**Request for CEO endorsement**

**Project Type: Full-sized Project**

**Type of Trust Fund: The GEF Trust Fund**



|  |  |  |  |
| --- | --- | --- | --- |
| **Project Title:**  **Promotion of sustainable biomass based electricity generation in Benin** | | | |
| **Country:** | Benin | GEF Project ID: | 5752 |
| **GEF Agency:** | UNDP | GEF Agency Project ID: | 5115 |
| **Other Executing Partner(s):** | Ministry of Energy and Water; Ministry of Environment; Ministry of Agriculture, Société Béninoise d’Energie Electrique (SBEE); Commune of Kalalé | Submission Date: | xxx June 2015 |
| **GEF Focal Area(s)** | Multifocal Area | Project Duration (Months) | 60 months |
| **Name of Parent Program (if applicable):**   * For SFM/REDD |  | Project Agency Fee ($): | 367,897 |

**part i: project Information**

1. **INDICATIVE FOCAL AREA STATEGY FRAMEWORK**

|  |  |  |  |
| --- | --- | --- | --- |
| Focal Area Objectives | Trust Fund | IndicativeGrant Amount($) | Indicative Co-financing($) |
| CCM-3: Renewable Energy: Promote investment in renewable  energy technologies | GEF TF | 1,959,132 | 10,750,000 |
| LD-3: Reduce pressures on natural resources from competing land uses in the wider landscape | GEF TF | 1,000,228 | 6,000,000 |
| SFM-1: Reduce pressures on forest resources and generate sustainable flows of forest ecosystem services | GEF TF | 913,242 | 6,000,000 |
| Total Project Cost |  | 3,872,602 | 22,750,000 |

1. **Indicative PROJECT FRAMEWORK.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Project Objective: To introduce an integrated energy and ecosystems-based approach to sustainable biomass electricity generation in Benin. | | | | | | |
| Project Component | Grant Type[[1]](#footnote-1) | Expected Outcomes | Expected Outputs | Trust Fund | IndicativeGrant Amount ($) | Indicative Co-financing($) |
| 1. Policy, institutional, legal and regulatory framework for biomass electricity generation established. | TA | Streamlined and comprehensive market-oriented energy policy and legal/regulatory framework for biomass electricity generation by Independent Power Producers (IPPs). | 1.1 Appropriate policy and legal/regulatory framework established and operational for  *(a) Biomass electricity generation.*  *(b) Establishment and implementation of a mechanism for re-investment of partial energy proceeds into community lands conservation.*  1.2 Technical report on grid capacity requirements to enable feed-in for grid-connected renewable energy systems followed by development of an updated grid code; as well provision for isolated mini-grid options.  1.3 Established procedures and standardized PPAs for the introduction of a transparent procurement process in the selection/award of biomass-based electricity supply agreements by private developers/IPPs.  1.4 One-stop shop for issuance of construction licenses and permits to private RE developers.  1.5 Methodology developed for a joint environmental, economic and financial evaluation of biomass plants in line with government regulations and policies.  1.6 Capacity developed within SBEE, local banks and key national actors such as Ministries of Energy, Agriculture and Finance to appraise renewable biomass[[2]](#footnote-2) projects for PPAs and lending. | GEF | $270,000 (CCM)  Total= **$270,000** | 2,500,000 |
| 2) Promotion of investment in biomass-based electricity generation through appropriate catalytic financial incentives available for project investors. | TA & INV | Increased investment in clean energy technologies and low-carbon practices in the agro-forestry waste sector. | 2.1 Financial Support Mechanism (Renewable Energy Guarantee Scheme) established and capitalized to support private investment in biomass plants.  2.2 MOU signed with the Central Bank setting out the objective, funding mechanism, administration rules and confirmation of their participation as fiduciary agent of the Financial Support Mechanism (FSM).  2.3 Financial and other  incentives to be provided to  project  developers/Independent  Power Producers (IPPs).  2.4 Documents supporting financial closure (Power Purchase Agreements, where applicable) with identified investors.  2.5 Reports confirming completion of construction of at least 4 MW of on-/off-grid biomass-based electric plants by IPPs at various sites by end of project. | GEF | 200,000 (TA)  1,500,000  (INV)  Total= **$1,700,000** (CCM) | 10,000,000 |
| 3) Sustainable land use and forest management and implementation at the commune level. | TA & INV | Integrated land use, sustainable forest management and natural resource management provide social benefits and sustain biomass for electricity production. | 3.1 Institutional framework and planning for integrated land uses is strengthened and functional at the local level.  3.2 Fire management practices are operational over 3,000 ha in the Classified Forests in the neighbour of the biomass plants.  3.3 Woodlots are established in order to provide sustainable biomass and incomes.  3.4 New methods and techniques of agro-ecology (conservation farming practices) reduce lands degradation and increase lands productivity (agricultural harvests and residues). | GEF | 500,000 (TA) + 370,000 (INV) =  $870,000 (LD)  500,000 (TA) + 300,000 (INV) =  $800,000  (SFM)  Total= **$1,670,000** | 9,000,000 |
| 4) Outreach and results dissemination programme aimed at sustaining a growing market for biomass gasifiers. | TA | Outreach programme and dissemination of project experience/best practices/lessons learned for replication throughout the region. | 4.1 National Plan to implement outreach/promotional activities targeting domestic (and international) investors.  4.2 Capacity development of concerned Ministries / Institutions to monitor and document project experience.  4.3 Published materials (including video) and informational meetings with stakeholders on project experience/best practices and lessons learned. |  | 15,000  (CCM)  30,000  (LD)  15,000  (SFM)  Total= **$60,000** | 500,000 |
| Subtotal | | |  |  | 3,700,000 | 22,000,000 |
| Project Management Cost (PMC)[[3]](#footnote-3) | | |  | GEF | 172,602 | 750,000 |
| Total Project Cost | | |  |  | 3,872,602 | 22,750,000 |

