
Practical annual utilizing hours	Hrs.	5982	**5410**	4546
Recommendation			√	

Table E1.2: Comparison of installed capacity and energy estimates of Mouakeu SHP site

site	**unit**	**Mouakeu**		
Installed capacity	kW	3×400	**3×500**	3×600
Generating head	m	38	**38**	38
Generating flow	M3/s	4.2	**5.1**	6.3
Theoretical mean annual output	10,000 kWh	737.6	**815.4**	858.7
Practical mean annual output	10,000 kWh	663.8	**733.8**	772.8
Practical annual utilizing hours	Hrs.	5531	**4892**	4293
Recommendation			√	

The estimated budgets for the two SHP projects are given in the table E1.3 and E1.4 respectively

Table E1.3: Total budget item list of the Manjo SHP Site

No	**Project item**	**Construction Cost**	**Equipment Cost**	**Installation Fee**	**Other Fees**	**Sum(USD)**
1	Construction	1,784,385				1,784,385
2	M/e equipment and installation		600,000	100,000		700,000
3	Metal structures and installation		426,456	71,076		497,532
4	Temporary structures				150,000	150,000
5	Transmission				50,000	50,000
6	Independent cost				293,319	293,319
7	**Sum of 1-6 item**	**1,784,384**	**1,026,456**	**171,076**	**493,319**	**3,475,236**
8	Basic reserve fund (10%)					347,524
9	**Total static investment**					**3,822,760**

Table E1.4: Total budget Item List of the Mouakeu SHP Site

No	Project item	Construction Cost	Equipment Cost	Installation Fee	Other Fees	Sum (USD)
1	Construction	2,377,514				2,377,514
2	M/e equipment and installation		750,000	125,000		875,000
3	Metal structures and installation		383,256	63,876		447,132
4	Temporary				150,000	150,000
5	Transmission				50,000	50,000
6	Independent cost				414,958	414,958
7	**Sum of 1-6 item**	**2,377,514**	**1,133,256**	**188,876**	**614,958**	**4,314,604**
8	Basic reserve fund (10%)					431,460
9	**Total static investment**					**4,746,064**

E2: Pre-feasibility of the Biomass power projects

The feasibility study of the biomass power plants has been carried out in and around the villages nearby the identified SHP sites. The project team visited the villages and identified the available resources, expected loads, villager's willingness and paying capacity, community interest, district council support possibility etc. Based on the detailed assessment it is proposed to install the two biomass gasifier based power projects (75 kW at Ekom-Nkam village in Bare-Bakem district and 50 kW at Foyemtcha Chefferie village in Kekem district). The preliminary assessments and design estimates are given below.

E2.1 Biomass resources

Cameroon has vast resources of forest biomass. The total area covered by dense productive forests is estimated at 16,467,570 ha (Eba'a Atyi et al., 2009). The major phytogeography divisions, which unquestionably correspond to the major climatic zones in both physiognomic aspect and floristic composition, form three main ecological regions: the Congo-Guinean region in the south, the Sudano-Zambesian region in the north and the Montane region which is associated with local physiography.

Further the agriculture remains the backbone of Cameroon's economy, employing 70% of its workforce, while providing 42% of its GDP and 30% of its export revenue. Land use in Cameroon follows arable land 13%, permanent crops 2%, permanent pastures 4%, forests and woodland 78% (rainforest represents 40% of total land use), and others 3%. Arable land is estimated at 7.2 million hectares, but only 1.8 million hectares are effectively cultivated. The most important cash crops are cocoa, coffee, cotton, bananas, rubber, palm oil and kernels, tobacco, tea, pineapples and peanut. Cameroon is among the world's largest cocoa producers with 130,000 tons of cocoa beans produced in 2004 and 200,005 tons produced in 2009. The main food crops are plantains, cassava, corn, millet, yam, cocoyam, potatoes and beans.

Considering these vast forest as well as the agricultural resources it is observed that the country has huge potential for the biomass based energy production. As per the estimates (Emmanuel K. Ackom, Dieudonne Alemagi et al. 2013) Cameroon has the potential of producing about 1.11 million tons of bone dry biomass residues annually from its agriculture as well as forest cover. At project sites also it is observed that the villagers freely takes wood chips and firewood from forest for their daily domestic

requirements and adequate quantity of these waste wood resources can be available for long term in the area, which makes it suitable to install a biomass based power generation in the village area.

