

Concept Note

Hybridization of thermal power plants of electricity production with solar photovoltaic in Guinea Bissau

Banque Ouest Africaine de Développement (BOAD)| Guinea Bissau

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Concept Note

Project/Programme Title: Hybridization of thermal power plants of electricity production with solar photovoltaic in Guinea Bissau

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Notes

- The maximum number of pages should **not exceed 12 pages**, excluding annexes. Proposals exceeding the prescribed length will not be assessed within the indicative service standard time of 30 days.
- As per the Information Disclosure Policy, the concept note, and additional documents provided to the Secretariat can be disclosed unless marked by the Accredited Entity(ies) (or NDAs) as confidential.
- The relevant National Designated Authority(ies) will be informed by the Secretariat of the concept note upon receipt.
- NDA can also submit the concept note directly with or without an identified accredited entity at this stage. In this case, they can leave blank the section related to the accredited entity. The Secretariat will inform the accredited entity(ies) nominated by the NDA, if any.
- Accredited Entities and/or NDAs are encouraged to submit a Concept Note before making a request for project preparation support from the Project Preparation Facility (PPF).
- Further information on GCF concept note preparation can be found on GCF website [Funding Projects Fine Print](#).

A. Project/Programme Summary (max. 1 page)			
A.1. Project or programme	<input checked="" type="checkbox"/> Project <input type="checkbox"/> Programme	A.2. Public or private sector	<input checked="" type="checkbox"/> Public sector <input type="checkbox"/> Private sector
A.3. Is the CN submitted in response to an RFP?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> If yes, specify the RFP: _____	A.4. Confidentiality¹	<input type="checkbox"/> Confidential <input checked="" type="checkbox"/> Not confidential
A.5. Indicate the result areas for the project/programme	<p>Mitigation: Reduced emissions from:</p> <input checked="" type="checkbox"/> Energy access and power generation <input type="checkbox"/> Low emission transport <input type="checkbox"/> Buildings, cities and industries and appliances <input type="checkbox"/> Forestry and land use <p>Adaptation: Increased resilience of:</p> <input checked="" type="checkbox"/> Most vulnerable people and communities <input type="checkbox"/> Health and well-being, and food and water security <input type="checkbox"/> Infrastructure and built environment <input type="checkbox"/> Ecosystem and ecosystem services		
A.6. Estimated mitigation impact (tCO₂eq over lifespan)	945,520 tonnes of CO ₂ equivalent over 20 years (47, 27629 tonnes of CO ₂ equivalent per year).	A.7. Estimated adaptation impact (number of direct beneficiaries and % of population)	At least 35 000 persons
A.8. Indicative total project cost (GCF + co-finance)	Amount: USD 15 340 750	A.9. Indicative GCF funding requested	Amount: USD 8 910 750
A.10. Mark the type of financial instrument requested for the GCF funding	<input checked="" type="checkbox"/> Grant <input type="checkbox"/> Reimbursable grant <input type="checkbox"/> Guarantees <input type="checkbox"/> Equity <input type="checkbox"/> Subordinated loan <input type="checkbox"/> Senior Loan <input type="checkbox"/> Other: specify _____		
A.11. Estimated duration of project/ programme:	a) disbursement period: 3 year b) repayment period, if applicable: _____	A.12. Estimated project/ Programme lifespan	This refers to the total period over which the investment is effective 20 years
A.13. Is funding from the Project Preparation Facility requested?²	Yes <input type="checkbox"/> No <input type="checkbox"/> Other support received <input type="checkbox"/> If so, by who: _____	A.14. ESS category³	<input type="checkbox"/> A or I-1 <input checked="" type="checkbox"/> B or I-2 <input type="checkbox"/> C or I-3
A.15. Is the CN aligned with your accreditation standard?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	A.16. Has the CN been shared with the NDA?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
A.17. AMA signed (if submitted by AE)	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> If no, specify the status of AMA negotiations and expected date of signing: _____	A.18. Is the CN included in the Entity Work Programme?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
A.19. Project/Programme rationale, objectives and approach of programme/project (max 100 words)	<p>Brief summary of the problem statement and climate rationale, objective and selected implementation approach, including the executing entity(ies) and other implementing partners.</p> <p>The situation in the electricity sector is characterized by a structurally flawed service, both in quantity and quality, due to the obsolescence of production, the intermittency of electricity production and the high dependence on imported oil in a context of scarce</p>		

¹ Concept notes (or sections of) not marked as confidential may be published in accordance with the Information Disclosure Policy ([Decision B.12/35](#)) and the Review of the Initial Proposal Approval Process ([Decision B.17/18](#)).