1. **Sources of confirmed co-financing for the project by Name ($)**

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

|  |  |  |  |
| --- | --- | --- | --- |
| **Sources of Cofinancing** | **Name of Cofinancer** | **Type of Cofinancing** | **Amount ($)** |
| National Government | MERPMEDER through PAPDFGC (EU funded project) | Grant | **4,500,000** |
| National Government | MERPMEDER through PAGEFCOM (AfDB funded project) | Grant | **5,000,000** |
| National Government | ANADER | In kind | **750,000** |
| GEF Agency | UNDP | Grant | **500,000** |
| NGO | SNV | In kind | **2,000,000** |
| Multilateral Agencies | FAGACE | Grant | **10,000,000** |
| **Total Cofinancing** |  |  | **22,750,000** |

1. **Trust Fund Resources Requested by Agency, Focal Area and Country**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **GEF Agency** | **Type of Trust Fund** | **Focal Area** | **Country Name/Global** | **Grant Amount ($) (a)** | **Agency Fee ($) (b)2** | **Total ($) c=a+b** |
| UNDP | GEF TF | Climate Change\* | Benin | 1,959,132 | 186,117 | 2,145,249 |
| UNDP | GEF TF | Land Degradation | Benin | 1,000,228 | 95,022 | 1,095,250 |
| UNDP | GEF TF | SFM | Benin | 913,242 | 86,758 | 1,000,000 |
| **Total Grant Resources** | | | | 3,872,602 | 367,897 | 4,240,499 |

**E.** **Does the project include a “non-grant” instrument?** yes  no

part ii: project justification:

**A: DESCRIBE ANY CHANGES IN ALIGNMENT WITH THE PROJECT DESIGN OF THE ORIGINAL PIF**

1. As formulated, the PIF did not include a Component related to outreach and dissemination of project experience/lessons learned for in-country replication, as well as in and outside the region. The PPG launch workshop held in Benin in September 2014 recommended that is was necessary to include it; hence, the RCE has now included a new component which is labelled Component No. 4: Outreach and results dissemination programme aimed at sustaining a growing market for biomass gasifiers. This outcome is especially relevant as it will make information on best practices/lessons learned available both in-country and to several countries within and outside the region - those that have substantial unutilised agricultural residues that could be utilised in gasifiers to provide their rural population with access to modern energy services.
2. The PIF envisaged 4 Components, with Component 2 dealing with the promotion of investment in biomass-based electricity generation through the provision of catalytic incentives and Component 3 supporting the establishment of a 1 MW biomass plant for electricity generation. During implementation of the PPG, the view was expressed that it would be rational and appropriate to have incentives go hand in hand with actual investment. Hence, these two Components were combined into one, as Component 2, to deal with both investment promotion and establishment of not one 1 MW plant but 4 biomass gasifier plants with a total capacity of 4 MW.

1. The proposed Renewable Energy Guarantee Scheme (REGS) in the PIF has been re-named “Financial Support Mechanism” (FSM) as it makes it clearer that its objective is to support investment in agricultural biomass gasifiers for electricity generation in cases when private investors supply biomass gasifier-generated electricity to the SBEE main grid or one of its isolated mini-grids. Should SBEE default on its payment to the developers, the FSM kicks in as a “risk minimisation fund” to compensate them for electricity already supplied.
2. In addition, Article 25 of the Electricity Law 2006-16 of 27 March 2007 allows the private sector to build its own isolated mini-grid and supply electricity that it produces to consumers, thus operating as a small utility without having to resort to selling electricity to SBEE. In such cases, the project will consider supporting private investors in sharing the costs for the preparation of feasibility studies and business plans and, eventually, providing an upfront investment grant, with a view to jumpstarting the market, for construction of the generating plant and distribution system. In this particular case, regular project funds will be utilised and will constitute grant funds designed to reduce the developers’ transaction costs and make it easier for them to access debt financing from lending institutions.
3. The PIF envisaged development of a standardised baseline for renewable energy-based electricity generation, leading to reduced carbon finance transaction costs under the Voluntary Carbon Market mechanism. When the PIF was formulated a year ago, the carbon market was almost doing pretty well, enabling developing countries to capitalise on additional financial resources to advance their development agenda. However, the carbon market has since then almost “crashed”, given the lack of demand for both voluntary and certified emission reduction units. Therefore, it does not make much economic and financial sense to focus on this issue at the present time. If, however, the carbon market happens to recover during implementation of the project, this issue will get re-visited under UNDP’s adaptive management procedures and all efforts will be made to tap into it in order to access additional resources that the Government could use to expand development activities in the biomass gasification sector.
4. The PIF proposed to implement SLFM activities only for the Borgou Department (Commune of Kalalé). During the PPG, the target communes were expanded to include Djougou, Savalou and Dassa (see Prodoc for a detailed description). During the participatory process of the prioritization exercise, the government and the other stakeholders expressed the need to implement SLFM activities on the ground also for the 3 others pilot sites identified. Activities of the component 3 (SLFM) are now oriented for results on the ground to reach 9,000 ha of land under sustainable agriculture practices and 3,000 ha of forest sustainably managed in the 4 pilot sites selected. Reforestation activities have been reinforced to reach 2,000 ha. Hence, the project targets now a total of 14,000 ha of SLFM.