E2.1.1 Size estimation of the unit and operational details for biomass plant in Foyemtcha village

The capacity of the system is estimated to meet the lighting load requirement of households in the village as well as some commercial and micro-industrial loads. It is proposed that the plant will supply electricity to 150 households for lighting up-to 200W each household. The plant will supply electricity to 20 street light points at a common place in the village. Keeping this load into consideration, the plant size estimated is shown in table E2.1

Table E 2.1: Estimated plant size based on load requirement

Particular	**Value**
Number of household	150
Total domestic lighting load 4 Nos @ (200 W / household)	22.5
Street lighting load – 20 Nos. @ 50 W/point	1
Electricity for productive uses* @ 20 kWe	15
Addition power for new connection in future	10
Total connected load (kW)	48.5 rounded to 50kWe

*For rural enterprises loads such as cassava grinding /flour mill and one woodcutter tec.

In order to keep sufficient future capacity requirement and meet the technical and distribution losses the capacity of the proposed power plant is estimated to be 50 kWe and is planned to be met through one biomass gasifier based power plants of capacities 50 kWe to be installed in the main village. The demand for domestic load and evolving industrial load can be shared by shift in timings and load sharing arrangements.

Table E2.2: Cost breakup for a 50 kWe, biomass gasifier based power plant

S.No.	**Component**	**Cost US $**
1	Biomass gasifier system	45,000
2	100 % gas engine	40,000
3	Accessories for the gasifier and IC engine	15,000
4	Installation and commissioning	4,000
5	Transportation	8,000
6	Distribution network cost (5 Km @ USD 3636 per km)	23,000
7	House hold wiring (150 HH @ USD 18.2)	2,800
8	Civil construction cost of the building	33,000
Total		**170,800**

E2.1.2 Size estimation of the unit and operational details for biomass plant in Ekom-Nkam village

The capacity of the system is estimated to meet the lighting load requirement of households as well as some commercial, micro-industrial and public facility loads. It is proposed that the plant will supply electricity to about 60 households for lighting up to 200W each household. The plant will supply electricity to 20 street light points at a common place in the village. Keeping this load into consideration, the plant size estimated is shown in table E2.3.

Table E2.3: Estimated plant size based on load requirement

Particular	Value
Number of household	60
Total domestic lighting load 4 Nos @ (200 W / household)	12
Street lighting load – 20 Nos. @ 50 W/point	3
Electricity for productive uses* @ 35 kWe	35
Addition power for new connection in future	20
Total connected load (kW)	70

*For rural enterprises loads such as palm oil extraction unit, coffee grinder, cassava grinding /flour mill and one woodcutter tec.

In order to keep sufficient future capacity requirement and meet the technical and distribution losses the capacity of the proposed power plant is estimated to be 75 kWe and is planned to be met through one biomass gasifier based power plants of capacities 75 kWe to be installed in the main village.

Table E2.4: Cost breakup for a 75 kWe, biomass gasifier based power plant

S.No.	Component	Cost US $
1	Biomass gasifier system	75,000
2	100 % gas engine	70,000
3	Accessories for the gasifier and IC engine	25,000
4	Installation and commissioning	6,000
6	Distribution network cost (5 Km @ USD 3636 per km)	23,000
7	House hold wiring (60 HH @ USD 18.2)	1,092
8	Civil construction cost of the building	53,000
9	Transportation	10,000
Total		**263,092**

E3. Connected load and annual electricity demand

The proposed small hydropower project's as well as the biomass power projects are proposed to be installed in off-grid or small mini-grid mode based on the detailed feasibility during its implementation. Total installed capacity from two SHP project is 2.7 MW and that for two Biomass project is 125 kW. It is proposed that the SHP project would be installed with mini grid connecting about 15-20 villages from each project within their coverage area and the biomass power plants will first be installed in isolated micro-grid mode in Foyemtcha Chefferie and Ekom-Nkam villages, which can later be connected to the mini grid from SHP or the other main grid. The electricity from this plant will be distributed through the mini grid installation in the districts and will cater to the following prospective consumers.

1. Households in the villages of Kekem, Bare-Bakem and Manjo districts
2. Small industrial units (which includes palm oil expellers, cassava processing units, coffee drying and grinding units, carpentry shops and rice mills, cell phone towers etc.)
3. Health facilities in the command area of the project
4. Technical college of Foyemtcha village
5. Primary and secondary schools in the villages

The type and number of units were determined based on the baseline survey and stakeholder consultations undertaken in the districts. The total connected load for all these establishments in the year 2014 is

estimated to be 2683 kW. Based on the detailed analysis of the connected load, operating hours and the load factor the total annual electricity consumption demand in the year 2014 is estimated to be 15,394 MWh. The detailed estimation is given in the Table E3.1.

