



## **Promoting Better Access to Modern Energy Services through Sustainable Mini-grids and Low-carbon Bioenergy Technologies Among Guinea-Bissau's Forest-dependent Communities**

### **Part I: Project Information**

#### **GEF ID**

9561

#### **Project Type**

FSP

#### **Type of Trust Fund**

GET

#### **Project Title**

Promoting Better Access to Modern Energy Services through Sustainable Mini-grids and Low-carbon Bioenergy Technologies Among Guinea-Bissau's Forest-dependent Communities

#### **Countries**

Guinea-Bissau

#### **Agency(ies)**

UNDP

#### **Other Executing Partner(s):**

Direction General of Environment/Sekretariat of State of Environment, Direction General of Energy/Ministry of Energy, National Institute for Research and Applied Technology (INITA)

**Executing Partner Type**

Government

**GEF Focal Area**

Climate Change

**Taxonomy**

Focal Areas, Climate Change, Climate Change Mitigation, Renewable Energy, Influencing models, Transform policy and regulatory environments, Demonstrate innovative approaches, Convene multi-stakeholder alliances, Deploy innovative financial instruments, Strengthen institutional capacity and decision-making, Stakeholders, Civil Society, Non-Governmental Organization, Community Based Organization, Private Sector, SMEs, Individuals/Entrepreneurs, Type of Engagement, Consultation, Participation, Partnership, Beneficiaries, Communications, Awareness Raising, Public Campaigns, Strategic Communications, Education, Gender Equality, Gender results areas, Participation and leadership, Knowledge Generation and Exchange, Gender Mainstreaming, Capacity, Knowledge and Research, Learning, Innovation, Capacity Development

**Rio Markers****Climate Change Mitigation**

Climate Change Mitigation 2

**Climate Change Adaptation**

Climate Change Adaptation 0

**Duration**

60In Months

**Agency Fee(\$)**

276,707

**A. Focal Area Strategy Framework and Program**

<b>Objectives/Programs</b>	<b>Focal Area Outcomes</b>	<b>Trust Fund</b>	<b>GEF Amount(\$)</b>	<b>Co-Fin Amount(\$)</b>
CCM-1_P1	Promote timely development, demonstration and financing of low-carbon technologies and mitigation options	GET	2,000,000	10,000,000
CCM-2_P3	Promote conservation and enhancement of carbon stocks in forest, and other land-use, and support climate-smart agriculture	GET	912,702	4,500,000
<b>Total Project Cost(\$)</b>			<b>2,912,702</b>	<b>14,500,000</b>

## B. Project description summary

### Project Objective

To promote investment and sustainable business models in both solar mini-grids and low-carbon bioenergy technologies.

Project Component	Financing Type	Expected Outcomes	Expected Outputs	Trust Fund	GEF Project Financing(\$)	Confirmed Co-Financing(\$)
1. Policy and financial instruments and incentive scheme for solar mini-grids and low-carbon bioenergy technologies	Technical Assistance	Institutional and financial viability of solar mini-grids and low-carbon bioenergy strengthened	1.1 Policy package to operate solar mini-grids developed  1.2 Financial incentives and market mechanisms to secure supply and stimulate demand for energy-efficient stoves and firewood/charcoal developed  1.3 Developed gender-sensitive capacity development and modules for the production and utilization of improved kilns and cookstoves  1.4 Alternative sustainable solutions to wood energy explored and assessed	GET	320,000	1,000,000

Project Component	Financing Type	Expected Outcomes	Expected Outputs	Trust Fund	GEF Project Financing(\$)	Confirmed Co-Financing(\$)
2. Capacity building for mini-grid and low-carbon bioenergy	Technical Assistance	Capacity to deliver turn-key solutions and quality O&M services for mini-grids and low carbon bioenergy technologies developed	<p>2.1 Tailored capacity building programme delivered to public sector and civil society</p> <p>2.2 Various support delivered to and established for the private sector</p> <p>2.3 On-the-job training programme for 100 solar mini-grid installers delivered</p> <p>2.4 Capacity building for the fuelwood value chain delivered</p>	GET	454,002	3,200,000

Project Component	Financing Type	Expected Outcomes	Expected Outputs	Trust Fund	GEF Project Financing(\$)	Confirmed Co-Financing(\$)
3. Mini-grids and low-carbon bioenergy technologies roll-out	Investment	A functioning business model is demonstrated for the technical and financial viability of mini-grids and improved kilns and stoves	3.1 7 pilot sites totaling 1.2 MW for mini-grids identified and assessed, and business models defined  3.2 Productive use promoted to increase electricity demand in the targeted sites  3.3 5,000 improved cookstoves commercialized and 50 improved kilns disseminated	GET	2,000,000	10,000,000
Sub Total (\$)					2,774,002	14,200,000
Project Management Cost (PMC)						
				GET	138,700	300,000
Sub Total(\$)					138,700	300,000
Total Project Cost(\$)					2,912,702	14,500,000

C. Sources of Co-financing for the Project by name and by type

Sources of Co-financing	Name of Co-financier	Type of Co-financing	Amount(\$)
Government	Ministry of Energy	In-kind	10,000,000
Private Sector	Rural Energy Services SSD/FRES	Equity	4,000,000
GEF Agency	UNDP	Grant	500,000
Total Co-Financing(\$)			14,500,000

Agency	Trust Fund	Country	Focal Area	Programming of Funds	NGI	Amount(\$)	Fee(\$)
UNDP	GET	Guinea-Bissau	Climate Change		No	2,912,702	276,707
Total Grant Resources(\$)						2,912,702	276,707



E. Non Grant Instrument

NON-GRANT INSTRUMENT at CEO Endorsement

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Includes Non grant instruments? **No**

Includes reflow to GEF? **No**

### F. Project Preparation Grant (PPG)

PPG Required

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**PPG Amount (\$)**

90,000

**PPG Agency Fee (\$)**

8,550

Agency	Trust Fund	Country	Focal Area	Programming of Funds	NGI	Amount(\$)	Fee(\$)
UNDP	GET	Guinea-Bissau	Climate Change		No	90,000	8,550
Total Project Costs(\$)						90,000	8,550

Core Indicators

Indicator 6 Greenhouse Gas Emissions Mitigated

Total Target Benefit	(At PIF)	(At CEO Endorsement)	(Achieved at MTR)	(Achieved at TE)
Expected metric tons of CO <sub>2</sub> e (direct)	0	93900	0	0
Expected metric tons of CO <sub>2</sub> e (indirect)	0	939000	0	0

Indicator 6.1 Carbon Sequestered or Emissions Avoided in the AFOLU (Agriculture, Forestry and Other Land Use) sector

Total Target Benefit	(At PIF)	(At CEO Endorsement)	(Achieved at MTR)	(Achieved at TE)
Expected metric tons of CO <sub>2</sub> e (direct)				
Expected metric tons of CO <sub>2</sub> e (indirect)				
Anticipated start year of accounting				
Duration of accounting				

Indicator 6.2 Emissions Avoided Outside AFOLU (Agriculture, Forestry and Other Land Use) Sector

Total Target Benefit	(At PIF)	(At CEO Endorsement)	(Achieved at MTR)	(Achieved at TE)
Expected metric tons of CO <sub>2</sub> e (direct)		93,900		
Expected metric tons of CO <sub>2</sub> e (indirect)		939,000		
Anticipated start year of accounting				
Duration of accounting				

Indicator 6.3 Energy Saved (Use this sub-indicator in addition to the sub-indicator 6.2 if applicable)

Total Target Benefit	Energy (MJ) (At PIF)	Energy (MJ) (At CEO Endorsement)	Energy (MJ) (Achieved at MTR)	Energy (MJ) (Achieved at TE)
Target Energy Saved (MJ)				

Indicator 6.4 Increase in Installed Renewable Energy Capacity per Technology (Use this sub-indicator in addition to the sub-indicator 6.2 if applicable)

Technology	Capacity (MW) (Expected at PIF)	Capacity (MW) (Expected at CEO Endorsement)	Capacity (MW) (Achieved at MTR)	Capacity (MW) (Achieved at TE)
select		1.19		

**Indicator 11 Number of direct beneficiaries disaggregated by gender as co-benefit of GEF investment**

	<b>Number (Expected at PIF)</b>	<b>Number (Expected at CEO Endorsement)</b>	<b>Number (Achieved at MTR)</b>	<b>Number (Achieved at TE)</b>
<b>Female</b>		12,500		
<b>Male</b>		12,500		
<b>Total</b>	0	25000	0	0

Provide additional explanation on targets, other methodologies used, and other focal area specifics (i.e., Aichi targets in BD) including justification where core indicator targets are not provided

**\*The overall the breakdown of beneficiaries is estimated as 22,700 from mini-grid systems and 2,300 from cookstoves (2,000 from improved clean stoves and 300 from improved kilns)**

**PART II: Project JUSTIFICATION**

**1. Project Description**

**A.1.1. Global environmental and/or adaptation problems, root causes and barrier that need to be addressed**

The changes to the project are as follows:

- A large PPG consultation workshop held in Bissau in July 2018 recommended that it was necessary to finetune the project scope. At PIF stage, it was envisaged that mini-grids will be powered by both small hydro systems and Solar PV systems. Following the constraints of hydro coupled with the severe water pattern changes in the country due to Climate Change, it was recommended to narrow down the focus to solar PV-based only.
- The targeted installed capacity decreased from 2 MW at PIF stage to 1.2 MW at CEO endorsement stage. 1.5 MW out of the 2 MW were supposed to be generated from hydro. Therefore it is difficult to reach the same capacity with only Solar PV. In addition, more accurate data has been gathered during the PPG phase, showing that 1.2 MW is an achievable target for the project.
- The words “integration” and “system management” are removed from the project objectives and components as it referred mainly to the linkage between hydro, water, forest and charcoal.
- The cofinancing amount increased from 9,000,000 USD to 14,500,250 USD. The main increase came from private sector. From USD 0.5 million at PIF stage, it increased to USD 4 million, as a strong private sector company joined the initiative and provided co-finance letter. This also shows a strong private sector engagement for this project.

The project logical framework has been simplified to reduce the overall number of outputs (from 19 at PIF stage to 11 at CEO ER stage). While the underlying activities identified in the PIF’s outputs remain, the outputs have been merged in the PPG to increase clarity in the project’s structure.

Project in PIF	Outputs in PRODOC/CEO Endorsement Request
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<p>Component 1: Policy and financial instruments and incentive scheme for sustainable mini-grids and low-carbon bioenergy technologies</p> <p>1.1 Policy package to operate RE-based mini-grids and low-carbon bioenergy technologies developed and adopted</p> <p>1.2 Financial viability mechanism and tariff criteria for RE mini-grid operation defined, adopted and enforced</p> <p>1.3 Financial incentives and market mechanisms to secure supply and stimulate demand for energy-efficient stoves and firewood/charcoal are provided</p> <p>1.4 Developed gender-sensitive capacity development and modules for the production and utilization of improved kilns and cookstoves</p> <p>1.5 Alternative sustainable solutions to wood energy explored and assessed</p>	<p>Component 1: Policy and financial instruments and incentive scheme for solar mini-grids and low-carbon bioenergy technologies</p> <p>1.1 Policy package to operate Solar mini-grids developed</p> <p>1.2 Financial incentives and market mechanisms to secure supply and stimulate demand for energy-efficient stoves and firewood/charcoal developed</p> <p>1.3 Developed gender-sensitive capacity development and modules for the production and utilization of improved kilns and cookstoves</p> <p>1.4 Alternative sustainable solutions to wood energy explored and assessed</p>
<p>Component 2: Capacity building for RE-based mini-grid and low-carbon bioenergy system management</p> <p>2.1 Published guidebook (10,000 printed copies) on RE-based mini grids development (both solely RE and hybridized) specifically tailored for the country's context</p> <p>2.2 On-the-job capacity building programme for 500 RE plant installers delivered, including on materials, plant design, combination, construction, O&amp;M</p> <p>2.3 Business and technical advisory services to the power utility and other mini-grid plant developers</p> <p>2.4 On-the-job capacity building for 300 craftsmen, farmers and other actors in the fuelwood value chain.</p> <p>2.5 Tailored capacity building programme delivered to relevant national agencies</p> <p>2.6 National clearing-house mechanism for sustainable mini-grids and/or low-carbon bioenergy developers set-up</p> <p>2.7 Public relations and investment promotion campaign conducted</p>	<p>Component 2: Capacity building for mini-grid and low-carbon bioenergy</p> <p>2.1 Tailored capacity building programme delivered to public sector and civil society</p> <p>2.2 Various support delivered to and established for the private sector</p> <p>2.3 On-the-job training programme for 100 solar mini-grid installers delivered</p> <p>2.4 Capacity building for the fuelwood value chain delivered</p>
<p>Component 3: RE-based mini-grids and low-carbon bioenergy technologies roll-out</p> <p>3.1 4 pilot sites for mini-grids identified and assessed, and institutional / investment model defined</p> <p>3.2 Up to 4 public-private partnerships are established for the exploitation of mini-grids</p> <p>3.3 2 MW of RE-based power generation capacity installed</p> <p>3.4 2 specific and sustainable O&amp;M&amp;M models demonstrated for all mini-grid schemes</p> <p>3.5 Productive use promoted to increase electricity demand in 4 targeted sites</p> <p>3.6 5,000 improved cookstoves commercialized and 50 improved kilns disseminated</p> <p>3.7 Replication and scale-up plan is developed</p>	<p>Component 3: Mini-grid and low-carbon bioenergy technologies roll-out</p> <p>3.1 7 pilot sites totaling 1.2 MW for mini-grids identified and assessed, and business models defined</p> <p>3.2 Productive use promoted to increase electricity demand in the targeted sites</p> <p>3.3 5,000 improved cookstoves commercialized and 50 improved kilns disseminated</p>

### Global environment

Guinea-Bissau has one of the lowest electrification rates and the highest electricity service costs in Africa. The country is totally dependent on petroleum products despite its substantial renewable energy potential, particularly with regard to hydropower. Energy consumption in Guinea-Bissau is about 0.3 toe per person per year, one of the lowest in the world. National final energy consumption is characterized by the predominance of traditional biomass use (up to 87.8%), followed by 11.7% of petroleum products and only 0.5% of electricity. Wood is the dominant fuel, with demand exceeding 500 000 tons per year, followed by charcoal, which is the most used fuel in the capital, Bissau. The amount of biomass used is estimated at about 738 000 tons per year.

The situation in the electricity sector is characterized by a structurally deficient service, both in quantity and quality, due to the obsolescence of production, the intermittency of electricity production and the high dependence imported oil in a context of limited financial resources. Only a small proportion of the population has access to electricity: the national electrification rate is estimated at 11.5%, although this average hides huge disparities between Bissau (29%) and the other major cities of the country (with an average of only 4% electrification) and rural areas with an electrification rate of less than 1%. With 75% of the population living in rural areas, rural electrification is almost non-existent in Guinea-Bissau.

Due to almost continuous political instability, the available power in Guinea-Bissau has fallen by more than 80% in recent years (from 13 MW in 2003 to 2 MW in 2013). Today, the available power is between 2 and 8 MW while the demand is estimated at 30 MW and increasing.

*More details, please refer to the UNDP ProDoc, Section II; “Development challenge”.*

#### **Four main barriers need to be addressed**

**Legal, regulatory and institutional framework:** The current legal framework constitutes an obstacle to the development of renewable energies in Guinea-Bissau. So far, there are no regulations, incentives or legislative framework conditions to support the implementation of renewable energies in Guinea-Bissau. The government plans to create regulations allowing private operators to become involved in rural electrification, thus offering opportunities for the use of renewable energies. There are also plans, programs and strategies to increase the use of renewable energy, which is a very important "first step" in Guinea-Bissau for a more sustainable development scenario in the future.

Stakeholders (government, institutions, and national agencies) do not have sufficient capacity to formulate and implement policy and regulatory frameworks on biomass resources in an integrated manner, especially the use of firewood, charcoal and improved stoves that are sustainable, improved and more efficient.

**Technological supply chain:** The technological supply chain for renewable energies in Guinea-Bissau is at a very nascent stage. There are some local SMEs capable of assembling simple RE installations based on imported machines and turbines, but they lack the technical and technical capabilities to ensure optimal system design, installation and maintenance. In rural areas, there is only very limited local technical expertise in how to properly manage, operate, and manage RE-based mini-grids. Low quality and low numbers of skilled and skilled workers in the electricity sector add additional risks and increase the cost of operating mini-grids due to the need for costly imported services, even for repairs and basic maintenance. The technology supply chain for the production and use of bioenergy is very basic and lacks coordination and optimization among farmers, artisans, retailers and end-users.

**Sustainable O&M Model:** Lack of experience and demonstration in the sustainable operation, maintenance and management of RE-based mini-grids is a major bottleneck and the reason for the failure of donor-funded projects. The barrier is aggravated by the fact that Guinea-Bissau is a post-conflict society and that political instability is still sporadic. Technical and management capacity is extremely weak at the local level, especially in provincial and rural areas. The same problem exists with local businesses: the ranks of experienced managers and skilled technicians, already rare in provincial and rural areas, have declined further due to instability.

The main missing aspects of a sustainable operation and maintenance model should be: (i) technical supervision of plant operations and responsibility for the repair of defective equipment such as cracked solar panels; (ii) an efficient and effective rate structure that covers both start-up costs and operating and maintenance costs; (iii) a strong and efficient system of financial management, billing and payment collection; (iv) community mobilization, customer relations and dispute resolution procedures (e.g. in case of illegal connections

or theft), the engagement of productive end-users, etc. O&M is less of a problem for bioenergy technologies, but still needs to be put in place for kilns, stoves and alternative solutions such as biogas plants.

**Access to capital:** Significant initial investment needs remain an obstacle to the implementation of many projects. RE projects are capital-intensive and require large investments that generally exceed the capacity of local businesses or communities. In addition, the local banking sector is not sufficiently capitalized to facilitate the financing of RE projects with a longer return on investment and substantial risks.

**Investor Awareness and Risk Perception:** Information on the potential and benefits of renewable energies (especially small hydropower plants) for the development of provincial and rural electrification is rare in Guinea-Bissau. There is very little data on potential sites and their hydrological, climatic and other characteristics. Even when such studies exist, they are often not accessible to the public. Basically, there is no single point of information where a potential developer can receive the advice and data required to make an informed investment decision. The government is not able to gather these guidelines / data due to limited budgetary resources, staff capacity, lack of prior experience and a global vision of promoting RE-based mini-grids and private sector investment. While the national energy strategy recognizes the importance of developing renewable energy in the fight against energy deficits in secondary cities of Guinea Bissau, the government has so far focused on addressing the energy deficit of the capital Bissau and to facilitate hydroelectric and photovoltaic projects with public financing and IFI. Promoting solar PV mini-grids requires a different approach, more focused on the private sector and local communities, and requiring open and transparent access to information for investors. The scarcity of successful and sustainable RE projects limits the opportunities for awareness and trust of local communities, project promoters and investors, and is in itself a major obstacle to market development.

**Nascent private sector interest:** with political instability, there are limited private investors and all projects are donor driven and largely unsustainable. Private sector investors consider Guinea-Bissau a high-risk environment to invest in renewable energy projects. In the 2018 Doing Business data of the World Bank and the IFC, Guinea-Bissau ranks 175th out of 190 countries.

**Sensitivity to information / culture:** There is still a lack of knowledge and negative perceptions (lack of social or cultural acceptance) of the use of new technologies for cooking.