**A.1 NATIONAL STRATEGIES AND PLANS:**

**1. Situation Analysis**

With an area of 114,763 km2 and a population of almost 10 million inhabitants (May 2013), the Republic of Benin (Capital: Porto-Novo) is a located in West Africa bordering Togo to the west, Nigeria to the east and Burkina Faso and Niger to the north, where the Niger River, one of the largest in Africa, forms a 120-kilometre-long border between the two countries. Agriculture employs 70% of the active population and its contribution to the GDP amounts to 32% (World Bank, 2012) – per capita GDP was $ 872 (2014 estimate, IMF). A majority of the population live on its southern 125-km wide equatorial coastline on the Bight of Benin, which forms part of the Gulf of Guinea in the northernmost tropical portion of the Atlantic Ocean. The population is estimated at being 70% rural and 30% urban, with more than half being concentrated in the south. Although the coastline measures only 121 km, the country extends a distance of 650 km from the Niger River in the north to its southern coastline and is about 325 km at its widest point. The country is divided into twelve departments which, in turn, are subdivided into 77 communes.

[](http://www.google.com/url?sa=i&rct=j&q=&esrc=s&source=images&cd=&cad=rja&uact=8&ved=0CAcQjRw&url=http://www.lonelyplanet.com/maps/africa/benin/&ei=IqlTVN3bJYueNrbogcAB&bvm=bv.78677474,d.cWc&psig=AFQjCNF8fp1uoWjLOi3I68RyRbFv5mgbkQ&ust=1414855213513133)The economy of Benin (the “economic capital” is Cotonou, approx. 33 km to the west of Porto-Novo) is dependent on subsistence agriculture, cotton and cashew production as cash crops, and regional trade. Cotton accounts for 40 percent of GDP and roughly 80 percent of official export receipts. Growth in real output has averaged around 5 percent in the past seven years, but rapid population growth has offset much of this increase. Benin’s economy has continued to strengthen over the past years, with real GDP growth rising from 3.5% in 2011 to 5% percent in 2013. The main driver of growth remains the agricultural sector, with cotton being the country’s main export, while services continue to contribute the largest part of GDP largely because of Benin’s geographical location, enabling trade, transportation, transit and tourism activities with its neighbouring states.

Very little of the country’s subsistence agriculture is mechanized and irrigation is only slightly developed. The industrial sector as a whole remains under-developed, contributing only to about 13% of GDP in 2013, mainly with textile and cement industries. GDP per capita was estimated as $ 756 per person in 2012 (Source: World Bank). Projections show that Benin will continue to be dependent on subsistence agriculture, cotton production, (they both produce a huge amount of “renewable biomass” in terms of agricultural or crop residues that can be utilised for energy purposes) and small-scale regional trade.

For a more detailed description of the “Situation Analysis”, including “Stakeholder Analysis and Institutional Framework” and “National Strategies and Plans”, please refer to the UNDP Prodoc, pages 5 -17.

**A.2 GEF FOCAL AREA AND/OR FUND(S) STRATEGIES, ELIGIBILITY CRITERIA AND PRIORITIES:**

This project has been designed with the express intention of responding to GEF’s overall strategic vision under GEF-5 of helping countries meet their sustainable development needs and achieve multiple environmental benefits through an integrated approach.

For a detailed description, please refer to the UNDP Prodoc, Section 2 “Project rationale and policy conformity”, page 38 and “Country ownership: country eligibility and country drivenness”, pages 43.

**A.3 THE GEF AGENCY’S COMPARATIVE ADVANTAGE:**

The proposed project is clearly within the comparative advantages of UNDP as stated in the GEF Council Paper C.31.5 “Comparative Advantages of GEF Agencies”. UNDP is one of the few GEF agencies present in the country. It has the ability to mobilize and make available quality technical expertise to develop policies and strategies, particularly in climate mitigation and adaptation, social sectors, governance and environmental management and risk disasters. UNDP has also developed and implemented several projects in Benin related to Energy and Environment, among them 4 GEF projects dealing with adaptation and bio-diversity.

The proposed project is clearly within the comparative advantages of UNDP as stated in the GEF Council Paper C.31.5 “Comparative Advantages of GEF Agencies”. UNDP has the ability to mobilize and make available quality technical expertise to develop policies and strategies (particularly in climate mitigation and adaptation, social sectors, governance and environmental management and risk disasters); knowledge and ability to take into account the rights and basic needs of the most vulnerable segments of the population; the ability of partner, mobilize and empower the communities and individuals to identify and own their problems and come up with pragmatic solutions; the focus on capacity building in all areas of support; and confidence among populations and national and international partners. UNDP has also developed and implemented several projects in Benin related to Energy and Environment, funded by both GEF and other donors.

UNDP has implemented over 230 GEF clean energy projects in close to 100 developing countries, and has acquired a unique base of institutional knowledge on transforming renewable energy markets in developing countries. UNDP has developed biomass electricity generation projects in Botswana, India, Malaysia and Thailand. Two UNDP publications on de-risking renewable energy investment environments (‘Transforming Renewable On-Grid Energy Markets’ and ‘De-Risking Renewable Energy Investment’) summarize UNDP’s empirically- and theoretically-robust ‘theory of change’ for catalysing private-sector renewable energy investment.