Table E3.1: Load estimation and expected energy consumption

S. No.	Load establishment	Expected load (kW)	Annual electricity consumption (MWh)
1	Households	1750	12,096.000
2	Technical college, Foyemtcha	35	204.12
3	Industrial Units ▪ Cassava Processing Unit – 5 nos; ▪ Palm oil expellers- 40; ▪ Carpentry Shops – 5 nos; ▪ Coffee processing units – 5 nos	398	825.984
4	Health facilities - 20	200	1,555.200
5	Public offices -2	100	237.600
6	Primary and secondary schools	200	475.200
	Total	**2683**	**15,394.104**

The number of households for the year 2014 is estimated based on the growth rate of population at 2.26%[36] per year and the base population of the year 2005. Further it has been considered that approximately 7,000 households could get connected with approximate load of 200W each. From 2014 it is estimated that the electricity consumption demand will grow at the rate of 7% annually[37] . The annual electricity demand from the year 2014 onwards is provided in Table E3.2.

Table E3.2: Projected **a**nnual electricity demand in the project area

S. No.	Year	Annual electricity demand (MWh)
1	2014	15394.10
2	2015	16471.69
3	2016	17624.71
4	2017	18858.44
5	2018	20178.53
6	2019	21591.03
7	2020	23102.40

The pre-feasibility study report for the SHP and biomass power projects estimates following annual energy generation from the selected projects.

Table E3.3: Annual electricity generation from demonstration projects

Project	Estimated annual energy generation (MWh)
Mouakeu SHP 1.5 MW	7338
Manjo SHP 1.2 MW	6492
Ekom-Nkam biomass 75 kW	288
Foyemtcha Biomass 50 kW	192
Total	**14310**

[36] http://www.indexmundi.com/sierra_leone/population_growth_rate.html
[37] Estimates gives the electricity consumption annual growth rate of 7%,

This means the whole energy supply from these projects can be completely consumed in the villages. The extra energy will have to be met from any additional capacity which may come up in near future. This may be achieved through developing more hydropower and biomass power plants capacity in the sites identified in the region. Alternatively, the project is expected to get connected to the main electricity grid line in future. The connection with the national grid will have another advantage of supplying the extra energy generated from the project at the time of low load in the local grid which can give the financial sustainability to the project as well as the stability to the power systems.

ANNEX F: Minutes of Stakeholders Interaction Workshop in Cameroon

National level stakeholder consultation at Yaoundé
Date: July 1, 2013
Venue: Conference Hall, UNIDO office, Yaoundé, Cameroon
Participants: List of participants given in Table F1

About the workshop

The stakeholder meeting has been conducted with the objective of presenting the project objectives, activities being conducted and the present status, to the stakeholders like ministries, government departments, NGOs, multilateral and bilateral agencies, to take their views on the same and seek full cooperation in preparation and implementation of the project.

The following two presentations were made during the workshop

1. Presentation on the project objective, about the project sites and findings from site visit.
    - This covered the presentation on the overall project objective, activities done till now, about identified project sites, information collected from site survey and local level stakeholders interactions, project plan and stakeholders engagement need for the project execution etc.
2. Presentation on biomass energy technologies
    - This covered the presentation on the basic biomass conversion technology, its applications and some specific case studies with relevance of its usability and suitability in African energy scenario etc.

Discussion and suggestions of the stakeholders

After the presentations, all the participants appreciated the efforts being made by UNIDO for the preparation and development of rural electrification projects in the country. The following are the observations and suggestions from the participants:

- There is a great need for such rural electrification projects in the country, especially considering the fact that most of the villages are in remote areas and non-reachability of grid due to complex hilly terrain and dense forests. So this type of projects need to be planned very carefully as the success/failure of such project will affect the government decision making about the renewable energy projects.
- It has been suggested that, MINEPDED is responsible for providing clearances for any renewable energy development related work so the role of this ministry is very much important and should be involved at all stages of the project development.
- It has been suggested that being the nodal ministry for finance mobilisation, coordination with MINEPAT should be done for co-financing arrangements.
- It was suggested that the project should have good component of capacity building of the government institutions as well as the training of the technicians for plant operation and maintenance.
- The participants also emphasized on the importance of the involvement of the local NGOs (such as ADEID already being involved in this project) since the inception of the project so as to make the project easy implementable and successful.
- On the biomass energy technologies, all stakeholders were in agreement that there is a great need to introduce such technologies so that the huge amount of biomass available in the country could be sustainably harnessed for clean and progressive development.

The workshop ended with the thanks by the consultant team to all the participants. Mr. Nantchou Ngoko Justin, the GEF operational focal point for Cameroon, also expressed his thanks to the participants and the

project team for their hard effort and wished best with all supports for the successful development of the project.

Based on the suggestions received from the stakeholders it is observed that project activities considered are very much in line with the stakeholders expectations and further much care has been taken in designing the project components and result framework to meet the local as well as national level stakeholders.