² See [here](#) for access to project preparation support request template and guidelines

³ Refer to the Fund's environmental and social safeguards ([Decision B.07/02](#))

	<p>financial resources. Only a small proportion of the population has access to electricity: the national electrification rate is estimated at 19%. This sector is the second largest GHG emitter (156.81 Gg of CO₂e in 2011). The project aims to improve access to electricity and contribute to the reduction of GHG emissions through the hybridization of thermal power stations with solar energy. The accredited entity is BOAD and the project will be executed by the Ministry of Energy.</p>
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B. Project/Programme Information (max. 8 pages)

B.1. Context and baseline (max. 2 pages)

Describe the climate vulnerabilities and impacts, GHG emissions profile, and mitigation and adaptation needs that the prospective intervention is envisaged to address.

The energy situation in Guinea Bissau is mainly characterized by a very disproportionate and insufficient access to energy services, depending on whether it is urban or rural, on the one hand, and on the other, by an institutional and regulatory framework non propice to the development of the electricity subsector.

The untimely power cuts mean that most of the urban population uses personal generators to provide electrical energy needs in homes. At the same time, the current regulatory framework does not liberalize the transport and sale of electricity. The sector is held by the national electricity company EAGB. If its power generation capacity has been limited for a long time, the country has just made an effort with the support of BOAD to endow the capital and two other cities with 20MW solar power plants. While efforts are underway in the capital Bissau, it should be noted that the groups in most other cities are outdated, fuel consumers. In a few cities, old thermal groups are being replaced. However, the question of greenhouse gas emissions and the financial means to obtain fuel will always arise.

According to the NAPA (2011), Guinea Bissau remains entirely dependent on imports of petroleum products for the production of electrical energy. In terms of emissions, this sector is the second largest emitter of CO₂ after the forestry sector. At the national level, out of a total emission in 2011 of 3,780.81 Gg of CO₂ equivalent, 156.81 Gg of CO₂ comes from the energy sector. Although data are not available, emissions from the electricity sector are increasing with the increase in thermal generation. Hybridization of thermal power plants installed in cities will help reduce production costs in the medium and long term, which will affect the cost of the kilowatt and the competitiveness of national companies. This action will help reduce GHG emissions from electricity production and contribute to achieving the objectives set by the National Determined Contribution (NDC) document. The NDC plans to increase the share of renewable energy in the energy mix to 80% by 2030.

This project "Hybridization of thermal power generation plants by solar PV plants" aims overall to promote sustainable production and consumption of low-carbon energy and promote the development of energy efficiency. On the one hand, the project plans to strengthen the resilience of agriculture through solar energy in rural areas by hybridizing 18 small thermal power plants with solar systems and promoting solar pumps for small irrigations around targeted cities. In total, the hybrid project 4 generators of 500 kVA, and 12 generators of 250 kVA. On the other hand, it aims to strengthen the current institutional and regulatory framework by reforming the environment of the electricity sub-sector through timely and reliable technical assistance.

The aim of this project is therefore to hybridize the thermal groups and to reinforce the clean energy production in the majority of the cities that are in a precarious situation with regard to electricity.

Please indicate how the project fits in with the country's national priorities and its full ownership of the concept. Is the project/programme directly contributing to the country's INDC/NDC or national climate strategies or other plans such as NAMAs, NAPs or equivalent? If so, please describe which priorities identified in these documents the proposed project is aiming to address and/or improve.