Table 1 : Gaps in the Off-Grid Policy and Regulatory Framework

Indicator	Policy/Regulatory/Market Gaps	Recommended Intervention
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Indicator	Policy/Regulatory/Market Gaps	Recommended Intervention
<ul style="list-style-type: none"> <li>Specific National Policies, Laws and Programs</li> </ul>	<ul style="list-style-type: none"> <li>Lack of National Electricity / Electrification Policy</li> <li>No policy exists for rural electrification</li> <li>Main focus of policy is on national grid extension only</li> <li>Government is subsidizing fossil fuel electricity production</li> </ul>	<ul style="list-style-type: none"> <li>Support Government to establish a clear Rural Electrification Policy which encourages least cost, integrated planning for all options</li> <li>Support Government to develop a comprehensive, fully integrated electrification plan with geo-spatial modelling on least cost planning to consider where extension is the most efficient and sustainable approach to increasing energy access vs. development of the off-grid sector – mini-grids and stand-alone systems powered by local renewable resources</li> <li>Support Government to analyze where fossil fuel subsidies serve as an impediment to development of safe, clean energy access alternatives</li> </ul>
	<ul style="list-style-type: none"> <li>Lack of Integrated National Electrification Plan</li> <li>No integrated plan exists</li> <li>Insufficient focus on or understanding of framework to support private sector participation</li> </ul>	<ul style="list-style-type: none"> <li>Support Government to develop a comprehensive, least cost, integrated plan for all rural electrification options</li> <li>Support Government to improve the planning framework to encourage private participation in mini-grid and stand-alone solar system options</li> </ul>

Indicator	Policy/Regulatory/Market Gaps	Recommended Intervention
	<ul style="list-style-type: none"> <li>· Lack of Energy and Electricity Law</li> <li>· No specific Energy or Electricity Law with off-grid provisions exists</li> </ul>	<ul style="list-style-type: none"> <li>· Help Government develop new legal framework that is flexible and helps create appropriate incentives for private sector participation in off-grid market development (e.g. to initiate process of unbundling / electricity market liberalization)</li> </ul>
	<ul style="list-style-type: none"> <li>· Lack of national policies, laws, programs and/or action plans targeting off-grid market development</li> <li>· No specific Off-Grid Policy, Law, or Action Plan in place</li> <li>· No Lead Agency</li> <li>· Insufficient focus on or understanding of framework to support private sector participation</li> </ul>	<ul style="list-style-type: none"> <li>· Help Government establish the medium-long term rural electrification strategy in the country through development and implementation of a rural electrification Master Plan</li> <li>· Help Government establish a lead agency / rural electrification agency that has a clear mandate to coordinate activities with the private sector, donor community and at national and local level in order to accelerate off-grid market growth to achieve energy access objectives</li> <li>· Help Government improve off-grid framework to create appropriate incentives for private sector participation</li> </ul>

Indicator	Policy/Regulatory/Market Gaps	Recommended Intervention
<ul style="list-style-type: none"> <li>Financial Incentives (waivers on import duty, taxes, etc.)</li> </ul>	<ul style="list-style-type: none"> <li>Insufficiently supportive financial incentives / tax regime</li> </ul>	<ul style="list-style-type: none"> <li>Help Government develop appropriate VAT and tariff policies covering the entire off-grid / stand-alone solar product supply chain (including batteries, inverters or other system components) that would provide necessary support to the industry<sup>[1]</sup></li> <li>Help Government establish a Special Task Force to mitigate potential difficulties in customs clearance and import logistics</li> <li>Help Government introduce appropriate grant and subsidy schemes which require private funding matches and are predictable and not overly bureaucratic</li> <li>Help Government create PPP schemes to share high project development and market entry costs particularly with developers in remote areas</li> <li>Help Government analyze where subsidies or exemptions for non-renewable energy sources provide unfair advantage for fossil-fuels and impede development of clean energy solutions</li> </ul>

Indicator	Policy/Regulatory/Market Gaps	Recommended Intervention
<ul style="list-style-type: none"> <li>Standards and Quality</li> </ul>	<ul style="list-style-type: none"> <li>Unclear / lack of quality standards</li> </ul>	<ul style="list-style-type: none"> <li>Help Government establish international quality standards for off-grid stand-alone solar products, including minimum technical standards (IEC Technical Specifications), warranties, required availability of and cost guidelines for post-sale services/O&amp;M, etc.</li> <li>Help Government integrate standards with appropriate oversight agencies to ensure quality-verification procedures are in place</li> <li>Help Government implement a legal framework that enables companies or public authorities to prosecute those caught distributing counterfeit or poor-quality products that are not up to promulgated standards</li> </ul>
	<ul style="list-style-type: none"> <li>Lack of capacity of local technical sector (solar PV technicians, installers, services providers etc.)</li> </ul>	<ul style="list-style-type: none"> <li>Support establishment of technical certification and vocational training programs through government, private sector, and/or academia for installation and maintenance of stand-alone solar systems<sup>[2]</sup></li> <li>Support development of database of best practices / information sharing services to ensure skills transfer from international, local and regional initiatives (e.g. through MEIRN)</li> </ul>

Indicator	Policy/Regulatory/Market Gaps	Recommended Intervention
	<ul style="list-style-type: none"> <li>· Insufficient attention of private companies to environmental/social standards and community engagement</li> </ul>	<ul style="list-style-type: none"> <li>· Assist private sector and/or civil society organizations to ensure environmental/social standards are in place</li> <li>· Assist in development of strategies encouraging inclusive gender participation</li> <li>· Support with the implementation of a repair and recycling framework for off-grid solar systems and equipment</li> </ul>
	<ul style="list-style-type: none"> <li>· Insufficient public awareness</li> </ul>	<ul style="list-style-type: none"> <li>· Support Government, trade associations and civic society organizations to develop and implement consumer awareness/marketing/education programs on the benefits of off-grid solar products and the existence of related national programs</li> <li>· Support development and implementation of programs to educate consumers, retailers and distributors on the benefits of quality certified solar products (vs. ‘non-standard’ products)</li> </ul>
<ul style="list-style-type: none"> <li>· Concession Contracts and Schemes</li> </ul>	<ul style="list-style-type: none"> <li>· Lack of clear and transparent licensing and permitting procedures</li> <li>· Unclear procedures</li> <li>· Insufficient communication and streamlining</li> </ul>	<ul style="list-style-type: none"> <li>· Help Government develop clear licensing and permitting procedures</li> <li>· Help Government develop improved systems for sharing and disseminating information to project developers and key stakeholders, including establishment of a “one-stop-shop” for national level permits and approvals and expediting of local permits</li> </ul>

Indicator	Policy/Regulatory/Market Gaps	Recommended Intervention
	<ul style="list-style-type: none"> <li>· Lack of experience/understanding of emerging concession and energy services schemes for off-grid providers</li> <li>· Need for understanding of different SHS concession schemes</li> <li>· Need for understanding of emerging models for ‘Integrated Private Utilities’ or ‘Energy Companies of the Future’</li> <li>· Public procurement or public finance/budget laws that hamper deployment of energy services models for public facilities</li> <li>·</li> <li>· Lack of standardized contracts for energy services provided by private system operators to public facilities</li> <li>·</li> <li>· Insufficient protection for stranded investments</li> <li>·</li> </ul>	<ul style="list-style-type: none"> <li>· Help Government to understand and develop approaches to facilitate pilots of ‘Integrated Private Utility’ or ‘Energy Company of the Future’ schemes.[3]<sup>3</sup></li> <li>·</li> <li>· Help Government develop procurement and public finance laws that will facilitate stand-alone solar system investment for public facilities (schools, health care facilities, etc.)</li> <li>·</li> <li>·</li> <li>·</li> <li>· Help Government develop proper procedures and guidelines to protect against stranded investments from competition among all on-grid and off-grid rural electrification approaches[4]<sup>4</sup></li> </ul>

Indicator	Policy/Regulatory/Market Gaps	Recommended Intervention
· Business Model Regulation	· Lack of understanding about different pricing schemes and business models offered by stand-alone solar system developers	· · · Support Government and off-grid enterprises to collaborate specifically on developing pricing schemes for productive use market segment[5] <sup>5</sup>  · Support off-grid entrepreneurs and telecom companies in building the capacity of and fostering linkages between telecom companies / mobile money providers and off-grid solar companies to help roll out technology platforms and PAYG business models

*For more details, please refer to the UNDP ProDoc, Section II; “Development challenge”.*

#### **A.1.2. Baseline scenario and associated baseline projects**

The Government of Guinea recognizes that lack of access to energy in provincial and rural areas is a major detrimental factor to the country's economic development, social stability and environmental sustainability. To solve the problem, the government intends to create a rural electrification agency, a national agency for rural electrification, under the auspices of the Ministry of Environment and Sustainable Development (MADS) / Ministry of Energy. It is also planned to create another agency dedicated to the promotion of renewable energies. None of these agencies has materialized yet.

The government has also launched an ambitious program (Terra Ranka) to improve the country's energy infrastructure. This program includes major investment projects in power generation and transmission lines, including the construction of a 55 MW thermal power plant at Bôr (with an initial phase of 15 MW), financed by BOAD (West African Development Bank). On the renewable side, there are two hydroelectric dams, Cusselinta (13 MW) and Saltinho (14 MW). But that would require more than 200 million USD, which has not yet been obtained. There is also a project for a 10 MW photovoltaic solar plant in Gardette, which would require \$ 30 million, which has not yet been exploited. All these plans are projects connected to the grid. Even if they materialize, they will be limited to the capital Bissau and the big cities and will certainly not serve rural areas where the main electricity grid is non-existent.

There are, however, some initiatives for off-grid electricity in rural areas. The most important, already running, is the Bambadinca project developed by TESE, an international NGO. It is a mini solar photovoltaic power plant of 312 kW. The mini-grid provides electricity to about 450 homes in Bambadinca. The overall project cost \$ 2 million. The Bambadinca project is rich in lessons, from legal aspects to business model challenges, which will guide the design of the GEF-funded project.

In the area of clean cooking, many initiatives have been launched in the past, but these were mostly done by donors or pilot projects and did not result in a real transformation of the sector. Past initiatives have included: (i) the rational use of forest resources - an FAO / EU funded project - to protect forests through the rational use of wood products, the dissemination of improved carbonization techniques, and kilns; and (ii) a biogas project funded by the Chinese government.

*For more details, please refer to the UNDP ProDoc, Section II; “Development challenge”.*

### **A.1.3. Proposed alternative scenario**

This energy deficit situation prompted the Government of Guinea-Bissau to collaborate with UNDP to develop and submit to the GEF secretariat a project concept entitled "Promoting Better Access to Modern Energy Services through Solar mini-grids and low carbon bioenergy technologies amongst Guinea Bissau's forest communities". The project focuses on the specific obstacles related to investment in decentralized mini-grids and low-carbon bioenergy technologies.

The project objective is “To promote investment and sustainable business models in both solar mini-grids and low-carbon bioenergy technologies”. The project is structured into 3 components which are:

- Component 1: Policy and financial instruments and incentive scheme for solar mini-grids and low-carbon bioenergy technologies;
- Component 2: Capacity building for mini-grid and low-carbon bioenergy;
- Component 3: Mini-grids and low-carbon bioenergy technologies roll-out.

Investment and business models are at the center of the project design. For mini-grids, the project's approach recognizes both Guinea-Bissau's challenging general private sector investment environment, as well as the specific early-stage and nascent status of solar mini-grids. As such it is envisaged that three main business models will be explored in this context:

- A utility-based business model, where the public utility, EAGB, will build, own and operate the solar mini-grids
- A PPP business model, for example where the capital costs of the mini-grid are donor-funded, and the ongoing O&M/servicing is performed by an NGO and/or private sector. This model was pursued for the successful Bambadinca baseline mini-grid investment.
- A private-sector business model, where private developers, either domestic or international, will build, own and operate solar mini-grids.

It is envisaged that a mix of these three business models can be explored, with the project and its activities flexible to accommodate these different approaches. Over time, as the market evolves, the intent will be to increasingly move to a full private sector business model. Varying degrees of targeted financial support may be required for each of these models. Financial support will be designed with the objective to be phased out over time, as the market evolves on a path to financial sustainability.



With regard to engineering specifications, the project will promote lowest cost approaches for system design and sizing. Innovations in productive use will be encouraged, to increase demand over time and improve the mini-grid's financial viability. Designs will include both solar-battery mini-grids, and solar-battery-diesel hybrid mini-grids (both green-field and brown-field sites)

· Component 1: Policy and financial instruments and incentive scheme for solar mini-grids and low-carbon bioenergy technologies

This component envisages the preparation and adoption of a comprehensive policy framework for the promotion of solar mini-grids and low carbon bioenergy.

### **Outcome 1: Institutional and financial sustainability of solar mini-grids and low-carbon bioenergy strengthened.**

#### **Output 1.1: Policy package to operate Solar mini-grids developed.**

A simplified policy and an established and operational legal / regulatory framework for electricity generation by the private sector to provide mini-grids isolated by renewable energies is defined. The project will examine Decree-Law no. 2/2007 and no. 3/2007 which govern the energy sector and the NAPER "National Renewable Energy Action Plan" proposed to identify the problems that hinder the private sector and play a role in the decentralized generation of electricity from REs in the country. Subsequently, the project will develop a policy document outlining the necessary corrective measures, including the procedures / regulations accompanying the Electricity Framework Law, and propose a legal / regulatory framework that will encourage private sector investment in the development of mini-grids. The project will then seek government approval to operationalize this set of documents. Particular attention will be paid to the rapid implementation of all accompanying procedures (implementing texts) to ensure that the political and legal / regulatory framework does not suffer from delays in implementation.

This output will have a 3 layer of interventions: (i) on higher level intervention with the entire off-grid sector; (ii) on specific interventions explicitly on Mini-grid policies and regulation; and (iii) on tariff setting, and design of financial support.

(i) *Higher level intervention with the entire off-grid sector:*

Table 1 on Gaps in the off-grid policy and regulatory framework detailed the gaps (barriers) and provided some recommended interventions. As per the off-grid sector, the project will follow the recommendations by supporting the Government to:

- Establish a clear Rural Electrification Policy which encourages least cost, integrated planning for all options;
- Develop a medium-long term rural electrification strategy in the country through development and implementation of a rural electrification Master Plan. This includes establishing a lead agency / rural electrification agency that has a clear mandate to coordinate activities with the private sector, donor community and at national and local level in order to accelerate off-grid market growth to achieve energy access objectives;
- Develop a comprehensive, fully integrated electrification plan with geo-spatial modelling on least cost planning to consider where extension is the most efficient and sustainable approach to increasing energy access vs. development of the off-grid sector – mini-grids and stand-alone systems powered by local renewable resources
- Analyze where fossil fuel subsidies serve as an impediment to development of safe, clean energy access alternatives

(ii) *Specific interventions explicitly on Mini-grid policies and regulation*

As per the solar mini-grid specificities, the project will follow the recommendations by supporting the Government to:

- improve the planning framework to encourage private participation in mini-grid systems;
- establish international quality standards for solar products, including minimum technical standards, warranties, required availability of and cost guidelines for post-sale services/O&M, etc.;
- Support with the implementation of a repair and recycling framework for solar systems and equipments;
- establish a Special Task Force to mitigate potential difficulties in customs clearance and import logistics
- develop improved systems for sharing and disseminating information to project developers and key stakeholders, including establishment of a “one-stop-shop” for national level permits and approvals and expediting of local permits.

(iii) *Tariff setting, and design of financial support*

As per the tariff setting, and design of financial support, the project will follow the recommendations from table 1 by supporting the Government to:

- Analyze and then propose design for a public financial viability mechanism which will aim to improve the financial viability of private sector models for mini-grids, and set them on a path to sustainable financial viability (this can be in the form of concessional finance, upfront capital subsidies, etc.).
- Develop appropriate VAT and tariff policies covering the solar mini-grid supply chain, noting that the project will work on putting in place the best criteria for tariff settings and not specifically setting the tariffs. Tariff flexibility and innovative approaches by the private sector on tariffs will be encouraged.
- introduce appropriate grant and subsidy schemes which require private funding matches and are predictable and not overly bureaucratic.
- Support mini-grid entrepreneurs and telecom companies in building the capacity of and fostering linkages between telecom companies / mobile money providers and solar companies to help roll-out technology platforms and PAYG business models. In addition, the project will explore financing models like “Pay as you save” which enable users to take out loans, the payback of which, will be less than payments made for business-as-usual energy solutions (in this case diesel-powered generators).

**Output 1.2: Financial incentives and market mechanisms to secure supply and stimulate demand for energy-efficient stoves and firewood/charcoal developed**

Incentives and market mechanisms will be designed to support private investment (craftsmen) in high-efficiency stoves and kilns, which may include the subsidy of equipment used in the realization of kilns and improved stoves. In addition, the project will collaborate with loan guarantee funds and commercial banks to facilitate promoters' access to financing, provide advice when formulating the business plan and loan applications, and identify other sources of financing for promoters.

There are essentially 5 steps in the charcoal value chain (Figure below). In the light of discussions with key stakeholders in Guinea-Bissau, the project proposes a series of integrated interventions focusing mainly on stages 2 (charcoal production) and 5 (charcoal consumption) in the chain of production. This also applies to the production and use of fuelwood.

Figure 1 : Charcoal Value Chain – Interventions by Stage

The improved kilns/kilns of Stage 2 will mainly consist of Casamance prototypes. Improved stoves in Step 5 will include prototypes using charcoal or firewood. Through these activities, a viable business model for improving the production and distribution of kilns and stoves will be designed and implemented, focusing on the deployment of microfinance and loan guarantee programs. Sustainable alternatives to wood energy will also be explored and assessed.

#### **Output 1.3: Developed gender-sensitive capacity development and modules for the production and utilization of improved kilns and cookstoves**

Women are the final users of firewood and charcoal. Therefore, they are essential for the adoption of new cooking techniques with improved cook stoves and they can also play a determining role for the use of energy efficient kilns. These women will be informed, sensitized and trained on this news. They will be supported for the creation of association or GIE who will be in charge of the production, the marketing and the after-sales service of the improved stoves. While working in putting in place an enabling environment for improved energy-efficient stoves and charcoal, the project will ensure that there is a gender-sensitive participation in the decision-making process.

#### **Output 1.4: Alternative sustainable solutions to wood energy explored and assessed**

Biomass is the main household energy used in Guinea Bissau. Output 1.1 should include measures for alternatives to wood energy. For example, with the electrification of villages, firewood can be gradually replaced by hot plates (electric stoves). Rural areas are areas with a high concentration of forest residues but also breeding areas. Biogas can be used as an alternative, but social, cultural and religious barriers must be overcome through awareness raising and training. NGOs will be privileged partners for the success of this product.

#### **· Component 2: Capacity building for mini-grid and low-carbon bioenergy**

Through this component, the project will work on a market structure that should have the right balance between international and local firms, in order to develop and build skills and expertise and the country level for mini-grids and low carbon bioenergy development.

#### **Outcome 2: Capacity to deliver turn-key solutions and quality O&M services for mini-grids and low carbon bioenergy technologies developed.**

## **Output 2.1: Tailored capacity building programme delivered to public sector and civil society.**

Relevant national stakeholders for this output include Government bodies but also local community-based organizations. Capacities developed within the MEI / MEIRN, EAGB, Agencies, local banks and key national actors such as the Ministry of Agriculture and Rural Development and the Ministry of the Interior on best practices and opportunities for models of decentralized village electrification in forest areas (off-grid). This will include developing capabilities to familiarize them with suitable public derisking instruments, system sizing and optimization tools to evaluate system design options, including how to use the criteria and guidelines established to technically evaluate projects, determine the amount of the grant to be provided to project developers and decide on the appropriate fee that a given developer can charge to consumers. Finally, community-based organizations in selected locations (women's groups, local NGOs and SMEs / productive users) will receive training, assistance and advice on potential income-generating activities and security aspects related to the use of electricity.

## **Output 2.2: Various support delivered to and established for the private sector**

The project will provide various support to the private sector, via a help desk, clearing house, guidebook, targeted financial sector assistance, and a public relations and investment promotion campaign:

- *Help desk:* A "Help Desk" will be established to provide commercial and technical advisory services to potential mini-grid developers. This Help Desk will be housed within the Ministry of Renewable Energy (Rural Electrification Agency) and will have trained staff to provide quick and targeted responses to requests for assistance and / or advice to developers on specific issues related to the fundamental aspects of project development, including preparation of feasibility / business plans and interpretation of tripartite contracts / agreements involving them as developers, rural electrification agencies and EAGB. It will also undertake individual project reviews prepared by the promoters for their technical and financial soundness prior to submission to credit institutions. Support to be provided by the help desk will be billed; this will ensure its financial viability beyond the project period.
- *Clearing house:* Set up a one-stop shop (established in accordance with the Investment Charter under the supervision of the Ministry of Trade and Industry) by setting up a special office for the issuance of licenses and building permits to small project promoters' mini grids. At present, the one-stop shop does not exist. The window dedicated to the one-stop shop will be the repository of all the information that a potential developer will need before making a request, all the application forms and the required documentation must be submitted in support of an application, the fees to be paid, notify proponents if additional documents are required and provide a final decision on the outcome of an application. This will prevent the proponent from personally visiting multiple government offices to obtain the necessary approvals and speed up the approval process.
- *Guidebook:* This guide will provide a step-by-step approach to implementing mini-grids and serve as a tool for system designers, installers and operators to design, build, operate and properly manage mini-grids and grids. Assist all stakeholders to improve their common understanding and commitment to mini-grids. It will also aim to facilitate discussions between prefecture / sub-prefecture community groups and the private sector and will serve to demonstrate how mini-grids can foster economic and social growth, achieving development imperatives, while minimizing impacts, negative social, cultural and environmental impacts in villages. Finally, it will contain

standard application forms and provide information / guidelines on the documentation required for the issuance of building licenses and permits to potential promoters, as well as associated costs.