This project also feeds under the UNDP-GEF EITT Signature program number 1 “SP1 – Clean Energy” Promoting access to clean and affordable energy systems and services. This signature program aims at improving the energy access, use and supply through the promotion of distributed clean energy systems, based mainly on hydro power plants for electricity generation. The project also feeds under the UNDP-GEF Ecosystem and Biodiversity Signature program number 3 “SP3 – Ecosystem based adaptation and mitigation” Managing and promoting ecosystems for adaptation to and mitigation of climate change.

In Benin, the project is line with the UNDAF 2014-2018 which is under development and which has a strong emphasis on poverty reduction activities and programmes. Renewable energy projects provide electricity to populations which otherwise might have not had access to energy and are therefore extremely helpful in reducing poverty.

**A.4 THE BASELINE PROJECT AND THE PROBLEM THAT IT SEEKS TO ADDRESS:**

The northern part of the country has an abundance of agricultural biomass that is left unutilised after the crops have been harvested. To utilise these “waste” biomass resources, UEMOA commissioned a feasibility study in 2008 for the installation of a gasifier to operate either a 250 kVA or a 400 kVA generator to supply a mini-grid in Bouka in the department of Kalalé in the north-eastern part of the country. For the 250 kVA case, the installation cost was computed at $ 3,600/kVA, while it was going to be $ 3,250/kVA for the 400 kVA case. With a 15-year gasifier life, operation during 7,000 hours/year (a Capacity Utilisation Factor (CUF) of 80%) and a payback period of 10 years, the sale price of electricity to the SBEE grid was computed to be US Cents 20.3/kWh. For comparison purposes, the average SBEE generation cost for diesel-based isolated mini-grids is 40 US Cents/kWh, to which should be added the cost of transmission and/or distribution, as appropriate.

For a detailed description of the baseline project and the problem that it seeks to address, please refer to the UNDP Prodoc, Sections 1.4 “Baseline Situation and Problem to be addressed” to Section 1.6 “Barriers to gasification technology for electricity generation in Benin”, pages 17 – 34.

**The Economics of utilising Gasifiers for Rural Electrification**

At the present time, the biomass market in Benin is essentially dominated by non-renewable biomass, where active deforestation takes place as a result of charcoal production and direct fuelwood utilisation for cooking. Farmers barely take advantage of their crop residues which abound in quantity, mostly leaving them unused in the fields. However, as it is scattered randomly with low energy density, it is difficult to deal with centrally on a large scale. Hence, small-scale gasification-based power generation is an attractive resource for meeting the need for electricity services in rural areas. In addition, it can address poverty issues in the rural areas through the creation of income-generating activities related to fuel collection, transport, commercialisation to the gasifier units and the eventual productive use of the electricity generated.

For a more detailed description of the “The Economics of utilising Gasifiers for Rural Electrification”, please refer to UNDP Prodoc Section 1.7, pages 34 – 35.

**Financial Support Mechanism (FSM)**

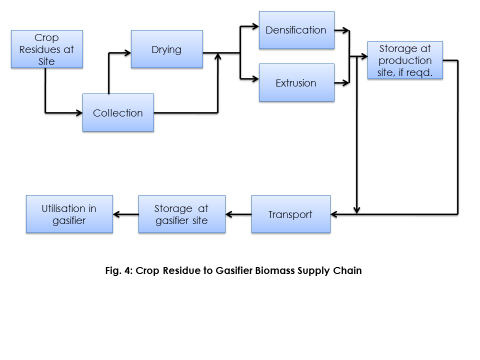
Investment in renewable energy projects often requires to be supported with financial incentives, at least initially, because such projects are not only typically more investment-intensive in terms of upfront costs, but that they are also, in some cases, considered to be riskier investments due to technology or resource uncertainties. The degree to which cost and risk factors apply varies according to technology and geographical location and project developers expect some form of financial support/risk-sharing to compensate them for taking on additional financial risks due to unfamiliarity with the technology being proposed. In the case of Benin, the upfront investment cost related to a new technology (biomass gasification) for electricity generation can prove to be a major barrier faced by private investors in their efforts to secure credit funding from lending institutions. The second major barrier is the setting of an appropriate tariff, allowing financial viability of the system, but also taking into account the capacity to pay in rural areas. Hence, in order to assist in jump-starting the market and making the business of electricity generation through agricultural biomass-fired gasifiers attractive to private investors, the project considered the options of either a Loan Guarantee Fund (LGF) or a direct Financial Support Mechanism (FSM).

For a more detailed description of the “Financial Support Mechanism”, please refer to UNDP Prodoc, Section 2 “Strategy”, pages 38 – 43.

**Project Components**

The Ministry of Energy is the central body responsible for, among others, the design, formulation, and implementation of the Government’s policy regarding development, supply and utilisation of energy at the national level. As such, it is entrusted with the responsibility of putting in place policy, plans and programmes that govern the promotion and rational utilisation of energy resources, development of renewable sources of energy and to participate in the promotion of energy sources respectful of the environment. To achieve this, it relies on its Directorate for Energy and can count on the support of other Government Ministries and Department, including the Ministry of the Environment.

This project aims to pioneer a functioning an effective market for the widespread use and commercialisation of agricultural biomass gasifiers in Benin via four interrelated components: 1) development of an appropriate policy, institutional, legal and regulatory framework; 2) a business-friendly climate providing crucial catalytic incentives to promote investment in biomass-based electricity generation; 3) sustainable land and forest management at the commune level; and 4) increased capacity/awareness of stakeholders and private sector investors to adopt agricultural biomass gasification for electricity generation to capitalise on the economic and environmental benefits that it provides. It will focus on agricultural biomass-based gasification technology development and utilisation to substitute for forestry-based biomass and imported fuel used by the majority of Beninese households for domestic or business use. This is proposed to be achieved through the participation of the private sector at both electricity generation level and, in some cases, at the electricity distribution and sale level, as well. This programme will not only benefit household consumers and businesses, but will also connect financial institutions, technical training and local/women organisations to promote the establishment of an agricultural residue supply chain (Fig. 4) to develop the biomass gasification market.