The proposed project aligns well with the following national climate strategy and mitigation / adaptation priorities: (i) Nationally determined contribution (NDC); (ii) National Adaptation Climate Change Action Plan (NAPA).

The National Determined Contribution (NDC) developed in September 2015 aims to mitigate the country's greenhouse gas emissions by focusing on the following three areas: i) Create and plan a new forest policy. The vision is that of sustainable management of forest resources - including through the conservation and restoration of forests - to improve a socio-economic balance that meets the needs of communities and ensures their accountability; ii) carry out studies on the country's energy potential and the development of energy integrating the best possible opportunities for renewable energies into the energy mix; (iii) develop and implement a legal framework through a national long-term low-carbon development strategy. In the energy sector, the country has set ambitious targets to achieve 80% renewable energy in the national energy mix in 2030; reduce energy wastage losses by up to 10% in the 2030 time interval; provide

universal access to electricity at 80% by 2030 (NDC Guinea Bissau, 2015). These changes are aimed primarily at improving the living conditions and increasing the food security of rural populations in order to increase their adaptability, reducing pressure on forest and fisheries resources and improving access to drinking water for human and animal consumption. The proposed project through the hybridization of thermal groups with solar photovoltaic energy contributes to the objectives of the CDN. In total, the hybridization with solar will result in the reduction of emissions of 47 27629 tonnes of CO₂ equivalent per year, or 945,520 tonnes of CO₂ equivalent over 20 years.

Describe the main root causes and barriers (social, gender, fiscal, regulatory, technological, financial, ecological, institutional, etc.) that need to be addressed.

Low electricity coverage rate: In Guinea Bissau, the electricity service is still very inaccessible. Only 7% of the population has access to electricity, with a marked imbalance between cities and the countryside. The access rate to electricity would be 46% in the capital Bissau in 2010. The situation of electrification inside Guinea-Bissau is as follows: only 16 localities are electrified against 3763 not electrified. The geographic electrification rate, excluding Bissau, is around 0.4%. The Biombo region has the highest rate of geographic electrification with 1.54%. The regions of Cacheu and Oio hold respective rates of 0.82% and 0.70%. One of the consequences of the low level of access to electricity is the low level of total and per capita energy consumption. This situation hampers the development of the country's socio-economic activities.

Production infrastructure and antique electricity distribution generating significant losses: The energy crisis in Guinea Bissau is also partly due to the obsolescence of the production facilities and the electricity grid leading in recent years to rationing the supply of electricity to the population. The dilapidated nature of the generating fleet results in low plant availability, with recurrent and costly breakdowns in repair as well as high levels of specific consumption. As an indication, Guinea Bissau has an obsolete electricity network of 92 km Medium Voltage of lines and mainly limited to the capital Bissau with an installed capacity of 16 MW (including a 15 MW availability). The transmission and distribution network is characterized by a lack of maintenance with very high technical losses. As proof, the 15 MW thermal power plant available in Bissau has losses ranging from 20% to 30%; which leads to regular cuts. The distribution of electricity also suffers from the weakness or the absence of metering devices at the customer's premises which do not make it possible to secure the income of the operator.

Technology supply chain: The technology supply chain for RE in Guinea-Bissau is at a very nascent stage. There are a few local SMEs capable of assembling simple RE installations based on imported machinery, but they lack the technical and engineering capacities to ensure optimal system design, installation and maintenance. In the rural areas, there is only very limited local technical expertise available on how to properly administer, operate and maintain RE based mini-grids. The low quality and quantity of skilled and competent workers in the power sector adds additional risks and increases the cost of mini-grid operation due to the need to rely on expensive imported services even for basic repair and maintenance.

Access to capital: significant upfront investment requirements remain a roadblock for implementation of many projects. RE projects are capital-intensive, with significant investment requirements that are generally beyond the capacity of local companies or communities. In addition, the local banking sector is not sufficiently capitalized to facilitate financing for RE projects with longer pay-back and substantial risks. The lack of financial support and the absence of an incentive framework prevents this sector from playing its full role.