- *Targeted financial sector assistance.* These activities will reach out to the nascent domestic financial sector, both publicly owned and private/commercial banks, to help inform domestic financiers with regard to the upcoming investment opportunities around solar mini-grids and low-carbon bioenergy. The aim is to build comfort with these domestic financial actors so that they begin to lend to the private sector in these areas: Issues to be addressed will include: typical financial profile, cash-flows, capital structure of these investment types and credit-worthiness of counterparts; investment assessment and appraisal of potential mini-grid and bioenergy activities; typical track-record profile of investments and international case-studies.

- *Public relations and investment promotion campaign:* National plan to implement awareness raising / promotional activities targeting national and international investors. This will include the preparation of promotional material, information sessions with investors already active in the energy / renewable energy sector in the country, local companies that have an interest in expanding their activities to include energy in the energy sector, rural areas and, potentially, possibly organizing road shows to attract foreign investors to establish consortia with local businesses to provide rural areas with modern energy services.

### **Output 2.3: On-the-job training programme for 100 solar mini-grid installers delivered.**

The project will train private sector installers to enhance knowledge and understanding of different aspects of renewable energy development for electricity generation and distribution / consumer sales, including identification of potential sites, evaluation pre-feasibility and preparation of feasibility studies / business plans that will necessarily include plant design, equipment selection and assembly, construction, operation and maintenance. Training modules will be designed and implemented for the main beneficiaries (male and female promoters, component producers, system designers / installers, service technicians and consumers) and capacity building for general skills development and implementation of projects. In this regard, capacity building activities will include issues related to the potentially negative impacts that the development of solar mini grids such as batteries can have on land use, water rights, biodiversity, etc.

### **Output 2.4: Capacity building for the fuelwood value chain delivered**

This output is designed to enhance the fuelwood value chain by conducting capacity building and training activities to strengthen the technical and commercial capacities of the chain actors.

Capacities developed within the IBAP, artisans, farmers, loggers, and key national actors such as the Ministry of Agriculture and Rural Development and the Ministry in charge of natural resources on best practices and opportunities for the sustainable use of firewood. This will take into account the awareness of deforestation and the sustainable use of forests. This capacity building will include the development of competence in the cutting and use of wood. This use will be based on the difference in efficiency between traditional stoves

and improved cookstoves, as well as improved stove making techniques. Emphasis will be placed on entrepreneurship to enable the establishment of a structure capable of developing viable business models for the production, marketing and maintenance of improved stoves.

On-the-job capacity building for 100 craftsmen, farmers and other actors in the fuelwood value chain will be conducted.

Finally, an awareness and information campaign on the impact of deforestation and climate change will help rural communities understand the notion of sustainability of the source. During this campaign, alternatives will also be proposed. The organizations (associations, producers) will then be trained on the methodology of manufacturing and operating improved stoves and kilns. Women's organizations will preferably be formed. They will then be accompanied to set up a local company producing improved stoves. Legal devices will frame them and allow them to market their production. The project will also propose a detailed study of the wood industry in Guinea Bissau. This study will provide a better understanding of the areas of harvest, coal production, actors, quantities produced and their end uses.

#### · Component 3: Mini-grid and low-carbon bioenergy technologies roll-out

The expected outcome of this component is increased confidence of communities, developers and potential investors in the technical and economic viability of renewable energy mini-grids for rural electrification and local socio-economic development. This is seen as an alternative approach to centralized systems of grid extension and diffusion of low carbon technologies by bioenergy. This goal will be achieved through the implementation of pilot investments, exploring business models that enable sustainability and replication. It is expected that the successful presentation of electrified villages will act as a precursor to the implementation of similar solar mini-grids to harness the country's solar potential for rural electrification. It is also expected that the successful presentation of villages using improved kilns and stoves will act in the same way. NGOs will support the project, including TESE who developed and implemented the management strategy of the Bambadinca plant.

Through the implementation of investment projects under this component, the relevance of risk reduction instruments and proposed policies will be demonstrated (Component 1). The solar plant and the deployment of improved kilns and stoves will also contribute to the demand for skills and capacity building (Components 2).

**Outcome 3: A functioning business model is demonstrated for the technical and financial viability of mini-grids.**

**Output 3.1: Seven pilot sites totaling 1.2 MW for mini-grids identified and assessed, and business model defined.**

At the PPG stage, initial engineering specifications have been developed for seven hybrid solar-battery-diesel mini-grids based on a lowest-cost techno-economic modelling approach. Hybrid systems will be a mixture of green and brown-field sites. For any hybrid systems, GEF INV support will be targeted to brown-field sites, and to the low-carbon components of green-field sites.

Under each of the seven sites, the project will expressly seek to explore and establish track records for each of the three different business models (utility, PPP, private sector). Targeted support and assistance will be provided, and lessons-learned extracted and disseminated to the broader mini-grid market community.

For each of the seven sites, a generator sizing will be determined for each village according to socio-economic activities. The capacity of the battery is dimensioned for a range of 8 hours. This duration makes it possible to optimize the number of charge-discharge cycle of the batteries. It also significantly reduces the size of the battery and therefore the initial investment and replacement costs. Loads affected by subscriber category for network sizing are:

- Power per ordinary subscriber (household): 500 w
- Power per concession: 1500 w
- School: 1000 w
- Multifunctional platform: 15000 w
- Drilling: 10000 w
- Dispensary, health center: 2000 w
- Health case: 500 w
- Shop: 500 w
- Public lighting lamp: 18 w
- Mosque / church: 500 w
- Socio-educational home: 1000 w
- Other workshops: 4000 w

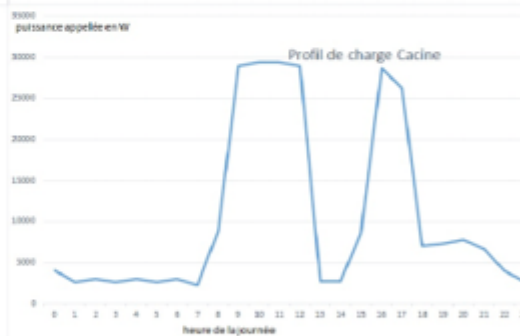
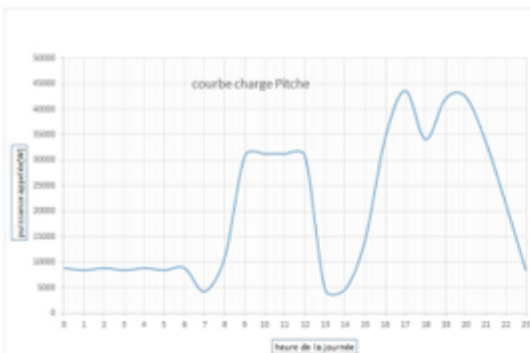
Table 1 presents the assumptions used to estimate energy requirements

Table 2: assumptions for estimating energy requirements

Household	Mill	Lighting	Pumping
1,000 Wh per household	10 Wh per person	5 Wh per person	Depending on water requirements and HMT if existing drilling otherwise 5 Wh / person

Figure 2 shows the set of site load curves selected. It is obtained by considering the different types of energy use and their probable time of use. The load profile thus determined will make it possible to size the power of the generating set to be used because the latter will have to be able to feed the tip (maximum power). It will also determine the operating scenario of the plant for a typical day. This day is taken for the least sunny month.





The following criteria were set for the site selections:

- Availability of the resource
- Sustainability of the resource
- Population density
- Socio-economic activities
- Accessibility of the site
- Geographical distribution of sites

For the villages visited, the exploitable energy potential for mini-power stations is solar energy. The hydroelectric potential is either too high for a micro hydroelectric run-of-river, or the river dries up for a certain period of the year, or the river is dependent on the phenomena of floods and major recession. After the visit of the sites and the various meetings with the stakeholders and the authorities, the following sites were selected:

· In the Gabu area, Pitche was chosen for a mini pilot solar plant. This locality is administrative chief town. It has a local distribution network that was powered by a 175 kVA generator. In addition to this generator, the village has a multifunctional platform run by the women's association. The multifunctional platform was used to peel the rice and grind the other cereals. The main activity of the village is agriculture. The village is heavily populated. The Tchetché site was also selected. This locality is a crossroads by its position (just at the exit of the river). Tchetché has a solar pumping system over the sun with low capacity (financed by JICA). It also has a military cantonment, a school with an improved fireplace used for its school canteen. This school is supported by the World Food Program (WFP) and UNICEF. At this village, it is planned to review their pumping system and install a mini-grid.

· In the Buba area, the Lamane site was chosen. It will be dimensioned a cold room for the conservation of the halieutic products but also fruits and a mini solar power station. Lamane is a village of sinners. It has also capitalized many successful projects with the Institute of Biodiversity and Protected Areas (IBAP). These projects were executed with the village association. In this same area of Buba, Dutadjara which is another very organized village with successful projects, is chosen for a mini-solar power station. By their organization, the populations have two rice husking machines and a tractor for field work. This village has two women's associations.

· In the Cantanhez area, the Jamberem site is retained. It will be a question of a cold room for the conservation of the halieutic products and fruits but also of mini-solar power station. It will be the pilot site for this region. It is also the site of Cacine.

In the region of Cacheu, Cacheu is selected as the only site. Cacheu is non-electrified and is a commune that has several community-based organizations. It is also a tourist site and the income generating activity that is developed there is fishing. A mini-grid will be installed with an anchor client as a cold room for the preservation of fishery products.

For the villages involved in the project, it is decided to make a water supply system because they are all faced with the problem of access to water. For the same villages, it will be question of development of improved hearths and kilns. The improved stoves are intended for households and women's associations that smoke fish. The kilns for their part, are intended for producers of charcoal.

### ***Installation of 1.2 MW of Solar PV-based power generation capacity installed***

During the implementation of the activities related to this component, the project will sensitize and train energy managers at the national and prefectural / sub-prefectural levels on best practices and opportunities for decentralized rural electrification models through mini-grids. It will also work with the Government's Bureau of Standards to ensure that only high-quality products / equipment associated with the development of renewable energies including solar PV that meet approved standards are allowed for import and installation in the country.

Finally, during implementation, the project will monitor new developments in decentralized production that could be applied in the context of Guinea Bissau when they become commercially available.

#### **Characteristics of the sites**

Figure 3 shows the operation of the various power sources of the plant. It is given for a typical day of the month the sunny month. It shows how energy needs are met by different sources. The solar PV is used as a first option, the batteries are then used, and the generator does not contribute when the demand is higher than the PV production and the stored energy or when the battery level is low and PV production is not enough. The maximum operating time of the groups is estimated at 3 hours when all the loads are used. This time may be at least null during the first five (05) years of operation of the plant. The peak power to be installed is 1,155 MWp for the energy needs of the 7 selected sites. Villages in protected areas may benefit from drinking water supply. The summary of the peak power required for each village is presented in Table 5 (for an annual output of 53.6 MWh). This peak power to install in the 7 selected sites takes into account a central and a water supply for all the sites but also a cold production according to the sites (Tchetché, Lamane, Jemberem, Cacine and Cacheu). The following table summarizes the peak powers for each type of use.

Table 3: Summary of the peak power to be installed for the type of plant chosen (hybrid)

Site	Number of modules for the Central	Number of modules for the pumping	Number of modules for the cold room	Number of total module	Total Peak Power (kWp)	Peak power of a module (Wc)	Annual production of PV (MWH)	annual needs (MWh)	Supply of Diesel by year (MWh)
Pitche	540	34		574	172,2	300	240	308,06	68,06

Tchetché	160	17	51	228	68,4		95,1	106,58	11,48
Lamane	240	4	68	312	93,6		128	137,5612	9,56
Duta Djara	240	4		244	73,2		100	113,88	13,88
Jemberem	700	16	51	767	230,1		303	326,99255	23,99
Cacine	300	17	68	385	115,5		155	161,79355	6,79
Cacheu	1220	51	68	1340	402		546	625,70125	79,70
Total	<b>3,400,00</b>	<b>143,00</b>	<b>306.00</b>	<b>3,850.00</b>	<b>1,155.00</b>		<b>1,567.10</b>	<b>1,780.57</b>	<b>213.47</b>

Table 4 presents the summary and the estimated production for the option of a pure solar power plant.

Table 4: summary of peak power for a pure solar option

Site	Number of modules for the Central	Number of modules for the pumping	Number of modules for the cold room	Number of total modules	Total Peak Power (kWp)	Peak power of a module (Wc)	Annual production of PV (MWH)	annual needs (MWh)
Pitche	760	34		794	238,2	300	332	308,06
Tchetché	240	17	51	308	92,4		128	106,58
Lamane	340	4	68	412	123,6		169	137,5612
Duta Djara	340	4		344	103,2		141	113,88
Jemberem	1,000	16	51	1067	320,1		421	326,99
Cacine	420	17	68	505	151,5		204	161,7936
Cacheu	1740	51	68	1859	557,7		757	625,7013
Total	<b>4,840.00</b>	<b>143.00</b>	<b>306.00</b>	<b>5,289.00</b>	<b>1,586.70</b>	<b>300.00</b>	<b>2,152.00</b>	<b>1,780.57</b>

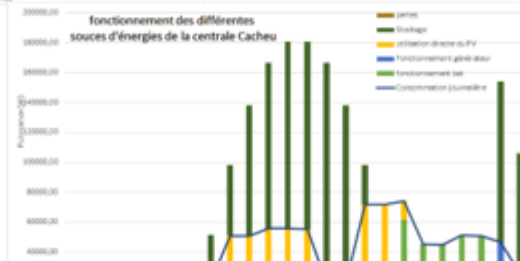
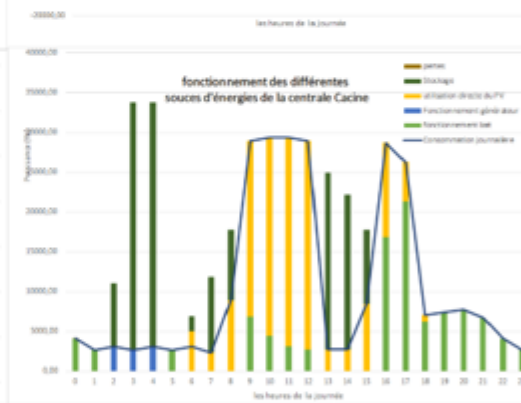
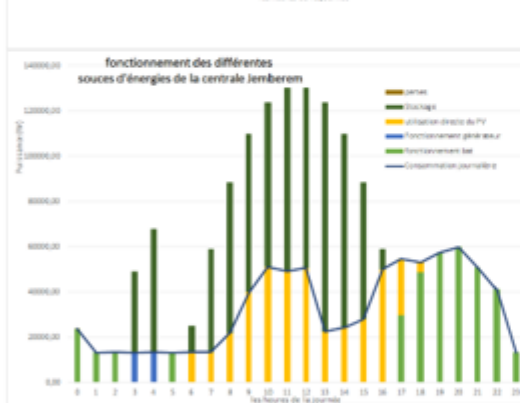
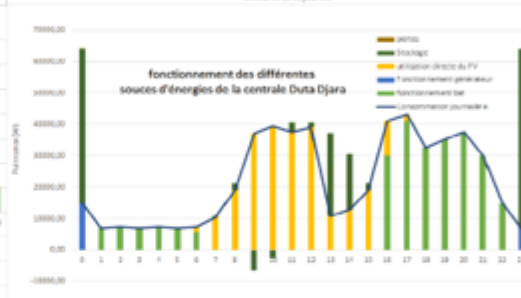
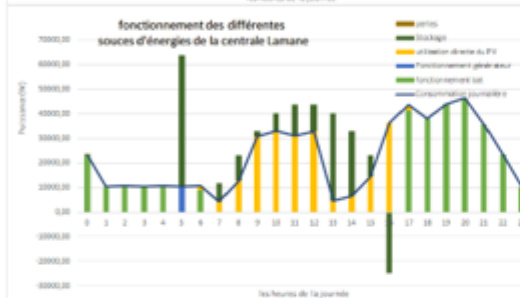
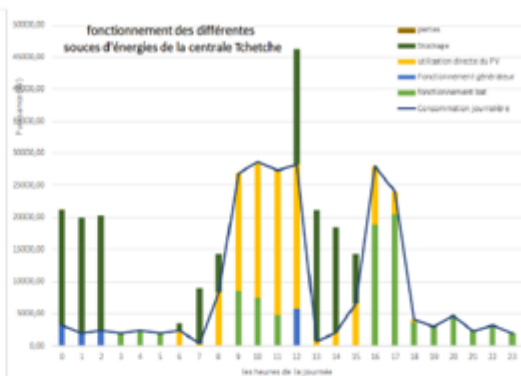
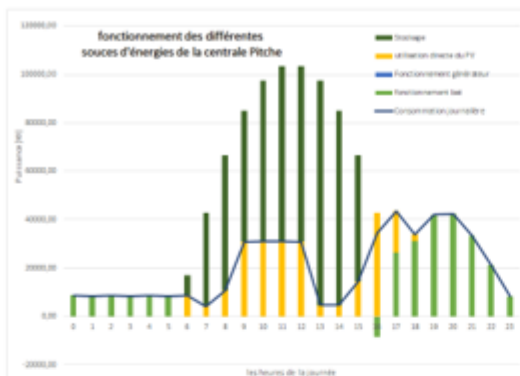


Table 5 : Characteristics of the project sites

N°	Region	Department	Site and proposed power	Number of households	Population[1]	Women	Daily requirements energy	Electricity services to be used for:
1	Gabu		Pitche	602	6021	3071	844 kWh	Lighting Community Income generating Pumping needs activities
			172.2 kWc					
2	Gabu		Tchetché	42	422	215	292 kWh	Lighting Community Income generating Pumping Cold room needs activities
			68.4 kWc					
3	Buba		Lamane	47	471	240	376.88 kWh	Lighting Community Income generating Pumping Cold room needs activities
			93.6 kWc					
4	Buba		Duta Djara	38	376	192	312 kWh	Lighting Community Income generating Pumping Cold room needs activities
			73.2 kWc					
5	Cantanhez		Jemberem	99	985	503	895.87 kWh	Lighting Community Income generating Pumping Cold room needs activities
			230.1 kWc					

6	Cantanhez		Cacine	129	1,289	657	443.27 kWh	Lighting	Community	needs
			116 kWc					Income generating activities		
7	Cacheu	Cacheu	Cacheu	713	7,126	3,640	1,714.25 kWh	Pumping	Community	needs
			402 kWc					Income generating activities		
								Pumping		
								Cold room		

**Output 3.2: Productive use promoted to increase electricity demand in the targeted sites.**

The project will emphasize the importance of productive use, both to improve the financial viability of mini-grids (which benefit greatly from economies of scale due to higher loads), and to improve the livelihoods and human development impact of end-users. Activities will include piloting and exploring innovative approaches to productive use in the business models supported by the project, including the opportunity for lease-back and third-party ownership arrangements, where the mini-grid developer absorbs the upfront cost of productive use equipment, and then spreads this cost over time to the end-user.

Capacity building of the rural population, especially women, to undertake income-generating activities using electricity will be conducted. Access to electricity services in rural areas opens up opportunities for income-generating activities associated with the processing of agricultural and fruit products such as rice, maize, sorghum, millet, mahogany, mango, banana. Electricity also allows the conservation and processing of fish products. This will add value to crops by allowing farmers to obtain higher prices through their sale in processed form rather than as raw products. The availability of electricity can and will also promote labor activities such as sewing, metal carpentry...

As productive activities increase the disposable income of some rural households and the availability of electricity, it may be wise to control household appliances for comfort and / or to robotise certain works dedicated to women. Electrical energy can also provide an alternative to using wood and charcoal for cooking with hotplates. Induction cookers are compact, portable, lightweight, efficient and affordable, with a selling price of 30,000 FCFA / unit (US \$ 54.5). Cooking with induction cookers does not generate smoke or soot and keeps the cooking surface clean. Induction cookers have the potential to move some households away from using wood or charcoal for cooking, reducing pressure on forests and reducing deforestation.

**Output 3.3: 5,000 improved cookstoves commercialized and 50 improved kilns disseminated**

The output of the project will work on the roll-out of the bioenergy technologies, namely the energy-efficient stoves and kilns. Activities under this output will includes:

- Prototypes for stoves and kilns: Clean cooking success resides on tailor-made approaches. A thorough consultation with beneficiaries, craftsmen and local entrepreneurs will be conducted to select the appropriate prototypes for improved cookstoves and for kilns. If the “Casamance” prototype is particularly relevant in this region, stoves prototypes need to be determined. The prototypes will then be tested before any scale up.

- Production: Local entrepreneurs and craftsmen will be supported to invest in energy-efficient stoves and kilns. A traditional stove cost around \$2 while energy-efficient stoves can cost between \$7 to \$15, depending on the prototype. A small portion of the production will be supported by the project as a subsidy, allowing to lower the overall capital cost of local entrepreneurs, thus being more affordable for the beneficiaries. International stoves manufacturers will also be contacted to explorer further partnerships. The same approach will be adopted for improved kilns.