Source: World Bank, 2009.

For a more detailed description of “Project Components”, please refer to UNDP Prodoc Section “Project objective, outcomes and outputs/activities”, pages 45 – 55.

**A.5 INCREMENTAL/ADDITIONAL COST REASONING**

For a detailed description of the Incremental/Additional cost reasoning, please refer to the UNDP Prodoc Sections on “Cost-effectiveness, Sustainability and Replicability”, pages 58 – 61.

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

For a detailed description of “Risks”, please refer to UNDP Prodoc Section on “Key indicators, assumptions and risks”, pages 54 – 58.

**A.7 COORDINATION WITH OTHER RELEVANT GEF-FINANCED INITIATIVES**

For a detailed description under this Section, please refer to UNDP Prodoc Section “Coordination with other relevant GEF-financed initiatives”, pages 62 – 64.

B. additional Information not addressed at PIF Stage:

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

The project will be implemented through the NIM execution modality by theMinistry of Energy, Petroleum, Mineral and Water Resources, and Renewable Energy Development (referred to as Ministry of Energy, in short form). The Ministry will also have responsibility for implementing the companion UNDP-GEF Adaptation Project entitled “Strengthening the resilience of the energy sector in Benin to the impacts of climate change – NAPA Energy”. For this, the Ministry will appoint a National Project Director who will assume overall responsibility for the implementation of both projects, ensure the delivery of project outputs and the judicious use of project resources. The National Project Director will be assisted by a Project Management Unit headed by a Project Manager (PM) and supported by 2 Deputy Project Managers, one each for the Adaptation and Mitigation (Energy) projects. The PM will be responsible for overall project coordination and implementation, consolidation of work plans and project papers, preparation of quarterly progress reports, reporting to the project supervisory bodies, and supervising the work of the project experts and other project staff. The PM will also closely coordinate project activities with relevant Government and other institutions and hold regular consultations with project stakeholders. A non-resident Technical Adviser (26 weeks/year) will be recruited to support the PM on technical issues, while a full-time Project Assistant (PA) will support him/her on administrative and financial matters.

For additional information on “Stakeholder Participation”, please refer to UNDP Prodoc, Section “Management Arrangements”, pages 76 – 77.

**B.2 Describe the socioeconomic benefits to be delivered by the Project at the national and local levels, including consideration of gender dimensions, and how these will support the achievement of global benefits.**

The project will bring about benefits at both local and national/global levels through reduced environmental and human health threats due to less burning of diesel, wood and charcoal, thus reducing negative environmental impacts. Some of the benefits on the long term are listed below:

* Electricity from the mini-grids will provide opportunities for households, mainly women, to pursue income-generating activities requiring an electricity service and extend the hours of school children for homework.
* A rural development dynamism would be generated as farmers will now have a market for their “waste” agricultural residues, thus generating an additional source of income.
* Opportunities for the private sector in job creation for gasifier installation, operation and maintenance. The project will work with local training institutions (e.g. Ecole Polytechnique d'Abomey Calavi, Institut Universitaire de Technologie, Université Africaine de Technologie et de Management, Lycée Technique Coullibaly, Lycée Technique Kpondehou, Lycée Technique de Porto Novo, etc.) to develop technical capacity required by project developers.
* The project will seek to achieve gender equality through the empowerment of women to fully participate in all project activities and specifically those related to capacity development under the various project components.
* Paricipation of civil society, through the involvement of NGOs, including women NGOs**,** and stakeholder consultations, in the decision-making process related to biomass gasifier development, and for information and awareness raising activities.
* 500 jobs will be created in the gasifier/SFM/LD sub-sectors and 5,000 households will benefit from clean, modern electricity services.

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

Within the requested funding of $ 3,872,602, $ 3,700,000 have been allocated for technical assistance and investment-type activities, as per the Logical Framework. The project management allocation is $ 172,602, representing less than 5% of the total budget.

The combined direct (340,399 t CO2) and indirect (1,287,720 t CO2) global benefits of the project have been assessed at almost 1.63 million tCO2 for only the CCM-3 component, corresponding to a unit abatement cost of $ 2.40/tCO2.

Including the associated sustainable forest and land management the project, an additional direct 50,951 tCO2 will be avoided every year: 3,600 tCO2 for classified forest management (output 3.2), 29,351 tCO2 for trees plantation (output 3.3) and 18,000 tCO2 for conservation agriculture. Thus during the 15-year lifetime of the biomass gasifiers, a total of 1,094,253 tCO2 will be avoided as direct global benefit, which mean an investment of $ 3.50 of GEF funds per tCO2.

1. **Describe the Budgeted M & E Plan:**

For additional details, please refer to the UNDP Prodoc, Section 5 “Monitoring and Evaluation”, pages 78 – 82.

A Project Board, as indicated above, will provide overall guidance to project execution. Private sector investors interested in developing business opportunities in biomass gasifier development and other interested parties will be invited to participate in the meetings of the Project Board, as observers, when required.