Low technical capacity: Delays in project implementation are also due to weak project management capacity at the country level, but also to technical difficulties in the project implementation phase. The implementation of renewable energy projects requires a high level of knowledge about technologies. Therefore, it is necessary to train actors in the development and implementation of renewable energy projects.

Where relevant, and particularly for private sector project/programme, please describe the key characteristics and dynamics of the sector or market in which the project/programme will operate.

B.2. Project/Programme description (max. 3 pages)

Describe the expected set of components/outputs and subcomponents/activities to address the above barriers identified that will lead to the expected outcomes.

The project has the following components and activities :

Component 1: Strengthening the regulatory, policy and institutional framework for the promotion of renewable energies and peri-urban and urban electrification

There will be talk of revising appropriate policies and regulations for renewable energies with a focus on solar and small hydropower in rural electrification; review the country's Energy Master Plan and include renewable energies with socio-economic and climate considerations and formulate and recommend a liberalized institutional framework for the

promotion of renewable energies including institutional mechanisms.

Component 2: Technical capacity building (knowledge and technical capacity for project development) and support to the public (central and local) and private sectors to provide the best quality of service in peri-urban and urban areas

For this component, in practice, it will be a question of setting up training programs in planning and evaluation on renewable energy as well as design; the implementation and maintenance of hybrid diesel / PV plants for regional, national and private actors and technical staff. In order to strengthen the capacity of the actors, a national planning workshop will be organized in Bissau and six regional technical training workshops for the design and implementation of hybrid system maintenance. Changes in mentality and habit in the adoption of new technologies require communication and awareness actions. As a result, flyers and TV and radio programs will be organized to boost the promotion of renewable energies and hybrid diesel / P. This communication strategy will also be adopted to inform and sensitize the population on the improvement of the environment and the social benefits of renewable energy. It will also focus on raising awareness through local events, village-based consultations and meetings as a platform to educate rural communities about the benefits of solar energy; possibly 1 tailor-made event in each of the 6 regions. A strategy for the private sector to develop business plans and access loans to expand their business will also be developed.

Component 3: Application Deployment of Hybrid Solar Energy Technologies in 16 Localities

In this component, it will be a question of validating the drawings and implementation plans for the demonstration of the commercial applications of solar technologies by the stakeholders; establish operational teams for demonstration projects in five pilot locations; to install and operationalize hybrid solar / diesel PV demonstration systems of 500 KVA / PV and 250 KVA / PV in 16 localities including 12 localities for 250 KVA / PV installations and 4 localities for 500 KVA / PV; install 18 solar pump kits for irrigation and drinking water supply; to increase the number of young people trained and employed in rural electrification projects.

Component 4: Knowledge Sharing, Monitoring and Evaluation and Dissemination of lessons learned

The establishment of a monitoring and evaluation system for the results of this project, integrating the assessment of environmental and socio-economic benefits is the strategic point of this component. It will also be a question of independently evaluating the project by an external consulting firm; evaluate lessons learned and recommendations regarding the impact of hybrid solar / diesel technologies on rural livelihoods as input to support other similar projects. Particular emphasis will be placed on sharing experiences gained from this project with all national entities and preparing the deployment project to ensure implementation of lessons learned and recommendations.

In terms of rationale, please describe the theory of change and provide information on how it serves to shift the development pathway toward a more low-emissions and/or climate resilient direction, in line with the Fund's goals and objectives.

In general, Guinea Bissau is characterized mainly by irregular access to energy services, especially in rural areas. This project, with emphasis on the hybridization of thermal power generation plants by PV solar power plants, will make it possible to change the paradigm in terms of access to energy permanently by beneficiaries but also in a sustainable way and less expensive. Strengthening the regulatory, policy and institutional framework for the promotion of renewable energies and peri-urban and urban electrification will allow for the revision of appropriate renewable energy regulations and policies with a focus on solar and small scale hydropower in rural electrification. This will significantly change the vision and orientation of energy stakeholders in terms of energy development and taking into account socio-economic and climatic issues in the development of energy projects.