- Dissemination: In order to overcome the capacity to pay of households, several financial options will be explored, including the “money box” and the “exchange”. The “Money Box” is a tin with a slot. The local entrepreneurs give its customers the stoves on credit, and they pay out of the savings they make from reduced charcoal consumption. The principle is common in West Africa. For example, in Ghana where the money box experience started, 3 of 4 customers used this money box mechanism. The “exchange” mechanism is allowing the consumer to exchange his/her traditional and improved cook stoves.

#### **GEF focal area strategies**

The proposed UNDP-GEF project will address barriers that are specifically related to the investment in decentralized mini-grids and low-carbon bioenergy technologies. This project is consistent with the GEF-6 strategy to address climate change (*CCM-1 Technology Transfer, and Supportive Policies and Strategies*), Programme 1 (*Promote timely development, demonstration and financing of low-carbon technologies and mitigation options*) and *CCM-2: Demonstrate Systemic Impacts of Mitigation Options*, Programme 4 (*Promote conservation and enhancement of carbon stocks in forest, and other land-use, and support climate-smart agriculture*) because its main objective is to facilitate investment in RE-based mini-grid systems (Solar PV) and low-carbon bioenergy technologies in Guinea Bissau.

#### **A.1.4. Incremental/additional cost reasoning and expected contributions from the baseline**

NA

#### **A.1.5. Global environmental benefits and/or adaptation benefits**

Time-frame	Direct project without replication (25-year equipment projected life).	Consequential post-project (top-down) with replication over next 10 years of project influence).	Consequential post-project (bottom-up)
Total CO2 emissions reduced (tonnes)	93,900	939,000	281,700
Unit abatement cost (\$/tonne CO2)	31	3.1	10

*For more details, please refer to the UNDP ProDoc, Annex K “GHG emission calculations”.*



#### **A.1.6. Innovativeness, sustainability and potential for scaling up**

##### **Innovativeness**

Guinea Bissau has low access to electricity. This rate is estimated at 1% in rural areas. Wood energy is the most widely used source of energy and causes unprecedented deforestation in the country (7380,000 tonnes of wood and coal per year).

The project has several distinctive characteristics, which makes it highly innovative in the context of Guinea-Bissau. First, it creates a strong link between forest and basic energy needs: by promoting the use of charcoal and sustainable fuelwood, the project will not only reduce the pressure on biomass resources, but also promote solar energy. The project will also test a combination of three business models (utility business model, PPP business model, and the private sector business model), exploring the advantages of these models to support decentralized mini-grids. It will also focus on identifying and supporting private-sector-led RE projects (as opposed to the traditional public/donor approach), thereby maximizing long-term financial and operational sustainability. Finally, unlike the traditional approach of providing easily available turnkey solutions for rural electrification, the project will work with the entire national value chain for photovoltaics and bioenergy, starting with design, construction and commissioning, maintenance and management.

##### **Potential for scaling up and replication**

Improving the social and economic conditions of the populations affected by the project will facilitate its reproduction. This replication may be carried out by national and/or foreign investors. The latter will be able to collect funds dedicated to the environment, sustainable development. The extension of the networks will depend on income-generating activities but also on the success of improved kilns and stoves.

##### **Sustainability**

The participatory management described in the theory of change will make the project sustainable. Indeed, with the actors, the defined operating mechanisms adopted will remain scalable according to the conditions. Electricity will not be free; the costs will be determined in common agreement with all stakeholders. The minimum price per kWh, on the other hand, will be defined by the profitability conditions.

For improved kilns and stoves, artisans will be trained and will be national producers and distributors. They will be supervised and covered by regulatory and even legislative measures if necessary.

*For more details, please refer to the UNDP ProDoc, PART IV: [Feasibility](#) Section iv. Sustainability and Scaling-up.*

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[1] INEC, 2009; WB, 2016 (official figures), growth rate 2.5%, female-to-male ratio 51%

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[1] The GoGB currently has incentives in place for solar panels only, but not for other components of a solar kit / SHS

[2] Acção para o Desenvolvimento is a local NGO that runs a technical school that provides solar PV training

[3] Innovative models are emerging for entire geographic areas to be concessioned to integrated private energy services operators who may offer an appropriate mix of solutions within their franchised area (i.e. a mix of SHS, rooftop solar, specialized systems for productive use, mini-grids and micro-grids). This is being piloted by the Shell Foundation in several countries.

[4] As the off-grid sector becomes populated by a variety of different approaches, all private operators are subject to potential stranded investments “when the grid arrives” and even SHS providers can have their assets and revenues threatened when the mini-grid arrives.

[5] The productive use segment is brand new with SHS providers, mini-grid operators and vendors specialized on a single type of SME or agricultural productive use (i.e. grain mills, water pumps, cocoa processing etc.) all grappling to arrive at attractive approaches to billing for energy services. This is a particular area where TA support is much needed to help all stakeholders sort out fair and practical approaches.

#### **A.2. Child Project?**

**If this is a child project under a program, describe how the components contribute to the overall program impact.**

N/A

#### **A.3. Stakeholders**

**Please provide the Stakeholder Engagement Plan or equivalent assessment.**

The table below proposes a stakeholder involvement plan for the implementation phase.

Stakeholders	Mandate and Functions	Prospective role in the project
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Stakeholders	Mandate and Functions	Prospective role in the project
<p><b>GROUP 1</b></p> <p><b>The Ministry of Environment and Sustainable Development (MADS))</b></p> <p>Currently: Secretary of State of Environment (S E: Ms. Quita Djata)</p>	<p>Mandate: Law No. 1/2011 approving the Basic Legislation on Environment.</p> <p>Law No. 10/2010 on Environmental Impact Assessment Regulation. (The AAAC is the Competent Environment Assessment Authority)</p> <p>Regulation No. 5/2017 of Public Participation Regulation No. 6/ 2017 The Environmental Fund Regulations No. 7/2017 Regulation of Environmental Impact Study Regulations No. 8/2017 Environmental Licensing Decree No. 9/2017 Environmental Audit Regulation Decree No. 10/2017 Environmental Inspection Regulation</p> <p>The MADS is responsible for environmental policy and the preservation of the biodiversity. exercises its mandate based on the implementation of environmental policy, based on the National Environmental Management Plan (1994), in compliance with international and regional commitments represents and responds to the main international agreements and conventions that bind the country in the field of environment and sustainable development. represents and serves as the GEF Policy Focal Point and Operational Focal Point. MADS has special services in different environmental topics, such as General Inspection of Environment (AAAC); Directorate-General for Environment (DGA); Directorate General for Sustainable Development (DGSD), Institute for Biodiversity and Protected Areas (IBAP).</p>	<ul style="list-style-type: none"> <li>· Leading Executing Partner for the project</li> <li>· Coordination of the overall project preparation and activities</li> <li>· Ensure consistency of the project</li> <li>· Co-participate in the identification of pilot sites</li> <li>· Environmental and social impacts assessment</li> <li>· Resources assessment for pilot projects</li> <li>· Ensure the Monitoring GHG emission reductions</li> <li>· Investment support and promotion, including from international climate finance</li> <li>· Monitoring and evaluation</li> </ul>

Stakeholders	Mandate and Functions	Prospective role in the project
<p><b>GROUP 1</b></p> <p><b>Ministry of Energy, Industry and Natural Resources</b> (in short Ministry of Energy and Industry - MEI)</p> <p>Minister: Antonio Serifo Embalo</p> <p>Secretary of State of Energy: João Saad</p>	<p>The MEI is responsible for defining policies, laws, regulations, sector supervision, import / export licenses, granting of concession schemes and definition of electric energy tariff structures (Decree-Law No. 2/2007)</p> <ul style="list-style-type: none"> <li>· It represents Guinea-Bissau in all national, regional and international energy forums; develops sectoral policies; develops structural, investment and fiscal policies; fixes energy prices where these are not fully liberalized; creates stable climate that attracts investors; definition of policy and management of national energy resources</li> <li>·</li> <li>· creating a favorable climate for the development of traditional and renewable energy resources;</li> <li>· granting of concessions, licenses and certification conditions for energy and business activities;</li> <li>· acceleration and expansion of national energy production and distribution.</li> <li>·</li> <li>· The MEI has the following services: General inspection of Energy and industry (GIEE); Directorate- General of Energy (DGE), of Industry (DGI), of Water Resources (DGRH), of Geology and Mining (DGGM), Directorate of Renewable Energy (DER); EAGB (National Electricity Company), Petroguin E.P (Oil and Gas Company); INITA (National Institute for Research and Applied Technology)</li> <li>·</li> <li>· The DGE is responsible for implementing the national energy policies defined by the MEI, accompanying its execution and supervising all activities related to the production, distribution and sale of electricity and fuels. It also protects consumers and verifies companies operating in the energy sector.</li> </ul>	<ul style="list-style-type: none"> <li>· Ensure the integration of proposed mini-grid related policies in the national policy and institutional framework for power sector reform</li> <li>· Co-participate in the identification of pilot sites</li> <li>· Technical advisory minigrid</li> <li>· Plan activities related to transfer and development of domestic supply chain and O&amp;M models</li> <li>· Facilitate investment promotion, support for mini-grids, and issuance of co-financing letters</li> <li>· Run awareness campaigns and co-participate in training on RE</li> </ul>
<p><b>GROUP 1</b></p> <p><b>Ministry of Finance and Economics and Planning</b></p>	<ul style="list-style-type: none"> <li>· The Ministry of Finance and Economics and the Planning Department control public investment funds and the implementation of all energy sector projects, having direct relations with donors, donors and international funds.</li> </ul>	<ul style="list-style-type: none"> <li>· Provide guidance on the design of appropriate financial mechanisms and to ensure the programming and the disbursement of the co-financing (cash) committed by the Government</li> </ul>

Stakeholders	Mandate and Functions	Prospective role in the project
<b>GROUP 1</b> <b>Further stakeholders</b> - Ministry of Commerce and Business Promotion  - Ministry of Infrastructure and Construction and Urban Planning  - EAGB: Public Electricity and Water Company of Guinea Bissau (Empresa Publica de Electricidade e Aguas da Guine Bissau) -		Dormant stakeholder, not sufficient capacity to act beyond Bissau,
<b>GROUP 2</b> <b>National Institute for Research and Applied Technology (INITA)</b>	INITA is the autonomous technical body of MEIRN in charge of (mission)	Conduct of required project researches and developments (R&D) Conduct of tailor-made learning programs on low carbon technologies Assist the project in the creation and production of informative material about low carbon technologies
<b>GROUP 2</b> <b>Institute of Biodiversity and Protected Areas (IBAP)</b>	Decree-Law No. 5A / 2011 - Framework Law on Protected Areas IBAP promotes sustainable management of biodiversity resources and conservation policies is in line with the agreements Guinea-Bissau. It is responsible agent for the management and monitoring of the Protected Areas, such as Cufada Lake and Cantanhez Forrest where project sites are situated.	Identification of forest communities and resources in the project pilot sites within Protected Areas Organization and conduct of awareness raising campaigns Assist with the management of RE solutions at the community level in the Protected Areas Ensure good buy-in from direct beneficiaries of the project
<b>GROUP 2</b> <b>National Institute of Studies and Research (INEP)</b> , which incorporates the <i>Center for Environmental Studies and Relevant Technology (CEATA)</i>	INEP is mandated to support national development strategies and has a long history in environmental studies and technologies as well as in participatory work with local communities and communication	Communication Strategy and development of material (flyer etc.) for RE applications and improved cooking stoves, charcoal Further environmental and non-technical studies for project implementation Drafting of national policies/strategies of RE, off grid and low carbon biotechnologies
<b>GROUP 2</b> - National Institute of Statistics (INE), data energy etc.	Research, provision, compilation and interpretation of energy related data bank Facilitate economic, political and social development through meaningful statistical evidence	Provision and interpretation of RE energy data, aggregated per sex

Stakeholders	Mandate and Functions	Prospective role in the project
<b>GROUP 1</b> <b>Ministry of Agriculture, Forestry and Livestock</b> <b>Direction General of Forests and Fauna (DGFF)</b>	Decree-Law No. 5/2011 approving the New Forestry Law.  · Mandated to control the use of forest resources, forest management and monitoring · MORE	· Ensure the integration of proposed low-carbon bioenergy technologies related policies in the national policy and institutional framework prescribed in the Domestic Energy Action Plan  Identification of forest communities and resources in the project pilot sites outside the Protected Areas Organization and conduct of awareness raising campaigns Ensure the inclusiveness and good buy-in from farmers, charcoal and fuelwood producers
<b>GROUP 3</b> <b>Private sector: mini-grid operators, installers of RE systems</b>	National/international enterprises in the RE sector, such as SDD/FRES, Impar, Dura Energy, Prosolia, PP Energy, ELMI SARL  Private installers and mini-grid operators with interest in public-private partnerships and	Provide equity investment for pilot projects Technology needs assessment for SHP and PV supply chain Design of O&M models
<b>GROUP 3</b> <b>Local and international finance institutions</b>	National Commercial Banks Regional Development Banks Small grant funds (GEF)  Manifested interest in cooperation for RE solutions, public-private partnerships	Provision of loan financing models for pilot projects Loans & funds for pilot communities
<b>GROUP 3</b> <b>2 Chambers of Commerce</b>	- Commerce Industry and Services, - Chamber of Commerce, small scale farmers	Stimulation of green business, women training and entrepreneurship in the RE sector in GB; Integration of energy component in private commercial investment plans etc., Develop public-private partnerships

Stakeholders	Mandate and Functions	Prospective role in the project
<b>GROUP 3</b> <b>National and International NGOs</b> <b>AD (Action for Development)</b> <b>ADPP (Development from People to People)</b> <b>TESE (Association for Development)</b> <b>GDVER (Gestão Durável Verde e Energias Renováveis)</b>	<p>AD NGO is dedicated to the development of key actions such as food security, creation and support of community radios, art training and other professions as well as environmental actions to protect the forests of Guinea-Bissau and conducting bio-ecological studies in the wetlands of Cantanhez</p> <p>ADPP Leading NGO in sustainable energy solutions and vocational training, sustainable integrative rural development</p> <p>TESE Leading NGO in sustainable energy solutions &amp; community management</p> <p>GDVER Renewable energy project design and implementation of Biogas plant for sustainable development</p>	<p>Provision of services as sustainable management of resources and local development actions, Community based management of RE off grid solutions, Management &amp; Finance Models Project design &amp; implementation of off-grid hybrid PV/Diesel plant solutions in GB Sustainable energy education programs in Basic Schools Training in electricity &amp; RE PV solutions of local communities; Cleaner cooking – cook stove production and marketing Organization and conduct of awareness-raising campaigns for RE and low carbon biotechnologies</p> <p>Ensure strong support and buy-in from direct beneficiaries of the project</p>
<b>Group 4</b> <b>AMAE and other specific women organizations</b>	<p>NGO works for support of economic activities of women nationwide; has about 5600 members/largest platform of this kind in Bissau</p>	<p>Promotion of women entrepreneurship in sustainable development and RE, training and support for start-ups</p>
<b>GROUP 4</b> <b>Local communities and their associations</b> <b>Pitche (Com. 1)</b> <b>TcheTche (Com. 2)</b> <b>Duta Djara (Com. 3)</b> <b>Lamane/Cufada R. (Com. 4)</b> <b>Cantanhez/Cacine (Com. 5)</b> <b>Cantanhez/ Iemberem (Com. 6)</b> <b>Cacheu (Com. 7)</b>	<p>Impoverished forest dependent populations with manifested interest in RE energy supply and low carbon biotechnologies: Women Groups, women community committee Fishermen Association, Association of Inhabitants, Youth Association, Association of Honey Producers Traditional Authorities (regulo, village chief) Local State Authorities (Administrators &amp; staff, Province Governor, Fishing &amp; Port Authorities)</p>	<p>Engagement in women and community management of RE solutions, including multifunctional platforms, cooling systems, water pumps, schools and health posts; Participation in Irrigation projects of women horticulture/gardens Commitment to development &amp; participation in Renewable Energy driven business solutions for rural population Participation in functional Alphabetization for women Local management of Domestic Electricity supply</p>

Stakeholders	Mandate and Functions	Prospective role in the project
<b>GROUP 4</b> <b>Farmers, charcoal and fuelwood producers and other cooking value-chain stakeholders</b>	Positive and pro-active engagement for improvement of the sector/ charcoal industry + reduction of firewood/biomass through low carbon biotechnologies; Lead by women association/ foster women entrepreneurship	Ensure initiative sustainability Participate in the design of the financial mechanisms Apply and further disseminate alternative cook stoves and charcoal kilns Awareness campaigns for cleaner energy Increase income of community participants
<b>UNDP Guinea-Bissau</b>	GEF Implementation Partner	Project oversight Financial administration and technical support Monitoring and Evaluation Overall Support Partnership with UN-system

## Documents

Title

Submitted

In addition, provide a summary on how stakeholders will be consulted in project execution, the means and timing of engagement, how information will be disseminated, and an explanation of any resource requirements throughout the project/program cycle to ensure proper and meaningful stakeholder engagement.

Select what role civil society will play in the project:

Consulted only;

Member of Advisory Body; Contractor;

Co-financier;

Member of project steering committee or equivalent decision-making body;

Executor or co-executor;

Other (Please explain)

### A.4. Gender Equality and Women's Empowerment



Please briefly include below any gender dimensions relevant to the project, and any plans to address gender in project design (e.g. gender analysis).

## Documents

Title

Submitted

**Does the project expect to include any gender-responsive measures to address gender gaps or promote gender equality and women empowerment?**

Yes

**If yes, please upload document or equivalent here**

### **Frame of Gender Action Plan**

*This section sets out the rationale for gender mainstreaming and presents the background to the process*

Women's empowerment is crucial for all-round social development and environmental sustainability. Mainstreaming gender in renewable energy policies and programming can enhance the efficiency of energy policies. Through the incorporation of gender perspectives the effectiveness and gender equality not just of energy programs and policies, but of all development activities involving energy use can be ensured (UNDP 2012).

Modern energy poverty and pollution from extensive biomass use affect men and women, boys and girls, the old and marginalized populations in rural and remote areas all over the developing world (UNIDO & UN-Women, p. 6). It is the time to improve their energy access with sustainable clean (renewable) energy, where beneficiaries are recognized as men and women with different energy needs and priorities. The goal of this project is to enhance the welfare of both women and men in Guinea-Bissau as their distinct energy needs are taken into account.

According to "SE4ALL Guinea-Bissau Investment Plan" (p. 38), the electricity coverage rate in 2010 was 29.1% in the city of Bissau, 4.3% in other major cities and only 1% in rural areas. Thus, only a very small portion of rural population have standalone power connections, run mainly on small conventional diesel generators (WB 2017). PV based electricity by private households is a rare exception in Guinea-Bissau's rural areas (see image from the project site, the village of Dutu Djara in the Cufada Lake Region, Community Report, p. 16).

Cooking, heating, conservation of fish & other food (through smoking etc.) are all predominantly women activities and based up to 95% on biomass use, i.e. mainly solid fuel (wood) and charcoal to a lesser extent. Men and women, children and the elderly, especially in remote rural locations, suffer from energy poverty (UNIDO & UN-Women, p. 8). Much female labor is unremunerated and overlooked in the national account. Women in Guinea-Bissau continue to be outside the decision-making sphere and their human rights are often comprised when addressing energy access issues. Albeit undeniable contribution to economic, social and political development, these women have not equally reaped its benefits.

Energy poverty is defined as the lack of adequate modern energy for the most basic needs of human life and development, such as cooking, heating, lighting, income generation, community schools and health centers. The lack of appropriate, sufficient and clean energy limits human development in many spheres such as education, nutrition and food

security, water (ECREEE 2015, Situation Analysis, p. 31). The energy divide is gendered with women in most developing countries experiencing energy poverty differently and more severely than men.

In Guinea-Bissau a considerable part of rural areas is located outside the main energy grid installations planned to be carried out as energy mix in the next 5-10 years (see areas covered in SE4All GB IP). The only alternative to cover their energy needs is through renewable energy/hybrid off grid / standalone mini grid solutions. The current GEF project works in this direction and aims to demonstrate the scope of mini and micro RE off grid solutions for Guinea-Bissau's forest dependent communities with focus on gender equality.