UNDP will monitor and report on progress in project implementation in accordance with the UNDP Programme Manual and GEF Monitoring and Evaluation (M&E) guidelines. In undertaking this, it will be supported by a National Project Director, to be designated by the Ministry of Energy, a common Adaptation - Mitigation Projects Management Unit (PMU) that will be supported by an international part-time Chief Technical Adviser and the UNDP-GEF Regional Coordination Unit (RCU) in Addis Ababa. The PMU will report on relevant progress to the National Project Director and UNDP on a quarterly basis. Regular monitoring of the project will take place through this reporting mechanism as well as through site visits, as required.

Progress will be measured against targets set out in the Work Plan and indicators defined in the Project Logical Framework. For each of the project components, a detailed monitoring plan will be prepared during project inception. In this connection, a Project Inception workshop will be organized at the start of project activities to review the Logical Framework; specifically detailed means of verification, assumptions, etc. will be revisited and adapted (adaptive project management) as necessary, including measures to track any major project risks and taking into consideration the situation prevailing in the country. These indicators will draw upon all sources of information, including those of other donors active in the communal services field in the country. Appropriate and specific performance benchmarks will be established prior to project implementation to effectively monitor project progress and to make crucial management decisions.

Annual Tripartite Review meetings (TPRs), with the participation of the project team and stakeholders, will be held to review progress, identify problems, and agree on solutions to maintain timely provision of inputs/achievement of results. The Project Board will review annual work plans as well as provide strategic advice on the most effective ways and means of implementation. Reporting to GEF will be accomplished through Annual Project Reviews (APRs) and Project Implementation Reviews (PIRs).

Additionally, the project will be the subject of an independent mid-term review midway through project implementation and a final evaluation at project completion. The independent review/evaluation will assess the relevance, timeliness and impact of project inputs and discuss lessons learned for use in improving the quality of future development interventions with similar activities that could be undertaken in collaboration with other development partners to the project. The results of the final evaluation, incorporating the lessons learned, will be disseminated both within and outside the region. All reports will be posted on the project website.

**part iii: Approval/endorsement by GEF Operational Focal point and GEF agency**

1. **Record of endorsement of GEF Operational Focal Point on Behalf of the Government**

|  |  |  |  |
| --- | --- | --- | --- |
| **NAME** | **POSITION** | **MINISTRY** | **DATE (**mm***/***dd***/***yyyy***)*** |
|  | **Gef Focal Point** | **Ministry of Environment** |  |

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

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| This request has been prepared in accordance with GEF policies and procedures and meets the GEF criteria for CEO Endorsement. | | | | | |
| Agency Coordinator, Agency name | Signature | Date  *(Month, day, year)* | Project Contact Person | Telephone | Email Address |
| Adriana Dinu  UNDP/GEF Executive Coordinator |  |  | Saliou Touré Regional Technical Advisor, EITT | +251 912 503 320 | saliou.toure@undp.org |

**Annex A: Project Results Framework**

An abridged version of the logframe is provided below. However, a complete version can be found in the GEF-UNDP project document.

|  |  |  |  |
| --- | --- | --- | --- |
| **Objective/Outcome** | **Indicator** | **End of Project Target(s)** | **Sources of Verification** |
| To introduce an integrated energy and ecosystems-based approach to sustainable biomass electricity generation in the country. | Emission reduction over the 15-year lifetime of gasifiers.  Biomass-based electricity generation by project end.  Integrated Land Uses Management Plans (ILUMPs) adopted.  Number of ha under SLFM practices.  500 jobs created in the gasifier/SFM/LD sub-sectors. | Biomass-based electricity generation of 76,651 MWh.  Direct reduction of 67,070 tons of CO2 over the 5-year FSP project life cycle. Subsequent generation of 24,498 MWh/year and reduction of 340,399 tons of CO2 over the 15-year lifetime of the plants.  Cumulative indirect GHG emission reduction of almost 1.3 million tons of CO2 by 2035.  At least 4 ILUMPs for project sites have been successfully developed, adopted (endorsed) by communes and under implementation.  At least an enhancement of 72,000 tCO2 during the 20-year lifetime.  At least 587,030 tCO2 sequestered during the 20-year lifetime.  At least 9,000 ha are under SALM practices.  At least 200 jobs created for technicians to install, operate and maintain gasifiers and 300 permanent jobs for other operations. | Project’s annual reports, GHG monitoring and verification reports.  Project final evaluation report. |
| **Outcome 1:** Streamlined and comprehensive market-oriented energy policy and legal/regulatory framework for biomass electricity generation by Independent Power Producers (IPPs). | Existence of adequate policy and regulatory framework. | Completed within 12 months of project initiation and approved by Government early in Year 2. | Published documents. Government decrees/laws. |
| **Outcome 2:** Increased investment in clean energy technologies and low-carbon practices in the agro-forestry waste sector. | Investment in biomass gasifiers taking place. | Completed within 12 months of project initiation and applied by Government thereafter.  $ 15 million invested in clean energy projects by project end. | Project documentation.  Project reports. |
| **Outcome 3:** Integrated land use, sustainable forest management and natural resource management provide social benefits and sustain biomass for electricity production. | a. Carbon stock enhanced in the forests.  b. Number of ha under SALM practices.  c. CO2 sequestration with trees plantation. | At least an enhancement of 72,000 tCO2 during the 20-year lifetime.  At least 587,030 tCO2 sequestered during the 20-year lifetime.  At least 9,000 ha are under SALM practices. | Project’s yearly reports.  Project site visits and evaluation for verification  Monitoring scheme. |
| **Outcome 4:** Outreach programme and dissemination of project experience/best practices/lessons learned for replication throughout the country/region. | Awareness about biomass gasifiers and their possibilities. | Increased awareness among stakeholders in place to promote and develop the market for biomass-based electricity generation. | Project final report and web site. |