Table F1: List of participants

Name	Institution	Address	Contact No.	Email-ID
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ANNEX G: GHG emission reduction calculations

G1. Background

This project is intended to contribute to the reduction of GHG emission from fossil-based power generation in Cameroon. This objective will be achieved through accelerating the development of biomass and small hydro resources for the productive applications as well as rural electrifications by removing barriers for these technologies and demonstration projects. The project is comprised of four components: (a) Strengthening the policy and regulatory framework for renewable energy and its enforcement; (b) Developing mechanisms to promote and sustain private sector investments in renewable energy generation (c) Demonstration of the technical and commercial viability of integrated renewable energy mini grids and (d) Project monitoring and evaluation. Under the project it is being proposed that 2.825 MW capacity renewable energy based mini grids (two SHP projects- 1.2 MW Manjo SHP and 1.5 MW Mouakeu SHP and two biomass based electrification projects- 75 kW at Ekom-Nkam village and 50 kW at Foyemtcha Chefferie village) will be installed. The feasibility studies carried out for all the four demonstration projects shows good utilisation potential of electricity from these projects and the annual energy generation from each project is given in the table below

Table G1: Annual electricity generation from demonstration projects

Project	Estimated annual energy generation (MWh)
Mouakeu SHP 1.5 MW	7338
Manjo SHP 1.2 MW	6492
Ekom-Nkam biomass 75 kW	288
Foyemtcha Biomass 50 kW	192
Total	**14310**

It is observed during the project preparation that, in absence of these renewable energy projects, government or any private agency would think of fossil fuel (oil/diesel) based power generation in the selected project areas. So these demonstration projects will be avoiding the possibility of fossil fuel based power generation.

G2. Direct CO_2 emissions reduction

Following are the important assumptions used in the estimation of the CO_2 emissions reduction from the project:

- CO_2 emission factor: SHP and biomass based mini grid systems that will be installed will directly displace diesel fuel oil (DFO) generators which are the only alternative source of power generation in the project areas in the absence of any grid electricity. In this regard, the CO_2 emission factor is estimated based on the CO_2 emission factor from diesel fuel (2.746 kg CO_2/liter[38]). The diesel consumption per kWh of electricity production is taken as 0.3 liter/kWh[39] per liter of diesel.

It has been assumed that the projects will be installed by the year 2016/17 and will start supplying electricity to the households in the villages coming in the vicinity of the mini-grid, public service establishments, health facilities, and productive micro enterprises in the districts covered under the projects. The total connected load for all these in the year 2014/2015 is estimated to be 2,863 kW.

[38] The emission factor for diesel is taken as 74.01 kg CO_2/GJ of energy (IPCC 1999, Volume 2, Section 1). Diesel calorific value is 0.0371 GJ/liter. This gives the emission factor of 2.746 kg CO2/liter of diesel burnet.

[39] Source: Nouni M.R., Mullik S.C and Kandpal T.C. "Biomass gasifier projects for decentralized power supply in India: A financial evaluation" Energy Policy 35 (2007) 1373–1385

Correspondingly, the electricity consumption demand is estimated as 15,394 MWh. The annual growth of electricity is estimated at 7%[40]. So it is considered that the electricity generated by the demonstration projects will be fully utilized. Based on the assessment it is also estimated that the total diesel and kerosene consumption that will be replaced through the electricity generated from the demonstration projects will be equivalent to about 70% of total electricity generation. So the direct CO2 reduction amount has been estimated using these replacement factors only.

Based on the GEF manual for calculating GHG emission reduction from renewable energy projects, the SHP project life of 20 years and the biomass power plant life of 15 years have been considered for estimating the cumulative GHG emission reduction over the useful life of the projects. The annual and cumulative direct GHG emission reduction in terms of tCO_2 is given for SHP and biomass power plants in Table G2 and Table G3 respectively.

Table G2: Cumulative direct CO_2 emissions reduction from SHP projects

Year	Installed Capacity, MW	Power Generation, MWh	Diesel abatement (liter)	CO_2 emission factor (kg CO_2/liter diesel)	Total CO_2 emission reduction (tCO_2)	Cumulative CO_2 emission reduction (tCO_2)
2016	2.7	13830	2904300	2.746	7975.2	7975.2
2017	2.7	13830	2904300	2.746	7975.2	15950.4
2018	2.7	13830	2904300	2.746	7975.2	23925.6
2019	2.7	13830	2904300	2.746	7975.2	31900.8
2020	2.7	13830	2904300	2.746	7975.2	39876.0
2021	2.7	13830	2904300	2.746	7975.2	47851.2
2022	2.7	13830	2904300	2.746	7975.2	55826.5
2023	2.7	13830	2904300	2.746	7975.2	63801.7
2024	2.7	13830	2904300	2.746	7975.2	71776.9
2025	2.7	13830	2904300	2.746	7975.2	79752.1
2026	2.7	13830	2904300	2.746	7975.2	87727.3
2027	2.7	13830	2904300	2.746	7975.2	95702.5
2028	2.7	13830	2904300	2.746	7975.2	103677.7
2029	2.7	13830	2904300	2.746	7975.2	111652.9
2030	**2.7**	**13830**	2904300	**2.746**	**7975.2**	**119628.1**
2031	2.7	13830	2904300	2.746	7975.2	127603.3
2032	2.7	13830	2904300	2.746	7975.2	135578.5
2033	2.7	13830	2904300	2.746	7975.2	143553.7
2034	2.7	13830	2904300	2.746	7975.2	151528.9
2035	**2.7**	**13830**	2904300	**2.746**	**7975.2**	**159504.2**
2036	2.7	13830	2904300	2.746	7975.2	167479.4
2037	2.7	13830	2904300	2.746	7975.2	175454.6
2038	2.7	13830	2904300	2.746	7975.2	183429.8
2039	2.7	13830	2904300	2.746	7975.2	191405.0
2040	**2.7**	**13830**	2904300	**2.746**	**7975.2**	**199380.2**