The Gender Action Plan (GAP) of the present project is orientated by the recent "ECOWAS Program on Gender Mainstreaming in Energy Access (ECOW-GEN)", the key program of ECREEE (ECOWAS Centre for Renewable Energy and Energy Efficiency) working at the intersection of gender and energy. Achieving gender equality and transitioning to clean energy are efforts that are interconnected and mutually reinforcing in surprising and complex ways. Complementing the regional effort to achieve access to sustainable energy for all, ECOWAS Regional Gender Mainstreaming Policy on Energy Access aims to harmonize and strengthen legislation and policies on gender equality,<sup>[1]</sup> increase women's participation in decision-making and expand the economic opportunities for women. It contains a number of specific provisions relevant to women's energy needs and work burden:

*> Access to Water and Sanitation -- Member States shall take the necessary measures for the improvement of sanitation and access of people to safe drinking water through: (b) the improvement of renewable energy (use of solar) and rural electrification in a bid to reduce the burden of work on women and improve the competitiveness of businesses managed by women;*

*> Environmental Management and Protection: -- Member States shall take measures to promote the use of alternative energy for domestic purposes in order to mitigate the negative impact of firewood use, such as the disappearance of certain plant and animal species, the degradation of forest resources, soil impoverishment, and the occurrence of bush fires;*

*> Access to Energy Services -- Member States shall undertake to promote access to energy services for all, and particularly to increase access to energy services for rural and peri-urban populations in an equitable manner and without gender related discriminations enable Development Goals, Climate Policies, ECOWAS RE and EE policy, etc.*

(ECREEE, 2015: Situation Analysis, p. 58).

Another important regional initiative is The West African Clean Cooking Alliance (WACCA), launched in 2012. It is led by ECREEE to ensure that by 2030 the entire ECOWAS population has access to efficient, sustainable, and modern cooking fuels and devices (ECREEE, 2015, p. 59).

### **Objectives of the Gender Action Plan (GAP)**

Based on accurate gender analysis, the ECOWAS' and other regional gender initiatives emphasize that women are increasingly and rightly perceived and viewed as *key actors of change in the energy sector* and not only as end-users or clients of energy solutions.

It is in this line of thought that the present project is conceptualized. It places the economic activities of women in rural areas / forest dependent communities of Guinea-Bissau at the center of renewable energy provision and related business models to be developed within the project.

The Gender Action Plan captures and expresses the way in which gender can be mainstreamed within this project to promote better access to modern energy services through sustainable mini-grids and low-carbon bioenergy technologies. The gender action plan will touch on all components of the project.

Its objectives are:

- integrating gender as an overall goal by promoting gender equality and empowering women in community-based renewable energy systems;
- ensuring effective participation of women in all project activities and lead position of women in the management of community based renewable energy systems;
- capacity building of women in the RE sector and low-carbon bioenergy technologies in technical aspects and management alike;
- mainstreaming women's energy needs and concerns as identified through the gender analysis and consultations with all relevant stakeholders into policies, planning and implementation of RE solutions;
- continuous assessment of equal need-responsiveness of the energy project for women and men through gender indicators and monitoring and evaluation (M&E) from a gender perspective.

### **Gender Responsive Project Design**

The field visits for the identification of seven project sites of forest dependent communities in the region of Gabu, Cufada Lake in Buba region, Cantanhez National Park and Cacheu Protected Areas include a careful need assessment and a gendered understanding of energy needs and priorities which will be dealt with in detail in the following section (gender assessment, situation analysis).

Reality on the ground from previous projects has important lessons for us to be learned. Although policies should guide the implementation of gender mainstreaming into energy projects, experiences from projects in Benin, Senegal and Guinea-Conakry demonstrate that gender is integrated at the project level first while policies are taking cues from activities already implemented. Only a few gender policies establish links between gender equality and energy poverty; vice versa the energy policies lack of gender considerations (ECREEE 2015: Situation Analysis, p. 62).

In view of the prevailing energy priorities and needs that we are able to identify at the community level, the RE supply model designed by the project not only will impact most positively on women as beneficiaries and consumers of energy but will put the productive economic activities of women at the center of power supply design and participatory energy management structures (business model).

*The gender responsive project design is based on three core elements with a history of evidenced successful implementation*

#### ***First core element: Multifunctional Platform***

Inspired by the UNDP Multifunctional Platform Program<sup>[2]</sup>, the project aims at focusing the energy installation on agro-processing machines (existing or partly existing in the visited communities) which enable women farmers and women led households to increase and diversify their income. The RE/hybrid energy provided will also strengthen capacities for service delivery of public infrastructures (health center, school, administration, water pumping, public lightning) in rural communities.

Women in isolated rural communities in Guinea-Bissau with no access to electricity are the primary customers for the energy services, purchasing grinding and milling services, and also the entrepreneurs who would own and operate these machines through local Women Associations/ Groups. While electrification will benefit both women and men by enhancing their engagement in more productive activities, gender gains in the first phase are derived mainly from reducing the workload of women and girls.

In addition to processing the local crops, pressing the oils etc., households and public buildings receive electricity, drinking quality water can be pumped by solar systems and energy can be provided for local private business, handicraft, battery chargers, welding stations and carpentry equipment.

While the main focus is to alleviate women's hardship of manual processing of crops etc., the energy also creates jobs for men (carpentry, welding, machine maintenance and repairs), increases agriculture production for the entire village, and, most importantly, involves both men and women in decision making processes.

### ***Second Core Element: Cooling and storage systems***

Beside agriculture, fishing is the second main activity of rural communities in Guinea-Bissau, particularly in the coastal zone where 5 of 7 project sites are located. Renewable / hybrid energy supply would focus on the provision of energy for cooling and storage of fish as well as of other products of seasonal character (different types of fruits and vegetables, cold water, ice, meat, chicken). As fish is traditionally commercialized by women, the management of cooling and storage systems could be with the Women Association who buy all fish of the community (mostly fished by men) or in combination with the Fisher Association.

RE/hybrid energy plants based fish conservation will increase the revenue of the whole community as the value of fresh fish is higher than of smoked fish. It further reduces the need to smoking fish by biomass (and consequently deforestation and health issues) and increase eventually overall fish catch if sales market is guaranteed. Good experience has been made with improved fish smoking facilities, some already existing in the visited villages which further reduce wood consumption (see ECREEE, 2015: Situation Analysis, p. 68).[\[3\]](#)

### ***Third Core Element: Low carbon bioenergy technologies***

This third element of the project design is by itself gender-responsive and empowers women.

Fuelwood use for domestic purposes is synonymous with women in Guinea-Bissau. Women are active agents in biomass management: they are the primary household cooks and they participate in many biomass-intensive processing sectors (on the subsistence and income generating level). As such they will play a key role in shifting the country onto a cleaner development pathway.

It is estimated that the time spent for wood collection varies between 2 to 3 hours per woman per day in Guinea-Bissau (PIF). With adequate management of firewood and improved cook stoves, this time window can be reduced to only 2 or 3 hours per week, while significantly reducing the firewood and toxic smoke due more energy efficiency (more than 50%).

Women most likely have a majority share in cook stoves' production and commercialization, if properly trained. The production and selling of improved charcoal is a business that can be of equal benefit for women and men small producers and traders.[\[4\]](#)

## **Gender Assessment**

*This section presents the results of the gender assessment, identifies gender gaps and issues that need to be addressed by the project.*

### ***Lack of gender disaggregated data***

Lack of or limited availability and poor accuracy / authenticity of gender disaggregated data for nearly all social, economic and political issues in Guinea-Bissau hinder a profound gender analysis ([www.genderindex.org/country/guinea-bissau](http://www.genderindex.org/country/guinea-bissau)). Systematic collection of comprehensive data, disaggregated by sex, and measurable indicators to assess trends in the situation of women and the progress towards gender equality are still missing. It is a challenge and an urgency to gather more energy need and consumption related gender disaggregated data within this project's frame.

### ***Gender Context and Policies***

The cultural and economic context in Guinea-Bissau dictates structural inequalities between men and women, added by specific social and political circumstances. Exclusion and discrimination of women in Guinea-Bissau are based on the logics of patriarchal power, reflected in phenomena such as female mutilation, domestic violence, early marriages, limited access to resources, land and credit, weak institutional representation, inequalities in the judicial and economic fields as well as in education, especially in rural areas. Less literate and less educated, more exposed to health risk factors and with less access to means of production and decision making, women in Guinea-Bissau are more exposed to poverty and not able to fully participate in the development of the country.

Awareness on gender issues was raised systematically, for the first time, in ***DENARP II (2011)***, the Second Poverty Reduction Strategy, which links structural gender inequalities to the economic development of the country, and through the ***PNIEG (2012/2017)***, the “National Policy for Gender Equity and Equality”.

The DENARP II sets (i) a specific objective for the promotion of gender equality and equity, which aims to "eliminate structural inequalities between men and women"; (ii) genders most of the specific objectives, explicitly differentiating men and women as targets of the proposed action; (iii) integrates the gender dimension into planning and follow-up indicators; and (iv) the project's budgeting takes into account gender structural disparities and inequalities.

The “National Policy on Gender Equality and Equity” (PNIEG) was elaborated with participation of all stakeholders over a period of two years and nationally validated in 2014. On one side, it is the product of the work of the *National Institute for Women and Children*, created as an operational structure for the development and coordination of policies on women's rights, gender equality and the advancement of women in Guinea-Bissau, and on the other site, the fruit of tireless engagement of strong civil society women's organizations, supported by committed international donors.

The PNIEG for the first time takes into account the role of women in the different sectors of the society as well as in the decision-making spheres. The document which also emphasizes the priority of sustainable development is the most important roadmap for gender equality in Guinea-Bissau, providing thorough and comprehensive analysis and recommendations.

The PNIEG finds that women and girls have been especially disadvantaged by the years of crisis since they are allocated by gender to a secondary status in all spheres of household, community and national life. They face gender-based restrictions on their access to scarce resources (such as credit and land) and to education, and the double burden of household work to care for and feed their families along with market work to contribute to family income. Additionally, girls and women in Guinea-Bissau face the gender-specific risk of maternal mortality, and gender-specific abuses such as domestic violence, female genital mutilation (FGM), and early/forced marriage (PNIEG, 2012/2017).

The 2015 national development plan “Terra Ranka” (A Fresh Start), a guiding document despite the political impasse lived in Guinea-Bissau since 2015, does not pronounce much about gender and has only one specific gender program (34c). Gender policies in GB are a relatively new issue: In 2015 the African Development Bank and UN-Women Guinea-Bissau presented the first “Gender Profile” of Guinea-Bissau; only some national policy documents, for example the Security Sector Reform and Justice Reform, mainstreamed gender into their plans in recent years.

### ***Strategic Links between Gender, Environment and the Energy Sector (Renewable Energies)***

It comes to no surprise that so far national documents on Climate Change and Plans for Energy and Electrification (via Renewable Energy/ energy mix) contain very little on gender, such as gender-differentiated vulnerabilities and resilience or gender specific energy needs and priorities.

The Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW), explicitly refers to women's electricity rights and obligates state parties to the convention to "take all appropriate measures to eliminate discrimination against women in rural areas [...] [and to] ensure to such women the right [...] to enjoy adequate living conditions, particularly in relation to housing, sanitation, electricity and water supply, transport and communications" (UNIDO& UN-Women, p.8).

Whereas the overall effects of energy poverty are largely consistent for both women and men and include low standards of living, suboptimal health, reduced productivity, and missed opportunities, women in poor settings often experience excess vulnerability to conditions of energy poverty above and beyond that faced by men (UNDP, 2016, p. 2-3).

Women are responsible for ferrying of goods, water, children, fuel, market goods, and household supplies. They do all manual labor at the household level beside farm work and manual agro-processing. They are exhausted physically by this workload and also exposed to physical hazards such as pollution, burns, back pain and poorly lit childbearing experiences (ECREEE, 2015: Situation Analysis, p. 33).

A clear linkage was found between energy and gender, once modern energy is provided, namely the differential access, use and effects of energy sources and appliances in the home, community and wider society. Socio-economic and socio-cultural dynamics interact to create distinct – engendered – patterns of use and benefits of the same energy source or appliance. (ECREEE, 2015, p. 18).

In the Guinea-Bissau NAPA (2007) the gender criteria are part of the multi-criteria analysis of intervention options for the increase of food security without women being focused on as particular vulnerable group (NAPA, Table 9, p. 46). The ACCC NAPA follow-up project (2011-2015) goes beyond this approach on the implementation level by consulting about 40% women out of a total number of 1120 persons and defining their specific needs. The project applies a meaningful participatory process for engaging women's voices and making them targeted beneficiaries of project interventions. Its success concerning mainstreaming gender into the project implementation is significant.

On the other hand, The Initial National Communication (2004) and the Second National Communication (2011) do not refer to gender issues beyond the notion of general vulnerability and gender biased climate change impact in particular. The same appears to be the case regarding basic environment laws and regulations.[5]

As described above for the regional level, ECOWAS in "ECOWAS Regional Policy for Gender Mainstreaming in Access to Energy" stresses the importance of incorporating gender considerations in the planning and execution of energy interventions to ensure socio-economic development. The dire energy poverty in the ECOWAS region remains a severe concern as well as the gender dimensions that characterize it. ECOWAS' innovative gender policy (see above) will support women and bring clean energy access to remote population across West Africa. Through contextualization of gender aspects to the realities and development priorities of the ECOWAS countries, the ECOWAS gender policy intends to address existing barriers that hinder the equal participation of women and men in expanding energy access in the region and empower women and girls by improved conditions (ECREEE, 2015, p. 17).

A National Validation Workshop for the “ECOWAS Regional Policy for Gender Mainstreaming in Access to Energy” was held in 2017 in Bissau. The workshop concluded that the Guinea-Bissau energy authorities need external support, i.e. technical and financial assistance for the integration of gender into energy programmes, particularly gender focal points in the lead ministries (energy, environment, agriculture) as well as the creation of a Regulatory Authority in the Energy Sector (see ECREEE, 2017: Situation of gender mainstreaming in access to energy in Guinea-Bissau).

None of the main three policy documents/ Guinea-Bissau National Action Plans of Energy,

- Renewable Energy (PANER),
- Energy Efficiency (PANEE) and
- SEforAll Action Agenda (SEforAll AA) for Guinea-Bissau and Investment Plan

Developed in recent years (2013-2017,) refers explicitly to gender divide in energy demand and consumption schemes nor to the gendered dimension of biomass fuel burning on the household level. In its calculations of energy demand and satisfaction rates, in the description of types of renewable energy and energy mix models to be provided, the main grid and off grid solutions for rural population and the roll-out of many different projects - in all these areas the gender perspective is missing.

The PANER, the New National Plan on Renewable Energy (2015 until 2030 / (*Plano de Ação Nacional no Setor das Energias Renovaveis*) makes some references to gender, but does not contain a specific analysis of women's energy needs and specific expected results of energy supply for women. It is the only document that mentions the lack of gender *disaggregated data* on energy consumption. The chapters on improved cooking stoves and awareness campaigns for renewable energy solutions (p. 28, 41-42) do not refer explicitly to women but only to population in general and primary and secondary school students. The paragraph on the Energy Information System which consists in a systematic and exhaustive statistical data compilation also is not gendered. It only mentions that the relevant indicators should consider socio-cultural factors.

All in all, gender is hidden and nearly completely invisible in these plans; it is referred to directly only once (at the margin of the biomass consume – health link for school manuals, p.42). ***Gender equality and gender gaps are so far poorly addressed in the relevant Guinea-Bissau National Energy Policy documents: such as gender differentiated energy needs and use; the impact of energy use on women; the resource ownership question and female participation in the energy sector as technicians, employees and women entrepreneurship.***

The lack of explicit gender references in energy policies of Guinea-Bissau and vice versa of energy references in gender policies, is undoubtedly a big gap. Guinea-Bissau's energy policies follow that of the region with no clear gender linkages and references to gender equality prior to the recent ECOWAS-GEN.

Progress in practical terms on the national level is constrained by limited human and financial resources available. The modern energy sector is very much male dominated, both at the decision and technical level, suffering from the absence of many would be participants and their efforts and talents.

In any case, some of the targets formulated in PANER have strong gender implications which should be considered as indicators at the implementation level: 9% of Guinea-Bissau's population (ca. 220.000 inhabitants), living in rural areas, should benefit from RE/hybrid minigrid solutions until 2030; 35% of population should use improved (traditional) cooking stoves and 40% use modern cooking equipment (solar, biogas, GPL) until 2030; 80% of health care facilities/hospitals should be electrified until 2030 (targeting primarily rural areas).

### ***Summary of main constraints and barriers against women equity and empowerment***

Inclusive participation of women in Guinea-Bissau remains an ongoing challenge. Gender inequality persists, as women are under-educated and generally have a lower socio-economic status, with inadequate access to basic social services and reduced economic opportunities compared to men. Gender inequality persists throughout the nation especially in rural areas where customary and religious practices tend to supersede state policies and laws.

As we have seen, there are several main constraints and barriers that contribute to the general status of gender inequity and hinder the empowerment of women in Guinea Bissau. All of them play a role in the disadvantaged position of women in socio-economic and political terms as well as in relation to women's energy needs, consumption and provision of energy for women:

- Lack of sufficient sex disaggregated data in all relevant sectors for this project, beyond lack of gender differentiated data on energy need, priorities, access etc.
- Lack of institutional capacity and legal and policy gaps for gender mainstreaming;
- Underrepresentation of women in decisive positions, government where men are holding almost 70% of positions in key ministries;
- Traditional gender-specific roles, where a man decides for the family;
- Lack of education, high illiteracy rates among rural women;
- Women land ownership rights are very much limited, the inheritance laws are discriminating, women face much more difficulties than men to access loans or other form of financial support;
- Women are main food producers for the households, they are responsible for housework, taking care of children, elderly and sick.
- Women are not decision-makers in terms of access to and management of household goods, even though their contribution to family income is generally growing.
- The efficiency of women work is very low in light of lack of basic sanitary infrastructure and electricity;



- Lack of basic health care leads to high rates of maternal and under 5-year mortality;

- Women are underrepresented in higher levels of value chains – they occupy the low end of value chains, namely positions such as harvesters. The men traditionally work in farming for export, bringing higher income. Traders and processors of export products are male. Also, more labor-intensive farming (like rice) lays on women's shoulders.

### **A Gendered Understanding of Energy Needs & Priorities and Access to Energy in Guinea-Bissau's forest dependent communities**

*NOTE: Data on the electrification benefits for women in the ECOWAS region are still poor. Compelling scientific studies exist on the gender impacts of electrification only with regards to: 1) women's market work and/or leisure time, 2) decreased time spent preparing meals, and 3) lowered fertility. There is a smaller body of research that supports some effect of electrification on school enrolment. This in no way indicates that many other positive impacts do not exist but more research is needed to credibly establish their causal chains. (cf. ECREEE, 2015).*

Women in Guinea-Bissau, particularly in rural / forest areas addressed by this project, belong to the poorest segments of society. Poverty in Guinea-Bissau is, as we have seen, feminized, and shortage or complete lack of modern forms of energy is intimately tied up with poverty. Rural women and girls are primarily responsible for the bulk of household work, as is explained by the women we had the opportunity to speak to during field visit at the project sites: Pitche, Tchetché, Tchandanca (DutaDjara neighbour village), Lamane and Cacine (see field visit notes). These women overwhelmingly support the introduction of improved cook stoves and, more generally, access to modern, clean and renewable energy. Women in Lamane, Tchetché and Cacine, for example, started to imagine how this energy would make a significant difference to their quality of life, foremost possibilities to improve and increase economic activities and their health. They talked about preservation of fresh fish by cooling systems instead of exclusively smoking fish and selling for much better prices at the local markets; the possibilities of continuous irrigation of horticulture fields with solar water pumping and the immense need they have for agro-processing of different crops, peanuts, palm oil etc. which all would be possible with the multifunctional platforms, run by Solar or hybrid mini grids (see field notes).

In-door pollution from the use of traditional three-stone-fire places, normally used in the *tabancas* (villages, is at the origin of serious health problems for women and girls. Improved cook stoves have been distributed to several of selected villages in former projects (EU and NGOs) but not in sufficient numbers. Women informed that they cook with them and confirmed their comfort with these improved cook stoves in terms of energy efficiency and less smoke. But they simultaneously have to use the three-stone fire places due to insufficient supply with improved cook stoves. The Responsible of the Women Association in Tchetché reported that women of her association have gained some experience with the production of improved cook stoves with local materials and are very interested in training for production and commercialization of these improved cook stoves.

#### ***Clean cooking***

With biomass accounting for as much as 95 percent of the total energy consumed for cooking in Guinea-Bissau, women could be liberated from 2-3 hours daily collection of wood, and **50% or more** of toxic smoke inhalation per day. For the important health gains related to clean cooking see statistics from ECOWAS countries that are collected in ECREEE 2015, p. 29-30.

Poor women tend to participate in the informal economy, more particularly in the food transforming and production sector which also relies strongly on biomass as its main energy source. Provision of clean renewable energy would therefore mean additional gains in terms of time and health for the impoverished women as well as a significant

reduction in the use of forest resources. The number of female-headed households is increasing everywhere in Guinea-Bissau, and these tend to be among the poorest and most vulnerable households in rural communities. Although there are no actual statistical data available at national level on the number of men migrating from the rural areas to the urban centers or abroad, we know through other recent studies (IOM/INEP 2018) that the number is huge. Women stay behind with all the responsibilities for their households, according to some women of the villages selected as intervention sites in the Cufada Natural Park.