**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)

**Responses to Council recommendations**

|  |  |  |
| --- | --- | --- |
| **Comment** | **Response** | **Reference** |
| *Germany’s Comments*  *Germany approves the following PIF in the work program but asks that the following comments are taken into account:*  Suggestions for improvement to be made during the drafting of the final project proposal:  We welcome the proposed project and its objective to reduce the impacts of climate change and variability on Benin’s energy sector.  **.** Regarding other relevant projects, we are pleased to see that the proposed project plans to build on various initiatives. The PIF lists the Program for the Decentralisation and Local Development (PDDC), the implementation of which is assisted by GIZ on behalf of the Federal Ministry of Economic Cooperation and Development (BMZ), as one of the planned baseline projects. The program’s “Rural Area Electrification” component is an EU Energy Facility by the co-financing with contributions by the Federal Ministry of Economic Cooperation and Development (BMZ), the French Agency for Development (AFD) and the Energising Development (EnDev) programme. The main objective of this component is to connect 105 rural villages to the power grid. In this context, the program also supports the Beninese Society for Electric Energy (SBEE) and the Beninese Agency for Rural Electrification and Prime Contracting (ABERME) in optimizing the planning processes, particularly in terms of cost-benefit optimization and low-cost technologies. In general, adding a climate-sensitive component to the GEOSIM tool seems reasonable and worth promoting. It would however be desirable that the initiative be embedded into the ongoing sector dialogue as well as the sector strategy which is currently being elaborated by the Ministry of Energy. We therefore recommend initiating inclusion into these processes as soon as possible, in order to ensure that the initiative can be anchored into the SBEE and ABERME proceedings in a sustainable manner. | The project will be anchored with the Ministry of Energy and will work directly with SBEE and ABERME, all of which are directly involved in the “Rural Areas Electrification” component of the EU Energy Facility. In addition, steps will be taken for the project to plug into GEOSIM, the powerful GIS-based planning tool that is already in use in Benin. |  |

**Responses to STAP recommendations**

|  |  |  |
| --- | --- | --- |
| **Comment** | **Response** | **Reference** |
| 1. STAP welcomes this project which addresses electricity regulations and grid integration from bioenergy power plants and capacity building across a wide range of stakeholders. Financing of 4 MW capacity is planned and a 1MWe gasifier demonstration plant is to be established. Biomass forest feedstock are to be managed sustainably.  2. With only a quarter of the population having access to electricity, either imported or from costly fuel oil plants at a very high USD 0.40/kWh generation cost, developing bioenergy plants will assist rural electrification. But deforestation has to be strictly controlled and must not be used to supply the biomass.  The UNEP/GEF guidelines on Biofuels can provide useful guidance in this regard (even though they target liquid biofuels rather than solid biomass).  3. The carbon balances from LD and SFM are complex and difficult to assess, but the use of residues avoiding deforestation and the encouragement of afforestation are major contributors.  4. Agricultural residues are proposed as a feedstock for bioenergy. There is apparently a large resource of residues from maize, with substantial amounts also from sorghum and cotton. To assess the sustainability of using these residues for bioenergy it is necessary to determine their current use. For example, if they are currently burned in the field, then their use for energy is not likely to have a detrimental effect on soil carbon levels or crop production. However if they are retained in the field as mulch, their removal could reduce yields due to loss of soil moisture and higher soil temperature, and increase risk of soil erosion. If they are gathered and used for fuel, then there is a potential leakage issue unless the proposed bioenergy plant will provide a suitable alternative energy product to those affected. Thus, it is important to determine the conventional use of the agricultural residues in order to assess and manage the likely impacts of residue removal.  5. Sustainable land management encourages the retention of residues, to enhance soil properties and productivity and resilience of agricultural production, and minimise erosion and soil carbon losses. Thus it is important that a new demand for biomass for bioenergy does not jeopardise the implementation of sustainable land management. The quantity of residue that should be retained will depend on the soil type and landscape position (which determine erosion risk). Education on the benefits to production from SLM is more likely an effective strategy than regulation, to encourage sustainable use of agricultural residues for bioenergy.  6. Agricultural residues could provide useful biomass feedstock for the proposed 400 kWe gasifier if carefully managed. Low moisture content of biomass is essential for efficient gasification. The GEF project is to seek finance models for similar plants and to increase the capacity of this demonstration plant to 1 MW.  Technically this is not easy, other than by adding multi-gasifiers in addition to the existing plant. It is not usually possible to retrofit an existing gasifier to increase its capacity. The challenges in operating and maintaining a gasifier should not be under-estimated and the experience from India in particular could be useful in this respect, though it is noted that experiences from other African countries are being sought.  7. The design, type and manufacturer of the gasifier is not described and seems has already been selected for the demonstration plant under construction. It is hoped due diligence was undertaken in this regard as plants vary widely in efficiency and reliability, particularly with respect to tar formation.  8. Integrating the generation plant into an existing grid can be challenging as a gasifier output cannot be easily ramped up and down to meet ever-changing loads as can hydropower (i.e., it is non-dispatchable). It is therefore possibly easier to run it continually as base load or possibly for periods during the day to meet higher load demand.  9. Calculations suggest that avoided CO2 from the bio-power plant assumes the power generated  displaces a portion of the current thermal power plant output. However, with continuing growth in demand and expansion of rural electrification, this will be additional generation but it is a form of low-carbon generation so should be supported.  10. Overall, the project will need to develop an appropriate M&E framework to assess project performance against agreed targets.  11. In the PIF it is noted that 75% of Benin's population do not have access to electricity. In addition to biomass energy, mini and micro-hydro and PV could be important technologies to increase access to electricity. Project proponents are recommended to consider specific incentives supporting on-grid and, particularly, off-grid RETs beyond biomass. Such support could be appropriate for policy component 1. | 1. During the 5-year project period, a total of 4 MW of biomass gasifier electricity generators will be installed, as outlined in the PIF.  2. The project proposes to exclusively utilise agricultural biomass that is left over after other uses like soil strengthening, fuel for cooking, raw material for hedges, etc. Available data show that there is a subsequent excess of “nuisance” agricultural residues that annually get disposed of. No active “forestry” biomass will be utilised to power the gasifiers. Specific plantations will be established, if required, in the neighbourhood of the power plants for (i) sustainable biomass supply, (ii) restoration of degraded lands, and (iii) incomes generating for households.  3. The project will support both afforestation and forest conservation in the commune where power plants will be established. The plantation of 5 million trees will stock 29,351 tCO2 per year. The improvement of SFM through development of wildfires practices will avoid the emission of 3,600 tCO2 every year.  4. Present usage of agricultural biomass has been assessed and there is more ample excess “nuisance” agricultural biomass for utilisation in the gasifiers.  5. The project will start with the development of integrated land uses at the commune level which integrate the demand of biomass for electricity generation. Then SLFM activities will enhance biomass production with (i) increase of crop productivity thanks to SALM practices implementation and (ii) reforestation of 500 ha per pilot sites. The approach for dissemination of SLFM practices is based on a training approach to raise education on the opportunity to implement SLM for land conservation and additional income generation.  6. The project will solicit expertise from countries like Brazil, Burundi, China, India, Indonesia, Philippines, etc. where there is a wealth of experience with gasifiers. In addition, the private sector investors will make their own decisions as to single- or multiple-unit biomass gasifiers they wish to install.  7. No selection of gasifier has been made and no recommendation is made regarding the gasifier type or manufacturer. While the project will advise private sector developers on the best designs/types available, it will be exclusively decision of the private sector to select the gasifiers it wishes to procure and install.  8. The gasifiers will run continuously as base-load plants, except for scheduled maintenance and repairs. For peak loads, either hydro or diesel generation will step in.  9. This is correct. Where the SBEE grid is available, the gasifier-generated electricity will be connected to the grid. Where there is no grid, the gasifiers will operated in isolated-grid mode.  10. This will be undertaken and is described in the project document.  11. As indicated in the RCE, Benin’s Second National Communication (June 2011) recommends the installation hydropower plants (147 MW), biomass plants (30 MW), solar plants (25 MW), and wind plants (10 MW) by 2030 in an effort to reverse the increasing trend in GHG emissions in the country. All these options are being/proposed to be pursued by the Government. |  |