[40] Lighting Africa policy report note for Cameroon -2012

Table G3: Cumulative direct CO_2 emissions reduction from biomass power projects

Year	Installed Capacity, MW	Power Generation, MWh	Diesel abatement (liter)	CO_2 emission factor (kg CO_2/liter diesel)	Total CO_2 emission reduction (tCO_2)	Cumulative CO_2 emission reduction (tCO_2)
2016	0.125	480	100800	2.746	276.8	276.8
2017	0.125	480	100800	2.746	276.8	553.6
2018	0.125	480	100800	2.746	276.8	830.4
2019	0.125	480	100800	2.746	276.8	1107.2
2020	0.125	480	100800	2.746	276.8	1384.0
2021	0.125	480	100800	2.746	276.8	1660.8
2022	0.125	480	100800	2.746	276.8	1937.6
2023	0.125	480	100800	2.746	276.8	2214.4
2024	0.125	480	100800	2.746	276.8	2491.2
2025	0.125	480	100800	2.746	276.8	2768.0
2026	0.125	480	100800	2.746	276.8	3044.8
2027	0.125	480	100800	2.746	276.8	3321.6
2028	0.125	480	100800	2.746	276.8	3598.4
2029	0.125	480	100800	2.746	276.8	3875.2
2030	0.125	480	100800	**2.746**	**276.8**	**4152.0**
2031	0.125	480	100800	2.746	276.8	4428.7
2032	0.125	480	100800	2.746	276.8	4705.5
2033	0.125	480	100800	2.746	276.8	4982.3
2034	0.125	480	100800	2.746	276.8	5259.1
2035	0.125	480	100800	**2.746**	**276.8**	**5535.9**
2036	0.125	480	100800	2.746	276.8	5812.7
2037	0.125	480	100800	2.746	276.8	6089.5
2038	0.125	480	100800	2.746	276.8	6366.3
2039	0.125	480	100800	2.746	276.8	6643.1
2040	0.125	480	100800	**2.746**	**276.8**	**6919.9**

G3. Indirect CO_2 emission reductions

This project will create the enabling environment through establishment of policy and regulatory framework and removal of barriers. This will facilitate widespread application of biomass and small hydropower technology in Cameroon. The primary targets of the project are the rural areas that are in need of energy services both for meeting household energy needs as well as for income generation and livelihood support activities. Capacity development activities that will be conducted under the project are expected to influence relevant stakeholder entities in the promotion, support, design and installation, financing, operation and maintenance of commercially viable and sustainable biomass and SHP based mini grid projects especially in public-private partnership model.

The project will also involve interventions that will bring about the necessary institutional, regulatory policy mechanisms facilitating promotion of biomass and small hydropower delivery models. It is

assumed that with the implementation of this UNIDO-GEF project, the rate of development of SHP and biomass power projects in the country will get accelerated and within 5 years of the commissioning of this project (i.e. year 2016-20), there would be an addition of about 70 MW SHP capacity apart from the already planned capacity by other initiatives. Similarly a capacity addition of about 5 MW biomass based power projects during the period of 10 years from the commissioning of demonstration project is envisaged. This is based on the consideration of about 0.5 MW biomass capacity addition annually.

The operation of a realistic technical potential for more biomass and small hydro energy systems in the country that are influenced and induced by the enabling environment established, and demonstrations shown, under the UNIDO-GEF will bring about a cumulative indirect CO_2 emission avoidance of about 995.1017 ktCO_2. Most of the indirect CO_2 reduction can be attributed partly to the interventions that will be carried out during the UNIDO GEF project such as the establishment and enforcement of renewable energy policies and financing mechanisms, market enhancement, and the successful demonstration project. In this case, the GEF Causality Factor (CF) can be taken as Level 3 ("substantial but modest"), i.e., 60%. In this regard, 60% of the estimated additional 995.1017 ktCO_2 emissions reduction can be considered as the UNIDO GEF project's Indirect CO_2 reduction.