The major gender dimension of cooking stem from who is doing it, how and in what context. The specific kitchen practices and preferences for stove technology are important to understand and incorporate into clean cooking interventions. In the meetings we conveyed with women at the project sites, we noted a quite high acceptance for improved cook stoves. Those women are well aware about the difficulties to collect enough biomass cooking fuels and the health consequences. According to the technical possibilities *in loci*, energy provided by sustainable mini-grids and low-carbon bioenergy technologies in the frame of this project will likely be able to reduce significantly the amount of biomass cooking fuels or even replace it completely by solar cookers or electric induction plates at later stage.

#### ***Solar-pumping systems for access to clean water***

*Water is the first resource gap in all visited project sites. An intensive demand for clean and drinkable water has been articulated by all interviewed women. Men in the villages also show great concern over lack of water quality and /or broken/ failing pumping-systems, most of them manual. There are very few solar pumps, but with need to be scaled up, for example in TcheTche (see Community Field Report).*

At all project sites women and men alike are deeply concerned about clean water. In each village, we have been shown the existing wells or waterholes and the population complained about the many problems related to water: mainly too small quantities of water because there are mechanical or no pumping systems in place and even worse, the inadequate water quality. In some villages, like Tchetché, Bakar Konté and Tchandanca, women collect drinking water from springs far away in the forest or from nearby rivers and spend a lot of their day with this arduous work (see images in the Community Field Report).

Access to clean, secure, and sufficient quantities of water is vital to achieving adequate standards of food and goods production, sanitation, and health, and all these have direct links to energy. As the population in Guinea-Bissau as well as in the region continues to rise and the development pressures increase, access to water will have to be handled in tandem with access to energy (ECREE 2015).

In terms of standard household activities electrical pumps for domestic water supply are very important to reduce women's manual labor in hand pumping or hauling. Easier access to clean water, for households, health posts and school kitchens as well as to water for horticultural gardening/irrigation of fields are mentioned as top priority by all communities.

The inhabitants of the Northern Cufada Lake Region, DutaDjara and neighbouring villages, undertake the hardship to cross the nearby river Corubal in risky passages with primitive boats (we visited the jetty for the small boats) to reach the village of Xitole at the other site of the river for medical treatment and any other issue related to their needs. The health posts and schools are not functioning in their villages without electricity and water supply (as observed in loci and informed in the meeting with village women, see field notes).

Water collection is a gendered activity and the installation of reservoirs, rain water harvesting systems, and foremost pumps, including solar PV-driven ones, can reduce the human female energy and time spent on water collection and transport. Creating access to fresh and clean water by solar pumping systems within this project will help significantly to build resilience into the Guinea-Bissau forest dependent communities, particularly at the remote sites within the Protected Areas which are very much threatened by climate variability, climate change and the degradation of fresh water sources.

#### ***Solar/hybrid agro-processing / multifunctional platforms***

Agro-processing is another very time and energy intensive gendered women daily activity. Producing palm-oil manually, as it is common practice in Guinea-Bissau's southern parts, for example in the Cantanhez Forrest region, at the project sites Iembérem and Cacine, needs extreme heat and is very labor intensive. The pounding of grains can take hours every day, including the time-consuming threshing and milling; these are activities of daily routine in nearly all Guinea-Bissau's villages.

At household subsistence level as well as at market orientated production level, electric grinding mills or multifunctional platforms can replace hand pounding of grains and of oil seeds, both backbreaking activities that are carried out by many women daily and that are very time consuming. Estimation go to up to 6 hours per day for these activities (Embaló, 2009).

The communities of Pitche, Tchetché, DutaDjara and Iembérem possess some agro-processing machines run on conventional diesel; Pitché even has a small multifunctional platform (former UNDP project) which currently is out of work due to technical defect. There is huge demand for agro-processing machines and the enlargement of existing systems as per the reports from the project sites where women and men alike manifested much interest in community managed PV-Solar run agro-processing machines. The villagers are well informed about the advantages of these machines and wish very much to benefit from them. Most of them lack of capital for such huge private investment (according to women association in Pitché and private owner of agro-processing machine in Tchetché). To be equipped with solar energy for running agro-processing machines in the frame of community projects is a highly welcome perspective for all villagers who talked to us. These machines will be more effective, clean and have less running and production costs than the current diesel solutions. That could stimulate increasing demand, also from surrounding smaller villages, as the Head of the Village association in Tchetché explains. The Heads of the Women and Inhabitants' Associations in the villages of Pitche, Tchetché and Dutu Djara which already have gained some experience with agro-processing machines unanimously highlighted the importance of agro-processing for economic progress, new income generation and sustainable development of their communities.

The following time-use estimates are obtained from a Bissau-Guinean agricultural expert (Embaló, 2009):

- 2-3 hours each day for just preparing grains (rice, millet, sorghum, fonio) for pounding, i.e. the threshing and milling;
- 82 women-hours for processing one drum of oil palm fruits;
- Furthermore, it can take up to 13 hours to pound enough maize for a family to eat over 4-5 days according to data of ECREEE (ECREEE, 2015, p.39).

*The time and energy taken by women to collect water and fuelwood and to process crops, grains, oil etc. manually is negatively related to income earning activities.*

*To the extent that any of the renewable energy technologies frees women from unnecessary labor, it presents an opportunity for development. To the extent that any of these technologies protects the natural resources, it helps to reduce pressure on the forest environment and is beneficial for climate protection.*

According to case studies in the ECOWAS sub-region, there is nothing quite so large scale and high profile as that of the Multi-Function Platform (MFP) program. Among the most often quoted benefits of the MFP program, a combined technical-institutional intervention that provides mechanical processing capabilities to women's groups, is the time-saving aspects and reduction in drudgery. In Mali, some female project participants reported saving between two and six hours of work per day, and that extra time was shifted to income generation (ECREEE, 2015, p. 45). Poverty alleviation, gender equity, and environmental sustainability are the three key gains related to MFP which on the other side might be problematic in as much as the machines are too sophisticated and donors insist on female ownership and control.

Project OUTCOME	GENDER ACTION	INDICA-TORS	IMPOR-TANCE
<b>Component 1</b>  Policy and financial instruments and incentive scheme for solar mini-grids and low-carbon bioenergy technologies	Integration of gender-sensitive and gender-responsive energy needs, priorities and management assessments into national policy, planning and development decisions on renewable energy and minigrid solutions  Including as much women as possible in decision-making positions of the energy sector, in the line ministries as well as in sector/regional administration and community decision making; Indicators:	Baseline: 0  Target: 4     Baseline: less 5%; Target: 30 – 40%	MEDIUM
	Ensure financial instruments and incentive schemes are gender sensitive: equal participation and access for female and male beneficiaries of minigrid RE infrastructure to the tools and financing that project will provide;  Special social tariff for poor female headed households	Indicators: baseline: N/A Target:  2000 poor  women receive special social tariffs	HIGH
	Ensure financial instruments and incentive schemes are gender sensitive: equal participation and access for female and male beneficiaries of minigrid RE infrastructure to the tools and financing that project will provide:  special credit line for poor women & women entrepreneurs,	Indicators: baseline: N/A Target:  500 women receive special credits	HIGH

	<p>Gender-sensitive capacity training designed and modules implemented for the production and utilization of improved kilns and cookstoves; study of charcoal market and marketing strategies;</p> <p>New kitchen &amp; cooking techniques overcoming cultural and social barriers; sensitizing and training of women for production, commercializing, maintenance &amp; use of kilns and cooking stoves at project sites and beyond;</p> <p>women green business start-up support + credits</p>	<p>Baseline N/A; Target: 10 women trained in each of 7 project sites + total of 20 women for kilns;</p> <p>special credits for up to 30 women start ups</p>	HIGH
	<p>Development and demonstration of alternative solutions, including community proposals by women, for high efficient electric cooking devices, solar cooker etc. beyond wood fuel;</p>	<p>Baseline: N/A</p> <p>Target:</p> <p>10 women at each project site can manage alternative cooking devices and share their experience</p>	MEDIUM
2. Capacity building for mini-grid and low-carbon bioenergy	<p>Mainstream women's needs and active role as RE + sustainable energy agents into guidebook, consider illiteracy (picture based); women participate at Ministry and Local Level in guidebook design</p>	<p>Baseline: 0</p> <p>Target: gender mainstreamed 10.000 copies distributed</p>	MEDIUM
	<p>Special training for women to overcome gender roles in the male dominated energy sector</p>	<p>Baseline: 0</p> <p>Target: 30-40% women participation</p>	HIGH
	<p>Train local authorities and community groups on RE solutions, including the integration of gender-responsive activities (30%-50% women trainees)</p>	<p>Baseline: 0</p> <p>Target:</p> <p>30-50% women trainees</p>	HIGH

	Design and implementation of capacity building program on fuelwood value chain based on tripartite partnerships: ministries- NGOS and women community committees: At least 150 women; extend gender appropriate capacity-building for women on renewable energy supply solutions and economic perspectives through including training on self-esteem, innovative leadership, entrepreneurship	Baseline: 0 Target: 50% or more women trainees	HIGH
	Development of gender-sensitive responsive RE-based mini-grid and low-carbon bioenergy system management; training of gender focal points and women of management, technical and, administration units of key ministries;  Community-based organizations in selected locations, especially women groups, local, fisher productive users, receive training, assistance and advice on potential income-generating activities & security aspects related to electricity use.	Baseline: 0 Target: 30-50% women trainees	HIGH
	Special office for the issuance of licenses and construction permits to small promoters of mini gridsconsiders particular women interests;	National clearing-house mechanism gender mainstreamed	MEDIUM
	National Communication Strategy touches particularly on women energy business'; establish communication line with regional/foreign women investors, example: Solar Sisters	Baseline: 0; Target: all campaign products include women energy business	MEDIUM
3. Mini-grids and low-carbon bioenergy technologies roll-out	Gender-sensitive screening and gender analysis of selected project sites, consultations with women in developing energy policies  . .	Communities Report, GAP + further roll-out	HIGH

	Training of women in energy management; development of gender responsive business model,	Target: up to 50% women present in decision making body of public-private partnership	HIGH
	Ensure that RE installations deliver equally for women and men men's identified different needs; ensure that women have equal opportunities to extra income from work performed in temporary contracts from construction companies (50% women contracts);	Gender equity access to energy and installation jobs applied	HIGH
	Elevated percentage of positions held by women in community councils and decision-making spaces related to local energy management and installation maintenance; create a discussion forum to facilitate dialogue on gender issues between the village associations, local authorities, regional and national administration	Up to 50% women participant	HIGH
	Mechanisms for women's economic empowerment through breaking out of traditional roles in the home and in economic activities: gender equality in access to resources, to begin micro or small businesses	Provision of technical and financial support should strive for a 50/50 balance between male and female recipients	HIGH
	Gender sensitive production chain of cookstoves built up; study on the charcoal market completed, including gender sensitive commercialization and management strategy; women entrepreneurs included	At least 4 small /medium green female biomass business created	HIGH
	Replication includes gender needs and priorities mainstreamed, women's strong participation in energy driven business and management; focal gender points and women groups participate in replication plan	Up to 50% women participation in replication planning	HIGH

*For more details, please refer to the UNDP ProDoc, Annex F "Gender analysis and action plan".*

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[1] Program areas are the **ECOWAS Women's Business Fund** to support the establishment and expansion of women-led energy businesses; **Women's Technical Exchange Program** to facilitate knowledge and technology transfer among women groups; **Women's Economic Empowerment through Energy for Productive Uses** to provide business development and capacity building for rural women etc. (ECREEE 2015, p.57ff.) In the same line we find the **African Development Bank Gender Strategy (2014-2018) which intends** to strengthen gender mainstreaming in all of the Bank's country and regional operations and strategies, including a focus on Women's legal status and property rights; Women's economic empowerment; and Knowledge management and capacity building. In 2018, ECREEE partnered with AfDB to launch a regional workshop to increase women participation in the renewable energy sector – only 2% of energy sector entrepreneurs in West Africa today are women. The joint initiative ultimately seeks to develop a pipeline of investment-ready, women-owned energy businesses across the region.

[2] Lead countries of the UNDP MFP program in West Africa are Mali, Senegal and Burkina Faso with about 3000 platforms installed as of 2012, benefitting over 3.5 million people, ECREEE, 2015: Situation Analysis, p. 66.

[3] See on-the-ground projects such as a women's fishing cooperative in Senegal that received support to modernize kilns used for smoke-drying fish. In addition to healthier working and air quality conditions. The eco-friendly kilns have boosted productivity, product quality and overall income levels for women.  
<https://www.seforall.org/content/empowering-women-west-africa-advance-climate-and-energy-access-goals>, 13.11.2017.

[4] The World Bank's Africa Renewable Energy and Access (AFREA) Gender and Energy program was implemented in Mali, Senegal and Benin. In Senegal, the program promoted the sustainable supply of wood fuel, sustainable management of forests as well as dissemination of improved cook stoves and installation of bio-digesters for cooking. AFREA's activities to integrate gender included a gender-sensitive rural appraisal to establish the baseline for the forest resource management; evaluation of the capacity of female and male charcoal producers to access urban markets; small business management training for men and women charcoal traders (ECREEE, 2015: Situation Analysis, p.67)

[5] See the "Basic Legislation on Environment" (2011), the recent regulations of 2017, such as the "Regulations of Environmental impact" (No 7/2017), the "Civil Protection Law" (Decree 09/2011), the "Land Law" (1998) and the "Plan of Investment in Agriculture" (2013).

**If possible, indicate in which results area(s) the project is expected to contribute to gender equality:**

**Closing gender gaps in access to and control over natural resources;**

**Improving women's participation and decision making**

**Generating socio-economic benefits or services or women**

**Will the project's results framework or logical framework include gender-sensitive indicators?**



#### A.5. Risks

**Elaborate on indicated risks, including climate change, potential social and environmental risks that might prevent the project objectives from being achieved, and, if possible, the proposed measures that address these risks at the time of project implementation.**

*Elaborate on indicated risks, including climate change, potential social and environmental risks that might prevent the project objectives from being achieved, and, if possible, the proposed measures that address these risks at the time of project implementation. (table format acceptable):*

Description	Type	Probability and Impact	Mitigation Action	Status
<b>Instability</b> Guinea-Bissau faces regular political instability. Several coups have taken place in the past, the last one in 2012. A new elected government has been in power since 2014. Elections will be held on November 18, 2018. Before 2019, a new legal government should be put in place to allow us to reassess the issue of instability. If further political instability occurs, it will certainly have a negative impact on the overall investment climate and delay the implementation of the project.	Political	P=4 I=4	The project will work as much as possible with decentralized authorities in provinces and rural areas. The political will to support this project in these regions is strong. The impact of political instability at the national level is most evident in the capital, Bissau. The project will also constitute a broad coalition of partners and stakeholders whose interest in rural development is likely to be maintained, even in the event of regime change. They include local businesses and communities, NGOs and international development agencies...	No change in the situation

Description	Type	Probability and Impact	Mitigation Action	Status
<p><b>Politics</b> Timid support for a framework to encourage the private sector to invest in mini-grids for rural electrification.</p>	Operational	<p>P=2 I=4</p>	<p>There is a possibility that the government may not intervene early enough in a policy framework that will encourage the private sector to invest in mini-grids for rural electrification; for example, there is no rural electrification master plan. If this were to happen, the implementation of the project would be hindered. However, the Government is strongly motivated to provide access to modern energy services to rural populations using traditional forms of energy, to improve their quality of life and for income-generating activities, and is motivated by its plans (PANER, PANEE, SE4ALL...) to achieve the Sustainable Development Goals.</p> <p>In addition, the project's interventions under Component 1 will help to mitigate this risk.</p>	New

Description	Type	Probability and Impact	Mitigation Action	Status
<p><b>Technology</b> Insufficient quality of PV equipment leading to</p> <ul style="list-style-type: none"> <li>· the first failure of mini-grid, pumping and storage systems</li> <li>· consumer doubts about renewable energy.</li> </ul>	Operational	<p>P=2 I=2</p>	<p>There is a possibility that the government may not intervene early enough in a policy framework that will encourage the private sector to invest in mini-grids for rural electrification; for example, there is no rural electrification master plan. If this were to happen, the implementation of the project would be hindered. However, the Government is strongly motivated to provide access to modern energy services to rural populations using traditional forms of energy, to improve their quality of life and for income-generating activities, and is motivated by its plans (PANER, PANEE, SE4ALL...) to achieve the Sustainable Development Goals.</p> <p>In addition, the project's interventions under Component 1 will help to mitigate this risk. New Technology</p> <p>Insufficient quality of PV equipment leading to</p> <ul style="list-style-type: none"> <li>- the first failure of mini-grid, pumping and storage systems</li> <li>- consumer doubts about renewable energy.</li> </ul> <p>Given the low literacy rate and lack of technical capacity among rural communities, maintenance deliveries represent a significant risk for mini-grid system operations. Minor repairs must be done by local-qualified personnel to prevent equipment from idling for long periods of time. Spare parts must be standard among locations, locally manufactured if possible, easily available for transport and installed at minimal cost. Technical and operational capacity building among rural communities will be critical to mitigate these technical risks. This will be done by providing basic technical training in rural areas and by sponsoring local institutions that take on maintenance tasks.</p>	No change

Description	Type	Probability and Impact	Mitigation Action	Status
<b>Financial</b> Widespread poverty and lack of sustainable sources of income, leading to low capacity to pay for modern energy services. Households may not be able to purchase improved stoves; and improved stoves may not be affordable for operational charcoal producers In addition, there is a risk on financial sustainability for investment in min-grids and low-carbon bio-energy technology (for example, suspension of credit financing and failure of loan guarantee funds).	Operational	P=2 I=3	The project will conduct assessments of the capacity and willingness to pay of end-users. In addition, the combination of the electricity utility business model and the private sector business model through public-private partnerships (PPPs) will reduce financial risk on both sides (public and private sector). The role of microfinance (adapted to the market of low-income people) and loan guarantees (financial risk reduction) will also help to reduce risk... In regard to the risk of failure with credit financing and loan guarantee funds, both mini-grids and low carbon technology development are fairly well-known among lending institutions throughout the world; hence, securing loans in the international finance market for investment in this area does not pose much of a problem. Therefore, the project will work to establish a combination between local and international markets (for example bringing foreign private sector companies) in order to have a balance between local and international credit financing options and opportunities.	No change
<b>Market</b> In Guinea-Bissau, RE systems will have to compete with locally available, subsidized alternatives to diesel. Without additional incentives, sustainable mini-grid companies can remain uncompetitive	Operational	P=3 I=3	The introduction of financially and socially sustainable tariffs for mini-grids based on renewable energy will be a fundamental instrument of the proposed package, specifically aimed at addressing this risk by levelling the playing field with regard to available alternatives.	No change
<b>Social</b> There will be limited social and/or cultural acceptance (this applies in particular to improved stoves, as people will have to adjust their behaviours, which is notoriously difficult to achieve). Although the project plans to address this directly, some aspects may remain beyond the project's control.	Operational	P=2 I=3	The PPG phase will develop a detailed analysis of the socio-economic aspects of the use of improved stoves. However, if a particular community or village does not wish to change its cooking habits, the project will focus on the benefits of improved stoves and provide examples of communities / villages that have adopted them.	No change

#### A.6. Institutional Arrangement and Coordination

**Describe the Institutional arrangement for project implementation. Elaborate on the planned coordination with other relevant GEF-financed projects and other initiatives.**

The project will be implemented by the Ministry of Environment and Sustainable Development (MADS, though a Project Management Unit (PMU). The PMU will work in close collaboration with UNDP and will imply several executive partners including Ministry of Environment, other ministries, other agencies and regional bodies such as ECREEE. The PMU will take attention to harmonize practices between the on-going projects. The steering committee of the project will include representatives of all major stakeholders of the project.

The proposed project is one of a series of similar UNDP and GEF funded initiatives aimed at promoting renewable energy-based mini-grids in Africa (such as small hydro-based mini-grids in Congo-Brazzaville, DR Congo and Central African Republic; wind-based mini-grids in Mauritania, solar PV mini-grids in Mali and Djibouti and biomass-based mini-grids in Benin). Also, the project will liaise with the new regional proposed GEF funded initiative on Africa Mini-grids program (AMP). The objective of the program is to increase access to energy by improving the financial viability and promoting scaled-up commercial investment in renewable energy mini-grids. The program is led by UNDP, in partnership with RMI, AfDB and BOAD. AMP consists of a cohort of National Projects in 12 countries and a one Regional Project. Coordination will include analysis and presentation of lessons learned, organization of regular face-to-face and virtual networking, knowledge-sharing and outreach activities and events.