The participatory and formative approach advocated by this project will support and respond to the aspirations of the beneficiaries. In terms of mitigation, the project will make a huge contribution to reducing greenhouse gas emissions. One of the innovations of this project is also the ease of implementation of solar technology and the diversification of project effects (access to electricity and water). The project's actions are therefore not limited only to access to clean energy. They also promote low-carbon development activities that have a strong impact in improving the standard of living of the beneficiaries. This project will strengthen the regulatory framework by improving the business and market environment in the RE sector in Guinea Bissau.

Describe how activities in the proposal are consistent with national regulatory and legal framework, if applicable.

The activities of this project are consistent with the current legislative and regulatory framework of the country defined by the following texts: (i) Law L / 92/043 of 08 February 1992 on the code of economic activities and allowing the privatization of the exploitation the public electricity service; (ii) Law L / 93/039 / CTRN of 13 September 1993 regulating the production of the transmission and distribution of electric energy and which grants the State-owned electricity company the monopoly of production activities, transport and distribution, and entrusts the regulatory function of the sub-sector to the Ministry of Hydraulics and Energy; (iii) Law L / 98/012 / of 1 June 1998 on the financing, construction, operation, maintenance and transfer of production infrastructure developed by private operators (BOT Act); (iv) Law L / 2001/18 / of 23 October 2001 on the adoption and promulgation of the State Enterprises Reform and Disengagement

Act.

Describe in what way the Accredited Entity(ies) is well placed to undertake the planned activities and what will be the implementation arrangements with the executing entity(ies) and implementing partners.

The accredited entity carrying this project is BOAD. It advocates the low-carbon development of member countries. The activities developed in this project are in line with one of the bank's flagship areas of financing, namely basic infrastructure and modern infrastructure. BOAD has just financed a 20 MW solar project in Bissau. This project is subject to GEF funding to take into account, in part, the most urgent energy needs in Guinea Bissau.

Please provide a brief overview of the key financial and operational risks and any mitigation measures identified at this stage.

Type of risk	Risks	Level of risk	Proposed mitigation measures
Political risk	The lack of political support may jeopardize the achievement of immediate outcomes and the impact of the project	Low	Initial consultations with the Government of Guinea Bissau have indicated interest and willingness to promote solar energy. Strong political support is provided to the project.
Technical risk	Solar systems based on individual kits or mini-networks are not technically viable for the production of electricity	Weak	These technologies of solar energy in isolated site are mature and have demonstrated their effectiveness in the context of the Decentralized Rural Electrification Project. During the operational phase, strengthening the capacities of the actors of the project and the beneficiaries will mitigate this risk.
Economic risk	The purchasing power of people in the project area does not allow the population to subscribe to the fixed rate scheme for electric energy consumption	Medium	Access to electricity in rural areas will enable the beneficiaries, mainly women, to carry out income-generating activities. Financially, the population having agriculture as main source of income will benefit from the opportunity to add value to agricultural products, through their transformation thanks to available clean energy. On the organizational level, the establishment of a local cell of the hybridized platforms management will be useful
Risk of lack of co-financing	The co-financing of 18 million US\$ equivalent, could not be materialized	Weak	The cost of the project is considered to be a counterpart of the hybridization project (20 MW) already undertaken by BOAD in Bissau.
Socio-cultural risk	The rate of acquisition of solar kits will be affected by the sudden change of traditional practices.	Weak	This risk will be mitigated by the sensitization

B.3. Expected project results aligned with the GCF investment criteria (max. 3 pages)

The GCF is directed to make a significant and ambitious contribution to the global efforts towards attaining the goals set by the international community to combat climate change, and promoting the paradigm shift towards low-emission and climate-resilient development pathways by limiting or reducing greenhouse gas emissions and adapting to the impacts of climate change.