Indirect CO_2 emission reduction (10 year influence period) = 995.1017 * 0.6 = 597 kton CO_2 (CF = 0.6)

Table G4: Annual indirect CO_2 emissions avoidance (ktons): 2021 - 2040 (Additional) from SHP projects

Year	Installed Capacity, MW	Power Generation, MWh	Diesel consumption (Liter)	CO_2 emission factor (kg CO_2/liter diesel)	Total CO_2 emission reduction (tCO2)	Cumulative CO_2 emission reduction (tCO_2)
2021	5	17520	5256000	2.746	14433.0	14433
2022	10	35040	10512000	2.746	28866.0	43299
2023	15	52560	15768000	2.746	43298.9	86598
2024	20	70080	21024000	2.746	57731.9	144330
2025	25	87600	26280000	2.746	72164.9	216495
2026	35	122640	36792000	2.746	101030.8	317525
2027	45	157680	47304000	2.746	129896.8	447422
2028	55	192720	57816000	2.746	158762.7	606185
2029	65	227760	68328000	2.746	187628.7	793814
2030	**70**	**245280**	**73584000**	**2.746**	**202061.7**	**995875**
2031	70	245280	73584000	2.746	202061.7	1197937
2032	70	245280	73584000	2.746	202061.7	1399999
2033	70	245280	73584000	3.746	275645.7	1675644
2034	70	245280	73584000	4.746	349229.7	2024874
2035	**70**	**245280**	**73584000**	**5.746**	**422813.7**	**2447688**
2036	70	245280	73584000	6.746	496397.7	2944085
2037	70	245280	73584000	7.746	569981.7	3514067
2038	70	245280	73584000	8.746	643565.7	4157633
2039	70	245280	73584000	9.746	717149.7	4874782
2040	**70**	**245280**	**73584000**	**10.746**	**790733.7**	**5665516**

Table G5: Annual indirect CO_2 emissions avoidance (ktons): 2021 - 2040 (Additional) from biomass projects

Year	Installed Capacity, MW	Power Generation, MWh	Diesel consumption (Liter)	CO_2 emission factor (kg CO_2/liter diesel)	Total CO_2 emission reduction (tCO_2)	Cumulative CO_2 emission reduction (tCO_2)
2021	0.5	2190	657000	2.746	1804.1	1804.1
2022	1	4380	1314000	2.746	3608.2	5412.3
2023	1.5	6570	1971000	2.746	5412.4	10824.7
2024	2	8760	2628000	2.746	7216.5	18041.2
2025	2.5	10950	3285000	2.746	9020.6	27061.8
2026	3	13140	3942000	2.746	10824.7	37886.5
2027	3.5	15330	4599000	2.746	12628.9	50515.4
2028	4	17520	5256000	2.746	14433.0	64948.4
2029	4.5	19710	5913000	2.746	16237.1	81185.5
2030	**5**	**21900**	**6570000**	**2.746**	**18041.2**	**99226.7**
2031	5.5	24090	7227000	2.746	19845.3	119072.0
2032	6	26280	7884000	2.746	21649.5	140721.5
2033	6.5	28470	8541000	3.746	31994.6	172716.1
2034	7	30660	9198000	4.746	43653.7	216369.8
2035	**7.5**	**32850**	**9855000**	**5.746**	**56626.8**	**272996.6**
2036	8	35040	10512000	6.746	70914.0	343910.6
2037	8.5	37230	11169000	7.746	86515.1	430425.6
2038	9	39420	11826000	8.746	103430.2	533855.8
2039	9.5	41610	12483000	9.746	121659.3	655515.2
2040	**10**	**43800**	**13140000**	**10.746**	**141202.4**	**796717.6**

G4. Total CO_2 Emissions Reduction

Thus considering the direct CO_2 emission reduction and post project indirect CO_2 emission reduction, the total emission reduction that can be attributed to the UNIDO GEF project is **888.913** kton CO_2 over a period of 20 years (Table G6).

Table G6: Total CO2 emissions reduction attributed to UNIDO-GEF project

Particulars	Quantity, kton	Remarks
Direct CO_2	159.504	2.7 MW SHP (20 year useful life)
Direct CO_2	4.152	0.125 MW biomass (15 year useful life)
Total Direct CO_2	163.656	2.825 MW total capacity
Indirect CO_2 (from both biomass as well as SHP)	597.000	(GEF causality factor = 0.6)
Total CO_2 reduction	**760.717**	**Direct CO_2 + Indirect CO_2**

ANNEX H: International and national consultants' to be hired under the project through GEF resources