The project will also liaise with various GEF-funded projects in Guinea-Bissau, such as the GEF-UNIDO project, “Promoting Investments in Small to Medium Scale Renewable Energy Technologies in the Electricity Sector”; and the GEF-UNDP project, “Strengthening the financial and operational framework of the national PA system in Guinea-Bissau”.

The GEF-UNIDO project is primarily focused on small-scale to medium-scale energy platforms in the electricity sector (peri-urban areas) while the present GEF-UNDP project focuses on the promotion of micro-scale systems providing both electricity and sustainable biomass applications in isolated forest-dependent communities.

The project will also liaise with the Small Grants Programme (SGP), which has developed a number of projects in the fields of bioenergy and ecosystem conservation.

Relevant SGP projects:

Project Title	Country	Area Of Work	GEF Amount	Objective
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<b>Environmental Education and Clean Energy</b>	Guinea-bissau	Biodiversity Climate Change Mitigation Land Degradation	20,000	Contribute to changing the mentality of society in general in the relationship with nature, as well as promoting access to clean energy.
<b>Women's Empowerment for Economic, Social and Environmental...</b>	Guinea-bissau	Biodiversity Climate Change Mitigation Land Degradation	33,000	Reduce the pressure on the use of renewable natural resources (forestry and fish), horticultural valorization as an alternative income-generating activity and ecologically correct in the perspective of guaranteeing social
<b>GHG emission reduction</b>	Guinea-bissau	Climate Change Mitigation	25,000	Phase 5 of the project. Promote Renewable Energies, and Clean energy (biogas, improved cookstoves)

**Additional Information not well elaborated at PIF Stage:**

#### **A.7. Benefits**

**Describe the socioeconomic benefits to be delivered by the project at the national and local levels. How do these benefits translate in supporting the achievement of global environment benefits (GEF Trust Fund) or adaptaion benefits (LDCF/SCCF)?**

The project will contribute towards the reduction of GHG emissions from the energy and forest sectors in Guinea-Bissau. The enabling environment for policies and regulations for a better management of the energy sector is strenghtened; particularly for off-grid solutions in rural isolated areas. By providing sustainable energy solutions, the project will improve the livelihoods of marginalized forest communities living in isolated areas.

The project will lead towards the reduction of 939,000 tCO<sub>2</sub>eq.

#### **A.8. Knowledge Management**

**Elaborate on the Knowledge management approach for the project, including, if any, plans for the project to learn from other relevant projects and initiatives (e.g. participate in trainings. conferences, stakeholder exchanges, virtual networks, project twinning) and plans for the project to assess and document ina user- friendly form**

**(e.g. lessons learned briefs, engaging websites, guidebooks based on experience) and share these experiences and expertise (e.g. participate in community of practices, organize seminars, trainings and conferences) with relevant stakeholders.**

The project results will be collected, documented and disseminated in an appropriate manner within and beyond the project intervention through existing networks and information sharing forums. A tailored audience, specific knowledge products and channels adapted to the target groups will be defined to ensure effective dissemination of best practices and lessons learned from the project.

The country will participate in relevant platforms and networks, such as the Renewable Energy Trade Platform in the West and African sub-region, providing and receiving inputs. The project proposal will therefore define how information on national projects will be shared and updated on these platforms. Sharing lessons learned and experiences through the platform will ensure the alignment of this proposed project with other national, regional and global transparency initiatives.

To promote learning, Component 2 training activities will be complemented by peer-to-peer visits and participation of relevant government staff in international conferences, workshops and meetings. Importantly, the exchange of lessons learned will be a two-way and participative process.

The project will follow seven elements that are recommended in a knowledge management approach as best practices: 1) Overview of existing lessons and best practice that inform project concept; 2) Plans to learn from relevant projects, programs, initiatives & evaluations; 3) Proposed processes to capture, assess and document info, lessons, best practice & expertise generated during implementation; 4) Proposed tools and methods for knowledge exchange, learning & collaboration; 5) Proposed knowledge outputs to be produced and shared with stakeholders; 6) Discussion on how knowledge and learning will contribute to overall project/program impact and sustainability and 7) Plans for strategic communications.

- 1) Overview of existing lessons and best practice that inform project concept.

The existing lessons and best practices that served for drafting the proposal are drawn from the ongoing solar mini grid projects in Guinea Bissau (GB) but also from the remarkable off grid market development in other countries in Africa.

Overall the energy access in Guinea Bissau is insufficiently developed due to the weak ecosystem: policies and enabling instruments, a narrow private window and investment in this nascent market, limited technical knowledge, lack of sustainable O&M practices and lack of ownership the beneficiaries.

On the opposite, Africa has become the leading region for energy access development with countries such as Kenya, Uganda, and Senegal paving the way with ground breaking market penetration strategies and innovative financial systems to provide clean and affordable energy to an increasing rural and peri-urban population. Some of these countries have reached a level of market maturity whereby donor money and government intervention are becoming quite redundant as the private sector has been enabled to deploy successful market penetration technologies and strategies. Some of the experience gathered from these countries can successfully be imported in GB.

The underlined proposal integrates most of the best practices gathered in Africa. Those are but not limited to: (1) designing and implementing genuine policies and regulations to remove barriers for the private sector; (2) involving a large variety of actors to enable all the technical, financial, social, operational and organisational facets to be in place; (3) derisking investment in the sector through incentives; (4) technology transfer, development of local skills and abilities in all manners; (5) strong involvement of local communities, local champions, etc to create ownership.

- 2) Plans to learn from relevant projects, programs, initiatives & evaluations;
  - a. Through Component 2, the project (with coordination with the Government), can organise a study tour in Senegal for instance to get acquainted with the success factors underlying the booming off-grid market, specially getting relevant information from the role of the Government to trigger the market growth.
  - b. It is equally required to assess thoroughly why the mini-grid market is not taking off in GB by determining also the missing ingredients in the sector.
    - o What has not been done?
    - o What is not in place?
    - o What are the shared responsibilities of the Government institutions, the private sector and the population.
- 3) Proposed processes to capture, assess and document info, lessons, best practice & expertise generated during implementation;



- a. Put into place processes for regular information collection and reviews to detect trends, common roots barriers and successful practices;
- b. Provide feedback to policy and decision makers to enable the Improvement of the ecosystem.
- c. Regular projects reviews and evaluation by independent actors

4) Proposed tools and methods for knowledge exchange, learning & collaboration;

- a. Creation of a national team from different public and private institutions including representatives of the beneficiary that will oversee and monitor the different projects and programs in the sector and provide feedback and recommendation to decision makers.
- b. Design standard questionnaires and fiches to collect all relevant information on project development, implementation, operation in order to monitor the performance;
- c. Train all actors on the contents of the questionnaires and fiches
- d. Regular follow up to collect the requested information

In terms of training and overall capacity development, the following activities are proposed:

- a. Training of policymakers and government institutions to evaluate the needs (policy gap) and formulate appropriate policies and regulations for unlocking the off-grid market
- b. Training program to develop/upgrade the technical skills for off-grid project preparation, implementation, O&M and monitoring;
- c. Training of local institutions on monitoring and evaluation of off-grid projects
- d. Assisting local education facilities to develop curriculum related to renewable energy technologies at different level: master, engineer, technician, and skilled labor
- e. Positioning 2 to 3 Technical assistants specialized in off-grid regulation, tariff setting and technical norms.
- f. Developing expertise for systematic best practices information collection, processing and dissemination.

5) Proposed knowledge outputs to be produced and shared with stakeholders;

- a. Guidelines for communities' mobilizations and involvements; customer relations and conflict resolution procedures in case of illegal connections or theft, engagement of productive end-users, etc.
  - b. Guidelines and recommendations for technical oversight over plant operations and responsibility for repairing faulty equipment;
  - c. Practical guide to accounting and administrative and financial management of off-grid systems, billing and payment collection system;
- 6) Discussion on how knowledge and learning will contribute to overall project/program impact and sustainability
- a. Promoting quality with the view of gaining the confidence of the beneficiaries and users. Discussions will be initiated with relevant government institutions to adopt specific norms and standards to safeguard the quality of the equipment and processes through certification and labelling. The custom office and relevant institutions need to be included in the discussion to prevent fraud and entrance of inappropriate equipment in the country.
  - b. Used batteries and electronic waste are a real menace and can reduce strongly the sustainability of mini grid program. Discussion with relevant actors on waste collection and management need to be held in the early stage of the projects so as to find solutions for systematic waste control.
  - c. Appropriate tariff setting is crucial to guarantee enough returns to investors while making the electricity services affordable to the population and small businesses. Several ministries and public institutions, private sector and consumers representatives should be involved in these discussions.
- 7) Plans for strategic communications.

The plan for strategic communication will seek to (i) establish trust between actors, partners and the community; (ii) manage expectations so that beneficiaries and partners are aware about the whereabouts of project to forge ownership; (iii) encourage participation and collaboration to in meaningful dialogue about the programs. Beside traditional medium as a project website and regular publications the following can be undertaken:

- a. Organise periodic regional and national stakeholder dialogue workshops on the projects expected outputs and challenges,
- b. Document and disseminate lessons learned and best practices to relevant regional and national partners.
- c. Access global best practices share them with other local and international stakeholders and ensure incorporation into the Project planning stages.
- d. Ensure programming is informed by Project audit and evaluation findings, formulating a detailed action plan for implementation of audit/evaluation recommendations.

## **B. Description of the consistency of the project with:**

### **B.1. Consistency with National Priorities**

**Describe the consistency of the project with nation strategies and plans or reports and assessments under relevant conventions such as NAPAs, NAPs, ASGM NAPs, MIAs, NBSAPs, NCs, TNAs, NCSAs, NIPs, PRSPs, NPFE, BURs, INDCs, etc.**

In latest years, Guinea-Bissau has adopted various policy and management tools for different sectors where development priorities are set up. Such priorities are likely completed and reinforced through actions defined not only at sub-regional and regional level but also at international level.

In its Document of Strategy for Poverty Reduction II (2011-2015), the Government of Guinea-Bissau aware of importance of energy in promoting economic growth (*Axis 3: Promoting inclusive and durable economic development – support to growth carrier sectors*). As support to the energy sector, DENARP II aimed at accelerating the implementation of electrification projects in certain interior regions (rural areas) in view to attract more investment in sectors of transformation of agricultural products and tourism. A target of 100 MW increase in national electricity production capacity was set up as concrete action for the achievement of that objective.

Regarding environment sector, DENARP II concern goes in integrating climate change in planning policy and investment in sectors that are growth carrier in order to make them more climate resilient as taking into account climate risk would allow development of agricultural zones, housing, tourism and coastal zones, etc. Mainstreaming climate change would include also aspects related to reduction GHG emissions, allowing also for prioritizing energy efficiency and renewable energies in all political decisions and investments. Development strategies of different sectors of growth should be transformed and aligned with the low-carbon emissions development and to be climate resilient to promote sustainable development.

Although this target could not be reached until end of 2016, DENARP II influenced afterward the 2015-2030 Strategic Operational Plan “Terra Ranka” (SOP 2015-2030) which targeted an increase in power production for a capacity up to 90 MW. This SOP considered energy sector as building bloc and component of Catalytic Sectors which is one of the three pillars of a house named “Guinea-Bissau”. For the achievement of the projected electricity production capacity, “Terra Ranka” calls for the development and the utilization of local natural resources, particularly renewables sources.

Guinea-Bissau also produced its National Determined Contribution (NDC) in 2015 in the track of Paris Agreement where energy and AFOLU sectors are taken as top priority for intervention in term of policies, strategies, plans and direct action, encompassing main objectives of National Environment Management Plan.

Guinea-Bissau is also Party to the “Rio de Janeiro” Generation Conventions: UNFCCC (ratified in 27/10/1999), the UNCBD (ratified in 27/10/1995) and the UNCCD (ratified in 27/10/1995). This country has also ratified the Protocol of Kyoto, ratified in 18/11/2005. In the framework of UNFCCC implementation, the country has produced its Initial/First (INC), Second (SNC) and Third National Communications (TNC), which GHG Inventories have produced, respectively, following figures of emissions:

INC, 2004 (Ref. Year: 1994)	-----1, 359, 88 Gg CO <sub>2</sub> (Energy sector emissions: 13% of total)
SNC, 2008 (Ref. Year: 2000)	----- 3,780.81 Gg CO <sub>2</sub> (Energy sector emissions: 4% of total)
TNC, 2018 (Ref. Year: 2015)	----- 6,899.36 Gg CO <sub>2</sub> (Energy sector emissions: 63%)

Currently, the execution of project of the first biannual update report (BUR 1) is underway and the preparation of the Fourth National Communication of UNFCCC implementation will start shortly.

At sub-regional and regional level, Guinea-Bissau has made adopted all major priorities set up for sustainable development in the West African Economic and Monetary Union (WAEMU/UEMOA), such as the Common Policy for the Improvement of Environment in WAEMU region, and the ECOWAS White Paper on Energy.

**C. Describe The Budgeted M & E Plan:**

GEF M&E requirements	Primary responsibility	Indicative costs to be charged to the Project Budget[1] (US\$)		Time frame
		GEF grant	Co-financing	
<b>Inception Workshop</b>	UNDP Country Office	11,000		Within two months of project document signature
<b>Inception Report</b>	Project Manager	None	None	Within two weeks of inception workshop
<b>Standard UNDP monitoring and reporting requirements as outlined in the UNDP POPP</b>	UNDP Country Office	None	None	Quarterly, annually
<b>Risk management</b>	Project Manager Country Office	None	None	Quarterly, annually
<b>Monitoring of indicators in project results framework</b>	Project Manager	19,000	13,000	Annually before PIR Per year: USD 4,000
<b>GEF Project Implementation Report (PIR)</b>	Project Manager and UNDP Country Office and UNDP-GEF team	None	None	Annually
<b>Lessons learned and knowledge generation</b>	Project Manager	None	3,000	Annually
<b>Monitoring of environmental and social risks, and corresponding management plans as relevant</b>	Project Manager UNDP Country Office	None	3,000	On-going

GEF M&E requirements	Primary responsibility	Indicative costs to be charged to the Project Budget[1] (US\$)		Time frame
		GEF grant	Co-financing	
Stakeholder Engagement Plan	Project Manager UNDP Country Office			On-going
Gender Action Plan	Project Manager UNDP Country Office UNDP GEF team			On-going
Addressing environmental and social grievances	Project Manager UNDP Country Office			On-going
Project Board meetings	Project Board UNDP Country Office Project Manager	None	3,000	At minimum annually
Supervision missions	UNDP Country Office	None[2]	6,000	Annually
Oversight missions	UNDP-GEF team	None	6,000	Troubleshooting as needed
GEF Secretariat learning missions/site visits	UNDP Country Office and Project Manager and UNDP-GEF team	None	None	To be determined.
Independent Mid-term Review (MTR) and management response	UNDP Country Office and Project team and UNDP-GEF team	30,000	6,000	Between 2 <sup>nd</sup> and 3 <sup>rd</sup> PIR.
Independent Terminal Evaluation (TE) included in UNDP evaluation plan, and management response	UNDP Country Office and Project team and UNDP-GEF team	50,000	10,000	At least three months before operational closure
Translation of MTR and TE reports into English	UNDP Country Office	None	5,000	As required. GEF will only accept reports in English.

GEF M&E requirements	Primary responsibility	Indicative costs to be charged to the Project Budget[1] (US\$)		Time frame
		GEF grant	Co-financing	
TOTAL indicative COST				
Excluding project team staff time, and UNDP staff and travel expenses		110,000	55,000	

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- [1] Excluding project team staff time and UNDP staff time and travel expenses.

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- [2] The costs of UNDP Country Office and UNDP-GEF Unit's participation and time are charged to the GEF Agency Fee.

**PART III: Certification by GEF partner agency(ies)**

**A. GEF Agency(ies) certification**

<b>GEF Agency Coordinator</b>	<b>Date</b>	<b>Project Contact Person</b>	<b>Telephone</b>	<b>Email</b>
Pradeep Kurukulasuriya	5/29/2019	Saliou Toure	6623049100	Saliou.Toure@undp.org

**ANNEX A: PROJECT RESULTS FRAMEWORK** (either copy and paste here the framework from the Agency document, or provide reference to the page in the project document where the framework could be found).

please refer to section 6 of ProDoc

**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).

During the PPG, comments from STAP had to be addressed. We fully agree with and considered the comments from STAP.

During the PPG, comments from German Council Member had to be addressed. We fully agree with and considered the comments.

Comments from STAP	Response
<p>1. The aim is to promote low-carbon technologies in Guinea Bissau including through renewable energy-based mini-grids and bioenergy systems using efficient cookstoves. Four pilot mini-grids (totaling around 2 MW capacity) are envisaged under a public/private partnership business model supported by around USD 6.4 M co-finance through the Government's development programme as funded by aid donors.</p> <p>2. The project will build on an existing UNIDO project on renewable electricity, and will also benefit from experiences gained from other UNDP GEF project investments currently under progress in West Africa.</p> <p>3. Modern energy access is low in the country but there are good hydro and solar resources, and the Government has a programme in place to improve the electricity grid and energy infrastructure. Wind resources have not been fully assessed, but given the location of the island nation, it could also be a useful resource in the more remote areas, as can solar systems. Bioenergy has potential if deforestation can be avoided and charcoal production kilns and cook stoves can become more efficient to reduce demand for fuelwood and charcoal.</p> <p>4. The country, therefore, has significant renewable energy potential. Hence it is recommended that this project should explore this possibility in detail to determine the most appropriate renewable energy systems that can be implemented cost-effectively in the near term to meet the project objectives in line with the country's priorities. Technologies with potential for long-term implementation should also be considered and recommended within the project</p>	<p>A detailed financial analysis has been conducted during the PPG phase, which has shown that in the current context of the country, Solar PV has the lowest LCOE. Therefore, the project is based solely on Solar PV based mini-grids rather than a mix of Solar and hydro power.</p>



<p>5. Since local technical, operational and management expertise is a significant constraint for both mini-grids and bioenergy systems, capacity building is paramount. Access to capital is also a constraint, but political instability is perhaps a more significant deterrent to private sector investment. The project should therefore proactively consider how best to ensure private sector engagement/investment from the onset.</p>	<p>The project focuses on both capacity building and putting in place the right legal framework to ensure financial attractiveness of the private sector. Components 1 and 2 are dedicated to these 2 major barriers.</p>
<p>7. The project document does not define the type and design of cookstove that is intended to be deployed. It is, however, essential to consider the effectiveness of clean cookstoves as a solution for climate change and air pollution challenges. Recent scientific studies have shown that many stoves do not deliver on the promised air pollution and climate benefits. For example, an evaluation of stove replacement program in India found that the proportion of black carbon emitted from intervention stoves, approved under the Clean Development Mechanism (CDM), was higher than emissions from the traditional stoves being replaced (see Aung et al., 2016: <a href="http://pubs.acs.org/doi/abs/10.1021/acs.est.5b06208">http://pubs.acs.org/doi/abs/10.1021/acs.est.5b06208</a>). Three other studies also show similar results (see: Wathore et al. 2017: <a href="http://pubs.acs.org/doi/abs/10.1021/acs.est.6b05557">http://pubs.acs.org/doi/abs/10.1021/acs.est.6b05557</a>; Mortimer et al. 2016: <a href="http://www.thelancet.com/journals/lancet/article/PIIS0140-6736(16)32507-7/abstract">http://www.thelancet.com/journals/lancet/article/PIIS0140-6736(16)32507-7/abstract</a> and Tielsch et al., 2016: <a href="http://www.thelancet.com/journals/langlo/article/PIIS2214-109X(16)30024-9/abstract">http://www.thelancet.com/journals/langlo/article/PIIS2214-109X(16)30024-9/abstract</a>). Hence before selection and deployment, the cookstoves for this project should be rigorously tested for effectiveness in delivering the expected climate and health benefits. Furthermore, the stove should be a type that is easy to use, both technically and practically. Alternatives to solid fuel cookstoves should also be sought where possible, such as biogas stoves (Anderman et al., 2015: <a href="https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4584993/">https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4584993/</a> and <a href="https://cleancookstoves.org/binary-data/TECHNOLOGY_FUELS/document/000/000/6-1.pdf">https://cleancookstoves.org/binary-data/TECHNOLOGY_FUELS/document/000/000/6-1.pdf</a>) or solar cookstoves( <a href="http://www.nature.com/news/sustainability-clean-cooking-empowers-women-1.17562">http://www.nature.com/news/sustainability-clean-cooking-empowers-women-1.17562</a>).</p>	<p>The suggestion is well noted. As indicated now clearly in the ProDoc, the project focuses on The improved kilns/kilns of Stage 2 will mainly consist of Casamance prototypes. For kilns (which are 30% more energy efficient). For improved stoves, it includes two types of prototypes using either charcoal or firewood.</p>
<p>8. Around 190 kt CO<sub>2</sub>-eq of greenhouse gases were estimated to be mitigated as a result of renewable electricity generation, improved kilns for charcoal production, and the uptake of clean cookstoves. Total investment equates to over USD 60/t CO<sub>2</sub>-eq avoided. It is however not clear if this estimate is mainly based on avoided deforestation or if it includes the expected black carbon emissions avoided from improved kilns and cookstoves (UNEP/WMO, 2011: <a href="https://wedocs.unep.org/rest/bitstreams/12809/retrieve">https://wedocs.unep.org/rest/bitstreams/12809/retrieve</a>). If not, STAP recommends that this should be included in the calculation of the climate benefits. See STAP advisory document to the GEF on black carbon: <a href="http://www.stapgef.org/sites/default/files/stap/wp-content/uploads/2015/10/Black-Carbon-Web-Single.pdf">http://www.stapgef.org/sites/default/files/stap/wp-content/uploads/2015/10/Black-Carbon-Web-Single.pdf</a>.</p>	<p>The GHG emission calculations are very conservative and do not include black carbon emissions. It takes into account the electricity generation from Solar PV (instead of fossil fuel) and the avoided deforestation in regards to charcoal production and usage.</p>
<p><b>Comments from German Council Member</b></p>	<p><b>Response</b></p>

- Regarding risks (p.14), it is not clear what the level of risks are. The value assignments of P and I should be explained.
- Regarding the technology risk: it is stated the spare parts should ideally be produced locally, but this aspect of locally-manufactured systems and spare parts is not addressed in the PIF. Please elaborate on project plans to support a homegrown manufacturing industry in support of off-grid infrastructure.
- Regarding financial risk: the project could explore financing models like “Pay as you save” which enable users to take out loans, the payback of which, will be less than payments made for business-as-usual energy solutions (in this case diesel-powered generators). Given the current high cost of energy per kwh in the country, it should be financially feasible to present more cost-effective energy solutions with solar power, which is why a pay-as-you-save solution could be viable here.
- Regarding market risk: the PPG should aim to provide certainty that diesel subsidies will be phased out in the targeted regions in order to make solar mini-grids financially viable. Please explain how the “introduction of financially- and socially-viable tariffs for Renewable Energy-based mini-grids “ can level the playing field to make renewables competitive with diesel alternatives.