GCF core indicators	<i>Expected tons of carbon dioxide equivalent (t CO₂ eq.) to be reduced or avoided (Mitigation only)</i>	47 27629 t CO ₂ eq per year or 945 520 t CO ₂ eq over 20 years
	<i>Expected total number of direct and indirect beneficiaries (reduced vulnerability or increased resilience); number of beneficiaries relative to total population (adaptation only)</i>	35,000 direct beneficiaries of which 51% are women 100,000 indirect beneficiaries of which 51% are women
Other relevant indicators	<i>Expected increase in the number of households with access to low-emission energy</i>	5 000
	<i>Expected increase in generation and use of climate information in decision-making</i>	80%

Provide an estimate of the expected impacts aligned with the GCF investment criteria: impact potential, paradigm shift, sustainable development, needs of recipients, country ownership, and efficiency and effectiveness.

1. Impact potential.

The project is fully consistent with the Green Fund's climate change mitigation goal. Component 3: "Deployment of Hybrid Solar Energy Applications in 16 Localities" will develop small irrigation and hybridize 16 thermal groups with small solar photovoltaic plants. This would avoid 47 27629 t CO₂ eq per year or 945 520 t CO₂ eq over 20 years.

The population of Guinea Bissau, according to data from the National Institute of Statistics (INEC) based on the last census of 2009, estimated at 1,548,159 inhabitants. The project will operate in 16 localities including 4 for 500KVA / PV installations and 12 localities for 250KVA / PV installations. Considering that the 500KVA installations will serve an average of 5,000 inhabitants and the 250KVA / PV installations will serve an average of 1,000 inhabitants, the direct beneficiaries of the hybridization will be around 32,000. Added to this are the beneficiaries of capacity building activities including young entrepreneurs, distribution of solar kits for the development of small irrigation, the installation of solar kits for the supply of drinking water. These can be estimated at 3,000 people. The number of beneficiaries of the project is therefore 35,000 people. Indirect beneficiaries are estimated at more than 500 000 inhabitants.

2. Paradigm shift potentiel

- **Potential for scaling-up and replication (e.g. multiples of initial impact size)**

This project was proposed to promote sustainable development of renewable energy in the most important cities of the regions with the poor who do not have essential infrastructure. It also aims to strengthen the resilience of beneficiaries in the drought by providing water for irrigation for small peri-against-season crops, market gardening and potable drinking water. The innovation of this project lies in the ease of implementation of solar technology and the diversification of project effects (access to electricity and water).

The introduction of solar energy in the country's regional cities has enormous potential for replication due to the country's low rural electrification rate. In addition, the improvement of the regulatory framework will allow domestic and international private investors to develop solar energy in other cities in Guinea Bissau. Several activities will be generated and will serve to demonstrate how the approaches and lessons learned can be used in the country and in West Africa. Replicability also comes from the project's ability to clearly demonstrate the financial and social benefits of renewable energy productive uses. The project will demonstrate this revenue stream, generated by benefits for end-users and power generators, through increased payment capacity, in which end users have clear commitments and willingness to pay electricity consumed.

- **Potential for knowledge and learning**

Component 2 of the project aims to raise awareness about renewable energy and specifically technical capacity building activities on solar energy. Capacity building activities involve all actors involved in the project (Government, local government, private operators, local populations, NGOs, independent power producers, etc.). These activities will enable the actors to assimilate the techniques promoted through this project. The sharing of knowledge and lessons learned will be based on the management strategy of a project. Communication by the media including radio broadcasts, public sensitization and the project web site will be promoted. The lessons learned materials will be produced and annual meetings will be organized to share experiences with stakeholders and all stakeholders.

- **Contribution to the creation of an enabling environment**

The project will contribute to the improvement of the environment through the promotion of renewable energy while strengthening the organizational and technical capacities of stakeholders through training and workshops.

- **Contribution to the regulatory framework and policies**

The establishment of a regulatory and institutional framework conducive to the development of renewable energy in the country will allow to move quickly to the use of diesel.

3. Sustainable development potential

- **Economic co-benefits**

The 18 cities will reduce their diesel consumption by more than 2,266,650 liters of diesel per year, or 45,333,000 liters over 20 years. This will result in a gain of more than \$ 761,594 a year and \$ 15.3 million over 20 years and will eliminate the subsidy that was granted by the state for the purchase of fuel. The project will make drinking water more available and allow the increase of off-season agricultural productivity, household income through the implementation of AGR.