**Annex C: status of implementation of project preparation activities and the use of funds**

1. **explain if the PPG objective has been achieved through the PPG activities undertaken.**

The PPG objective of formulating detailed Project Document has been achieved. The project formulation was done through consultations involving a range of stakeholders. Consultative activities were taken up through individual interviews with stakeholders and workshop (Problem/solution analysis and Log frame Workshop).

1. **describe findings that might affect the project design or any concerns on project implementation, if any:**

N/A

**C. Provide detailed funding amount of the PPG activities and their implementation status in the table below:**

The activities achieved during PPG are shown in the table below:

| ***Project Preparation Activities*** | ***Implementation Status*** | ***GEF Amount ($)*** | | | | ***Co-financing***  ***($)*** |
| --- | --- | --- | --- | --- | --- | --- |
| ***Amount Approved*** | ***Amount Spent to date*** | ***Amount Committed*** | ***Uncommitted Amount\**** |
| Collection and analysis of baseline data including comparative review of other countries under similar conditions and circumstances | Completed | 40,000 | 40,000 |  |  | 30,000 |
| Review of experiences in Benin and other countries of the following:   * Application of biomass electricity generation * Land use and forestry * Area/community-based energy needs assessment and planning | Completed | 15,000 | 15,000 |  |  | 15,000 |
| Conduct a Logical Framework Analysis (LFA) to define project goal, objectives, outcomes, outputs and activities, including success indicators as well as delineation of responsibilities and coordination mechanisms | Completed | 15,000 | 15,000 |  |  | 10,000 |
| Stakeholder engagement, capacity needs assessment of key local implementing partners and co-financing | Completed | 20,000 | 20,000 |  |  | 10,000 |
| Detailed design of project implementation plan | Completed | 10,000 | 10,000 |  |  | 5,000 |
| Preparation and finalization of the full-sized Project Document | Completed | 0 | 0 |  |  | 10,000 |
| **Total** |  | **100,000** | **100,000** |  |  | **80,000** |

\*Any uncommitted amounts should be returned to the GEF Trust Fund. This is not a physical transfer of money, but achieved

through reporting and netting out from disbursement request to Trustee. Please indicate expected date of refund transaction to Trustee. N/A

1. TA includes capacity building, and research and development. [↑](#footnote-ref-1)
2. Renewable Biomass implies biomass originating from agricultural and forestry residues. This is in opposition to non-renewable biomass, generated from tree cutting and active deforestation. [↑](#footnote-ref-2)
3. To be calculated as percent of subtotal. [↑](#footnote-ref-3)