Project Management

Position title	Qualification	Estimated person weeks	Tasks to be performed
National project manager	Should have experience in managing such projects with various components, especially on renewable energy/power generation/rural electrification related projects.	206	✓ Oversee the day-to-day planning, implementation and monitoring of project activities. ✓ Assist the NPD in management and implementation of the project and achievement of its goals. ✓ Coordinate and manage inception workshop and preparation of inception report. ✓ Coordinate for organizing regular meetings of PSC as per the agreed schedule at the initial stage of the project as well as on specific need of the project. ✓ To prepare progress report, annual work plans and budgets and any other necessary documentation required by UNIDO, MINEE and PSC. ✓ Coordinate for monitoring & evaluation and prepare and submit reports to MINEE and UNIDO/GEF. ✓ Prepare and approve Terms of Reference for consultants and EPC contracts for equipment procurement and pilot plant installations etc. ✓ Oversee the activities on national as well as international consultants and make sure that the desired quality inputs from these consultants are being received on timely basis. ✓ Disbursement of funds, maintenance of accounts as per requirements of UNIDO and provide inputs to internal and external audits. ✓ Liaise with counterparts and key stakeholders. ✓ Delegate responsibilities to the project team.
Training and capacity building manager	Should have good experience in renewable energy related training and capacity building program management at country level.	180	✓ Take lead in identification of the training needs and guide national consultant in the identification of appropriate stakeholders and interested candidates for various training and capacity building programs. ✓ Guide and training and capacity building experts in preparing the training courses and conducting the trainings for various stakeholders and monitoring of the same. ✓ Coordinate with national and international training experts for preparation and delivery of the training programs. ✓ Coordinate and facilitate preparation of all technical and policy related guidelines and standard operating practices manual. ✓ Plan and coordinate for the in-plant training. ✓ Analyze and study the possible productive micro enterprise in the project district and coordinate with the central and local governments to facilitate productive micro enterprise in the project area. ✓ Coordinate for the preparation of the dissemination materials of successful demonstration of the pilot projects.
Total		**386**	

Technical Assistance

International Consultants

Position title	Qualification	Estimated person weeks	Tasks to be performed
Small Hydro Power Expert	Experience in SHP project DPR preparation, design, implementation and management (2-3 experts may be hired based on the area of their specialization)	30	✓ Preparation of detailed project report covering engineering details, description of the electromechanical equipment and civil works, and all other necessary details such as equipment selection criteria, criteria for the evaluation of the offers for SHP project, assistance in the evaluation of the bids etc. ✓ Preparing the mini-grid design and electricity distribution arrangement from small hydro power plant. ✓ Analyze the technical and financial feasibility of different internationally adopted best practices in small hydro power development. ✓ Preparation of good practices training manual for plant operation and maintenance. ✓ Preparation of SHP plant operation and maintenance schedules ✓ Setting of operating performance targets for the small hydropower projects. ✓ Preparing list of parameters to be evaluated during the implementation of SHP plant. ✓ Preparing checklist for verifying the proper commissioning of SHP plant.
Biomass energy expert	Experience in biomass power project design specially for small rural applications	20	✓ Preparation of detailed plant design of biomass gasifier system of the appropriate capacity. ✓ Preparing the mini-grid design and electricity distribution arrangement from small biomass power system. ✓ Preparation of the operation and maintenance manual for biomass power system. ✓ Preparation of the technical specifications and criteria for the selection of the biomass power system supplier and EPC service provider. ✓ Assist in the evaluation of the offer received from the biomass power system supplier. ✓ Preparation of biomass power system operational performance parameter and methodology for its assessment. ✓ Preparing checklist for verifying the successful commissioning of the biomass power plant.
Technical training experts for	Should have experience in technical design and	20	✓ Development of training manuals on small hydro plant for the designers, project developers and O&M service providers. ✓ Capacity building of institutions for the

Position title	Qualification	Estimated person weeks	Tasks to be performed
small hydro plant	operation aspects of small hydropower plants and also in providing training on the same		planning and implementation of small hydro projects. ✓ Training of small hydro project operators and service providers on operation and maintenance including in-plant training. ✓ Providing technical advice and assistance (mainly remotely with few field missions) to trained national experts and enterprises during the implementation of the small hydro project.
Technical training expert for biomass power system	Should have experience in designing and operations of biomass power systems	20	✓ Development of training manuals on small hydro plant for the designers, project developers and O&M service providers. ✓ Capacity building of institutions for the planning and implementation of small hydro projects. ✓ Training of small hydro project operators and service providers on operation and maintenance including in-plant training. ✓ Providing technical advice and assistance (mainly remotely with few field missions) to trained national experts and enterprises during the implementation of the small hydro project.
Sustainability and productive application expert	Should have experience in designing sustainable business models and training on productive applications from renewable energy	20	✓ Identification of the suitable productive applications and develop appropriate model of electricity supply and revenue collection from both small hydro and biomass power projects. ✓ Preparing the best practices manual for productive applications of small hydro power and biomass power based mini grid. ✓ Training on rural electricity distribution management including revenue management. ✓ Providing training on productive applications of electricity from renewable energy systems. ✓ Creating awareness about the business opportunities and productive applications of electricity among the villagers.
Finance expert	Should have experience in renewable energy project financing	15	✓ Assess the financial parameters for renewable energy, mainly small hydro and biomass power development in Cameroon. ✓ Develop the manual and tool for the financing institutions for the evaluation of the financial parameters of small hydro and biomass power projects in Cameroon ✓ Provide training to all the relevant stakeholders on renewable energy project financing.
Policy and Regulatory	Should have experience in policy	25	✓ Review of national energy policy and regulatory regime for the renewable energy