The risk level are now explained in details in the UNDP Project Document.

Spare parts should ideally e produced locally. However, the project does not on supporting homegrown manufacturing industry. It will be too ambitious at this stage.

This is well noted and integrated in the Component 1 activities (output 1.1). It says: *the project will follow the recommendations from table 1 by supporting the Government to support mini-grid entrepreneurs and telecom companies in building the capacity of and fostering linkages between telecom companies / mobile money providers and solar companies to help roll-out technology platforms and PAYG business models. In addition, the project will explore financing models like “Pay as you save” which enable users to take out loans, the payback of which, will be less than payments made for business-as-usual energy solutions (in this case diesel-powered generators).*

This is indeed a key concern and the project will work specifically through output 1.1. of component 1 to help remove or at least reduce diesel subsidies. As stated in the previous bullet point. Furthermore, the project will *analyze where fossil fuel subsidies serve as an impediment to development of safe, clean energy access alternatives.*

As stated in the project outputs (1.1), the project will not define specific tariffs, but rather develop tariff policies covering the solar mini-grid supply chain. It means that the project will work on putting in place the best criterias for tariff settings and not specifically setting the tariffs. Tariff flexibility and innovative approaches by the private sector are expected to increase the attractiveness of solar mini-grids.

## ANNEX C: STATUS OF IMPLEMENTATION OF PROJECT PREPARATION ACTIVITIES AND THE USE OF FUNDS.

**A. Provide detailed funding amount of the PPG activities financing status in the table below:**

PPG Grant Approved at PIF: <b>90,000</b>			
<i>Project Preparation Activities Implemented</i>	<i>GEF/LDCF/SCCF Amount (\$)</i>		
	<i>Budgeted Amount</i>	<i>Amount Spent To date</i>	<i>Amount Committed</i>
Technical assistance ( design technical elements as well as all the required financial and administrative components of the project)	85,000.00	72,197	12,803
Stakeholder consultation and validation workshop	5,000.00	2,111	2,889
<b>Total</b>	<b>90,000.00</b>	<b>74,308</b>	<b>15,692</b>

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

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

ANNEX E: GEF 7 Core Indicator Worksheet

Use this Worksheet to compute those indicator values as required in Part I, Table G to the extent applicable to your proposed project. Progress in programming against these targets for the program will be aggregated and reported at any time during the replenishment period. There is no need to complete this table for climate adaptation projects financed solely through LDCF and SCCF.

Core Indicator 6	Greenhouse gas emission mitigated				(Metric tons of CO <sub>2</sub> e )	
		Expected metric tons of CO <sub>2</sub> e (6.1+6.2)				
		PIF stage	Endorsement	MTR	TE	
	Expected CO <sub>2</sub> e (direct)	190,288	93,900			
	Expected CO <sub>2</sub> e (indirect)		939,000			
Indicator 6.1	Carbon sequestered or emissions avoided in the AFOLU sector					
			Expected metric tons of CO <sub>2</sub> e			
		PIF stage	Endorsement	MTR	TE	
	Expected CO <sub>2</sub> e (direct)					
	Expected CO <sub>2</sub> e (indirect)					
	Anticipated start year of accounting					
	Duration of accounting					
Indicator 6.2	Emissions avoided Outside AFOLU					
			Expected metric tons of CO <sub>2</sub> e			
			Expected		Achieved	
		PIF stage	Endorsement	MTR	TE	
	Expected CO <sub>2</sub> e (direct)					

	Expected CO2e (indirect)					
	Anticipated start year of accounting					
	Duration of accounting					
Indicator 6.3	Energy saved					
			MJ			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE
Indicator 6.4	Increase in installed renewable energy capacity per technology					
		Technology	Capacity (MW)			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE
			2	1.19		
Core Indicator 11	Number of direct beneficiaries disaggregated by gender as co-benefit of GEF investment					(Number)
			Number			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE
		Female	12,500	12,500		
		Male	12,500	12,500		
		Total	25,000	25,000		

**ANNEX: Project Taxonomy Worksheet**

Use this Worksheet to list down the taxonomic information required under Part1 by ticking the most relevant keywords/topics//themes that best describes the project

Level 1	Level 2	Level 3	Level 4
<input checked="" type="checkbox"/> Influencing models			
	<input checked="" type="checkbox"/> Transform policy and regulatory environments		
	<input checked="" type="checkbox"/> Strengthen institutional capacity and decision-making		
	<input checked="" type="checkbox"/> Convene multi-stakeholder alliances		
	<input checked="" type="checkbox"/> Demonstrate innovative approaches		
	<input checked="" type="checkbox"/> Deploy innovative financial instruments		
<input checked="" type="checkbox"/> Stakeholders			
	<input type="checkbox"/> Indigenous Peoples		
	<input checked="" type="checkbox"/> Private Sector		
		<input type="checkbox"/> Capital providers	
		<input type="checkbox"/> Financial intermediaries and market facilitators	
		<input type="checkbox"/> Large corporations	
		<input checked="" type="checkbox"/> SMEs	
		<input checked="" type="checkbox"/> Individuals/Entrepreneurs	
		<input type="checkbox"/> Non-Grant Pilot	
		<input type="checkbox"/> Project Reflow	
	<input checked="" type="checkbox"/> Beneficiaries		
	<input checked="" type="checkbox"/> Local Communities		
	<input checked="" type="checkbox"/> Civil Society		
		<input checked="" type="checkbox"/> Community Based Organization	
		<input checked="" type="checkbox"/> Non-Governmental Organization	
		<input type="checkbox"/> Academia	
		<input type="checkbox"/> Trade Unions and Workers Unions	
	<input checked="" type="checkbox"/> Type of Engagement		
		<input type="checkbox"/> Information Dissemination	
		<input checked="" type="checkbox"/> Partnership	
		<input checked="" type="checkbox"/> Consultation	
		<input checked="" type="checkbox"/> Participation	
	<input checked="" type="checkbox"/> Communications		
		<input checked="" type="checkbox"/> Awareness Raising	
		<input checked="" type="checkbox"/> Education	
		<input checked="" type="checkbox"/> Public Campaigns	
		<input checked="" type="checkbox"/> Behavior Change	
<input checked="" type="checkbox"/> Capacity, Knowledge and Research			
	<input type="checkbox"/> Enabling Activities		
	<input type="checkbox"/> Capacity Development		
	<input checked="" type="checkbox"/> Knowledge Generation and Exchange		
	<input type="checkbox"/> Targeted Research		
	<input checked="" type="checkbox"/> Learning		
		<input type="checkbox"/> Theory of Change	
		<input type="checkbox"/> Adaptive Management	

		<input type="checkbox"/> Indicators to Measure Change	
	<input checked="" type="checkbox"/> Innovation		
	<input checked="" type="checkbox"/> Knowledge and Learning		
		<input checked="" type="checkbox"/> Knowledge Management	
		<input checked="" type="checkbox"/> Innovation	
		<input checked="" type="checkbox"/> Capacity Development	
		<input checked="" type="checkbox"/> Learning	
	<input checked="" type="checkbox"/> Stakeholder Engagement Plan		
<input checked="" type="checkbox"/> Gender Equality			
	<input checked="" type="checkbox"/> Gender Mainstreaming		
		<input checked="" type="checkbox"/> Beneficiaries	
		<input type="checkbox"/> Women groups	
		<input type="checkbox"/> Sex-disaggregated indicators	
		<input type="checkbox"/> Gender-sensitive indicators	
	<input checked="" type="checkbox"/> Gender results areas		
		<input type="checkbox"/> Access and control over natural resources	
		<input checked="" type="checkbox"/> Participation and leadership	
		<input type="checkbox"/> Access to benefits and services	
		<input type="checkbox"/> Capacity development	
		<input checked="" type="checkbox"/> Awareness raising	
		<input checked="" type="checkbox"/> Knowledge generation	
<input type="checkbox"/> Focal Areas/Theme			
	<input type="checkbox"/> Integrated Programs		
		<input type="checkbox"/> Commodity Supply Chains (Good Growth Partnership)	
			<input type="checkbox"/> Sustainable Commodities Production
			<input type="checkbox"/> Deforestation-free Sourcing
			<input type="checkbox"/> Financial Screening Tools
			<input type="checkbox"/> High Conservation Value Forests
			<input type="checkbox"/> High Carbon Stocks Forests
			<input type="checkbox"/> Soybean Supply Chain
			<input type="checkbox"/> Oil Palm Supply Chain
			<input type="checkbox"/> Beef Supply Chain
			<input type="checkbox"/> Smallholder Farmers
			<input type="checkbox"/> Adaptive Management
		<input type="checkbox"/> Food Security in Sub-Saharan Africa	
			<input type="checkbox"/> Resilience (climate and shocks)
			<input type="checkbox"/> Sustainable Production Systems
			<input type="checkbox"/> Agroecosystems
			<input type="checkbox"/> Land and Soil Health
			<input type="checkbox"/> Diversified Farming
			<input type="checkbox"/> Integrated Land and Water Management
			<input type="checkbox"/> Smallholder Farming
			<input type="checkbox"/> Small and Medium Enterprises
			<input type="checkbox"/> Crop Genetic Diversity
			<input type="checkbox"/> Food Value Chains
			<input type="checkbox"/> Gender Dimensions
			<input type="checkbox"/> Multi-stakeholder Platforms



		<input type="checkbox"/> Sustainable Commodity Production
		<input type="checkbox"/> Comprehensive Land Use Planning
		<input type="checkbox"/> Integrated Landscapes
		<input type="checkbox"/> Food Value Chains
		<input type="checkbox"/> Deforestation-free Sourcing
		<input type="checkbox"/> Smallholder Farmers
	<input type="checkbox"/> Sustainable Cities	
		<input type="checkbox"/> Integrated urban planning
		<input type="checkbox"/> Urban sustainability framework
		<input type="checkbox"/> Transport and Mobility
		<input type="checkbox"/> Buildings
		<input type="checkbox"/> Municipal waste management
		<input type="checkbox"/> Green space
		<input type="checkbox"/> Urban Biodiversity
		<input type="checkbox"/> Urban Food Systems
		<input type="checkbox"/> Energy efficiency
		<input type="checkbox"/> Municipal Financing
		<input type="checkbox"/> Global Platform for Sustainable Cities
		<input type="checkbox"/> Urban Resilience
	<input type="checkbox"/> Biodiversity	
	<input type="checkbox"/> Protected Areas and Landscapes	
		<input type="checkbox"/> Terrestrial Protected Areas
		<input type="checkbox"/> Coastal and Marine Protected Areas
		<input type="checkbox"/> Productive Landscapes
		<input type="checkbox"/> Productive Seascapes
		<input type="checkbox"/> Community Based Natural Resource Management
	<input type="checkbox"/> Mainstreaming	
		<input type="checkbox"/> Extractive Industries (oil, gas, mining)
		<input type="checkbox"/> Forestry (Including HCVF and REDD+)
		<input type="checkbox"/> Tourism
		<input type="checkbox"/> Agriculture & agrobiodiversity
		<input type="checkbox"/> Fisheries
		<input type="checkbox"/> Infrastructure
		<input type="checkbox"/> Certification (National Standards)
		<input type="checkbox"/> Certification (International Standards)
	<input type="checkbox"/> Species	
		<input type="checkbox"/> Illegal Wildlife Trade
		<input type="checkbox"/> Threatened Species
		<input type="checkbox"/> Wildlife for Sustainable Development
		<input type="checkbox"/> Crop Wild Relatives
		<input type="checkbox"/> Plant Genetic Resources
		<input type="checkbox"/> Animal Genetic Resources
		<input type="checkbox"/> Livestock Wild Relatives
		<input type="checkbox"/> Invasive Alien Species (IAS)

		<input type="checkbox"/> Temperate Forests
		<input type="checkbox"/> Grasslands
		<input type="checkbox"/> Paramo
		<input type="checkbox"/> Desert
	<input type="checkbox"/> Financial and Accounting	
		<input type="checkbox"/> Payment for Ecosystem Services
		<input type="checkbox"/> Natural Capital Assessment and Accounting
		<input type="checkbox"/> Conservation Trust Funds
		<input type="checkbox"/> Conservation Finance
	<input type="checkbox"/> Supplementary Protocol to the CBD	
		<input type="checkbox"/> Biosafety
		<input type="checkbox"/> Access to Genetic Resources Benefit Sharing
	<input type="checkbox"/> Forests	
	<input type="checkbox"/> Forest and Landscape Restoration	
		<input type="checkbox"/> REDD/REDD+
	<input type="checkbox"/> Forest	
		<input type="checkbox"/> Amazon
		<input type="checkbox"/> Congo
		<input type="checkbox"/> Drylands
	<input type="checkbox"/> Land Degradation	
	<input type="checkbox"/> Sustainable Land Management	
		<input type="checkbox"/> Restoration and Rehabilitation of Degraded Lands
		<input type="checkbox"/> Ecosystem Approach
		<input type="checkbox"/> Integrated and Cross-sectoral approach
		<input type="checkbox"/> Community-Based NRM
		<input type="checkbox"/> Sustainable Livelihoods
		<input type="checkbox"/> Income Generating Activities
		<input type="checkbox"/> Sustainable Agriculture
		<input type="checkbox"/> Sustainable Pasture Management
		<input type="checkbox"/> Sustainable Forest/Woodland Management
		<input type="checkbox"/> Improved Soil and Water Management Techniques
		<input type="checkbox"/> Sustainable Fire Management
		<input type="checkbox"/> Drought Mitigation/Early Warning
	<input type="checkbox"/> Land Degradation Neutrality	
		<input type="checkbox"/> Land Productivity
		<input type="checkbox"/> Land Cover and Land cover change
		<input type="checkbox"/> Carbon stocks above or below ground
	<input type="checkbox"/> Food Security	
	<input type="checkbox"/> International Waters	
	<input type="checkbox"/> Ship	
	<input type="checkbox"/> Coastal	
	<input type="checkbox"/> Freshwater	



		<input type="checkbox"/> Pollution	
			<input type="checkbox"/> Persistent toxic substances
			<input type="checkbox"/> Plastics
			<input type="checkbox"/> Nutrient pollution from all sectors except wastewater
			<input type="checkbox"/> Nutrient pollution from Wastewater
		<input type="checkbox"/> Transboundary Diagnostic Analysis and Strategic Action Plan preparation	
		<input type="checkbox"/> Strategic Action Plan Implementation	
		<input type="checkbox"/> Areas Beyond National Jurisdiction	
		<input type="checkbox"/> Large Marine Ecosystems	
		<input type="checkbox"/> Private Sector	
		<input type="checkbox"/> Aquaculture	
		<input type="checkbox"/> Marine Protected Area	
		<input type="checkbox"/> Biomes	
			<input type="checkbox"/> Mangrove
			<input type="checkbox"/> Coral Reefs
			<input type="checkbox"/> Seagrasses
			<input type="checkbox"/> Polar Ecosystems
			<input type="checkbox"/> Constructed Wetlands
	<input type="checkbox"/> Chemicals and Waste		
		<input type="checkbox"/> Mercury	
		<input type="checkbox"/> Artisanal and Scale Gold Mining	
		<input type="checkbox"/> Coal Fired Power Plants	
		<input type="checkbox"/> Coal Fired Industrial Boilers	
		<input type="checkbox"/> Cement	
		<input type="checkbox"/> Non-Ferrous Metals Production	
		<input type="checkbox"/> Ozone	
		<input type="checkbox"/> Persistent Organic Pollutants	
		<input type="checkbox"/> Unintentional Persistent Organic Pollutants	
		<input type="checkbox"/> Sound Management of chemicals and Waste	
		<input type="checkbox"/> Waste Management	
			<input type="checkbox"/> Hazardous Waste Management
			<input type="checkbox"/> Industrial Waste
			<input type="checkbox"/> e-Waste
		<input type="checkbox"/> Emissions	
		<input type="checkbox"/> Disposal	
		<input type="checkbox"/> New Persistent Organic Pollutants	
		<input type="checkbox"/> Polychlorinated Biphenyls	
		<input type="checkbox"/> Plastics	
		<input type="checkbox"/> Eco-Efficiency	
		<input type="checkbox"/> Pesticides	
		<input type="checkbox"/> DDT - Vector Management	
		<input type="checkbox"/> DDT - Other	
		<input type="checkbox"/> Industrial Emissions	
		<input type="checkbox"/> Open Burning	
		<input type="checkbox"/> Best Available Technology / Best Environmental Practices	

			<input type="checkbox"/> Climate Resilience
			<input type="checkbox"/> Climate information
			<input type="checkbox"/> Ecosystem-based Adaptation
			<input type="checkbox"/> Adaptation Tech Transfer
			<input type="checkbox"/> National Adaptation Programme of Action
			<input type="checkbox"/> National Adaptation Plan
			<input type="checkbox"/> Mainstreaming Adaptation
			<input type="checkbox"/> Private Sector
			<input type="checkbox"/> Innovation
			<input type="checkbox"/> Complementarity
			<input type="checkbox"/> Community-based Adaptation
			<input type="checkbox"/> Livelihoods
		<input checked="" type="checkbox"/> Climate Change Mitigation	
			<input type="checkbox"/> Agriculture, Forestry, and other Land Use
			<input type="checkbox"/> Energy Efficiency
			<input type="checkbox"/> Sustainable Urban Systems and Transport
			<input type="checkbox"/> Technology Transfer
			<input checked="" type="checkbox"/> Renewable Energy
			<input type="checkbox"/> Financing
			<input type="checkbox"/> Enabling Activities
		<input type="checkbox"/> Technology Transfer	
			<input type="checkbox"/> Poznan Strategic Programme on Technology Transfer
			<input type="checkbox"/> Climate Technology Centre & Network (CTCN)
			<input type="checkbox"/> Endogenous technology
			<input type="checkbox"/> Technology Needs Assessment
			<input type="checkbox"/> Adaptation Tech Transfer
		<input type="checkbox"/> United Nations Framework on Climate Change	
		<input checked="" type="checkbox"/> Climate Finance (Rio Markers)	
			<input type="checkbox"/> Nationally Determined Contribution
			<input type="checkbox"/> Climate Change Mitigation 0
			<input checked="" type="checkbox"/> Climate Change Mitigation 1
			<input type="checkbox"/> Climate Change Mitigation 2
			<input checked="" type="checkbox"/> Climate Change Adaptation 0
			<input type="checkbox"/> Climate Change Adaptation 1
			<input type="checkbox"/> Climate Change Adaptation 2



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