- **Social co-benefits**

The promotion of solar energy through capacity building, awareness and dissemination of lessons learned are important social impacts. The implementation of this project will contribute to job creation. It is estimated directly 150 permanent jobs in a new sector that will grow and more than 1000 new indirect jobs. This project will improve the living conditions of the population in the areas targeted by access to drinking water for households, reducing inequalities between the sexes by providing them with equitable access; improving school results. The project will provide access to drinking water for households and also water for irrigating fields. This project will also improve access to information for all and the health of populations by reducing the incidence of respiratory diseases and eye diseases, with low access to

electricity in project areas.

- **Environmental co-benefits**

The hybridization of thermal power generation plants by solar PV plants will contribute to: improving air quality by reducing emissions of nitrogen oxides, non-methane volatile organic compounds and sulfur dioxide from power plants in reverse the proportion of clean energy produced; increase the resilience of the population to climate change through the local use of renewable energies; and contribute to local and global climate change mitigation efforts by meeting electricity needs with clean energy.

- **Gender-sensitive development impact**

Facilitating access to energy will help develop income-generating activities for women. These activities include: processing and preservation (solar drying of fruits, fish and vegetables, jam production and fruit juice), agricultural extension, mentoring groups, beekeeping and sustainable forest management. Increasing women's incomes will improve girls' education. The demand for women at the workplace and their involvement in management committees will be strongly encouraged. The gender equality criterion will be included to give women, youth and adults the opportunity to participate fully in the project. Jobs will be created for women. At least 50% of direct and indirect beneficiaries will be women.

4. Needs of recipient:

- **Level of exposure to climate risks for beneficiary country and groups**

In Guinea Bissau, climate change threatens key sectors of the economy: energy, agriculture, tourism, human settlements and health, water resources, coastal erosion and land use, and so on. Without organized intervention and the expected level of governance of these sectors to meet these challenges, climate change could be very threatening to the country's development. The CDN also recognizes that sector-level measures and initiatives to anticipate and integrate climate change risks and opportunities are limited and deserve more attention and greater human and financial resources. This applies to both climate change adaptation and GHG mitigation. The Guinea-Bissau NAPA concluded that the gradual increase in temperature and reduced rainfall will significantly reduce agricultural productivity and exacerbate water shortages. It is therefore necessary and urgent that the government of Guinea-Bissau take initiatives such as the development of market gardening crops and changes in agricultural systems in order to increase the resilience of its agriculture to climate change and adopt measures to reduce risks in the long term, such as integrating climate change into local development plans, forest management and land use plans and, in general, into development strategies and policies.

With the project in the very poor target area, young people and women can now engage in off-season crop activities that were not possible because of the irregular rains. The entire population will benefit from project activities, especially component 3, which will reduce the dependence of the rural population on imported fossil fuels and reduce the economic shocks of price fluctuations. Project activities on improving the regulatory and legal framework will help develop a local market for food processing and conservation, agriculture / dairy products, which will reduce the economic vulnerability of the rural population. In the intervention area, agriculture is heavily dependent on rainfed production systems. The downward trend in rainfall and rising temperatures result in high evaporation / transpiration, which exacerbates the scarcity of water in the continental areas and its use in production systems during drought seasons (Gabu and Bafata). Reducing access to water is already leading to reduced yields and productivity and increasing food insecurity in the country. For this reason, in addition to the hybridization of diesel generators, the distribution of 18 solar pumps for small irrigation, livestock and household, are aimed at strengthening the resilience of beneficiaries during dry periods that have lasted more and more in recent years.

Needs for strengthening institutions and implementation capacity

At the regulatory and legal level, the main weakness concerns the lack of a specific legislative framework governing renewable energies and energy efficiency indicating the quota or purchase price targets for electricity produced by renewable energies in the mix energy. No quality control is performed on the RE / EE equipment available on the local market.