Position title	Qualification	Estimated person weeks	Tasks to be performed
Expert	and regulatory aspects of renewable energy development		development ✓ Development of technical, social, environmental, economic and other parameters for small hydro and biomass power development in Cameroon that may be used for preparation of guidelines and incentives for private sector participation. ✓ Preparation of best practice manual of the international policies for SHP development for rural electrification and power sector development applications such as tax rebates, subsidies, loans, electricity tariff for sale to grid, electricity purchase policies and so on. ✓ Recommendation to the government for the adaptation of learning's from international policy initiatives. ✓ Setting of tariff for electricity users. ✓ Determining the generation tariff from SHP and biomass power project. ✓ Help government in developing the renewable energy policy and regulatory framework and build their capacity on the same.
Monitoring and Evaluation Expert	Should have experience in monitoring and evaluation of GEF projects	20	✓ Support the PMU in project's mid-term and final evaluation and related stakeholder consultations, information collection and report preparation.
Total		**170**	

National Consultants

Position title	Qualification	Estimated person weeks	Tasks to be performed
Renewable energy expert	Should have knowledge of renewable energy projects	60	✓ Assist the international consultants in site visits, information collection for various tasks such as DPR preparation, stakeholder identification, arranging interactions with appropriate stakeholders etc. ✓ Supporting international experts in collecting any data related to the renewable energy development, policy and regulatory aspects etc. in Cameroon. ✓ Assist international consultants in designing the procurement guidelines, selection criteria for

Position title	Qualification	Estimated person weeks	Tasks to be performed
			EPC contractor etc. based on the country specific norms as well as the GEF and UNIDO standard practice.
Training experts	Should have good exposure to various stakeholders and experience in making arrangements for training and capacity building programs	60	✓ Train personally or, as needed, organize other training for the local stakeholders to successfully implement the project and to meet its capacity building objectives; ✓ Identification of stakeholders interested in training ✓ Organize and provide training to the key stakeholders to further develop and implement the adopted practices, methods, or materials. ✓ Assist international consultants in preparing the best practices manual for productive applications of small hydro and biomass power project based mini grid ✓ Assist the international training experts in development of training manuals for the O&M service providers ✓ Work with the international training experts in preparation and delivery of the training ✓ Guiding the PMU in preparing and delivery of the training
Monitoring & Learning specialist	Should have experience in monitoring of similar project activities	10	✓ Coordinate with all the components of the project; ✓ Help PMU in carrying out the monitoring of the project activities ✓ Development of monitoring & learning reports ✓ Process documentation
Procurement specialists	Should have experience in procurement of materials as per GEF/UNIDO or other international agency guidelines and the national government policy.	50	✓ Work with the PMU, plan and procure services for the project ✓ Procurement of services and equipment as and when required; ✓ Procurement planning for timely execution and completion of small hydro and biomass project ✓ Prepare and execution of EOIs, ToRs and other procurement related activities for EPC and service contracts, with the guidance of international consultants; ✓ Monitoring of contracts and amendments, if required; Coordination with MINEE and other stakeholders.
Project evaluator	Should have experience in evaluating similar project works	10	✓ Support the project's mid-term evaluation and related stakeholder consultations, ✓ Support the project's final evaluation and related stakeholder consultations, ✓ Information collection and report drafting for

Position title	Qualification	Estimated person weeks	Tasks to be performed
			all evaluation
Audit experts	Should be qualified auditor	10	✓ Undertake project audit as per the UNIDO procedures and the annual audit plan; ✓ Prepare final audit report as per the UNIDO instructions to be submitted to UNIDO management
Policy expert	Should have experience in national government policy analysis and evaluation	40	✓ Coordinate with international policy expert and arrange meetings with the government agencies and other stakeholders for any discussion and information collection. ✓ Provide all the information to international experts on existing energy policies and laws and help reviewing this. ✓ Interact with stakeholders and financing agencies to assess their needs and for development of financing mechanisms for renewable energy based mini-grid project. ✓ Assist international consultants in conducting training and capacity building on policy and regulatory aspects of renewable energy for the government officials as well as other important stakeholders.
Total		**240**	