This lack of a regulatory and legal framework means that private investors, especially private electricity producers, do not find the RE market very attractive in the country. The GCF's donation under the project will create a framework conducive to the development of renewable energy by creating a sustainable investment market.

5. Country ownership:

Coherence and alignment with the country's national climate strategy and priorities in mitigation or adaptation

The project is consistent with the objectives of the National Action Plan for Adaptation to Climate Change (NAPA), the Nationally Determined Contribution (NDC), the National Action Plan for Renewable Energy and Energy Efficiency (SE4ALL) -2030, approved in 2015. The overall objective of this plan is to: (i) ensure universal access to modern energy services by 2030; (ii) double the overall rate of improvement in energy efficiency; and (iii) double the share of renewable energy in the overall energy mix. Specifically, this plan plans to create a favorable environment for renewable energies by) the development of the institutional and regulatory framework, (ii) the establishment of a fund for the promotion of renewable energies to capture and centralize financing for the sub-sector as much as possible; (iv) the inclusion of the solar variant in public energy markets; (v) the exemption of photovoltaic and thermal solar equipment from customs duties and value-added tax (VAT) by introducing tax-related taxation in the field of the use of

renewable energies (Ministry of Energy, n.d).

The National Strategy for Poverty Reduction (DENARP, 2010), has planned to have in 2020 an electricity network that covers 80% of urban centers.

The energy policy proposes to create the conditions for the production and the regular supply of the whole territory of the various forms of energy, tending to ensure the development of the activities related to the domestic sector, the services of the agro-industry to improve good governance through the implementation of rural electrification programs such as: (i) the electrification of 35 localities with more than 300 households per year; and (ii) electrification of 120 villages with more than 150 households per year.

• Brief description of executing entities (e.g. local developers, partners and service providers) along with the roles they will play

Stakeholders	Proposed Role
Ministry of the Environment	Coordination of the entire project; and all aspects of policy design and implementation of climate aspects
Ministry of Energy / DGER	Client of the project; and ensure that project activities are in line with its strategy and master plan
DGER and EAGB	Technical coordination of the project
Ministry of Economy and Finance	Provide guidance on the design phase of financial mechanisms and incentives; assist in the establishment and operationalization of financial mechanisms and incentives
BOAD	Accredited GCF Agency; Approval of project design, evaluation, implementation, supervision and monitoring-evaluation documents; Technical support of the project
Private sector	Provide information on solar technologies, sales services, after sales services, warranties, equipment maintenance; Get incentives to promote solar energy.
International Financial Institutions and International Partners	Synergy and support for exchange of experiences
National Financial Institutions	Financial support for the replication of the project.
Villagers, Local / Rural Organizations and NGOs	Participation in the design and implementation of the project; Participation in awareness campaigns; Sharing knowledge for replication
Municipalities and neighborhoods	Coordination of the whole project at the local level, and all aspects concerning local governance and monitoring / evaluation

• Stakeholder engagement process and feedback received from civil society organizations and other relevant stakeholders

The project is a strong demand from the ministries in charge of energy, agriculture and the environment. Small solar system installers require training to develop their business, especially with regard to standards, sales, after-sales services, guarantees. NGOs will be interested in participating in the design and implementation of the project, awareness campaigns, knowledge sharing.

6. Efficiency and effectiveness:

The project will avoid greenhouse gas emissions in the order of 47 27629 t CO₂ eq per year, or 945 520 t CO₂ eq over 20 years.

Considering GCF funding, US \$ 8,910,750, the cost per ton of CO₂ is US \$ 9.42.

Considering the total project cost, \$ 15,340,750, the cost per ton of CO₂ is \$ 16.25.

Considering the investments of component 3 which concerns hybridization, ie 8,500,000 USD, the cost per ton of CO₂ is \$ 18,89.

B.4. Engagement among the NDA, AE, and/or other relevant stakeholders in the country (max ½ page)

Please describe how engagement among the NDA, AE and/or other relevant stakeholders in the country has taken place and what further engagement will be undertaken as the concept is developed into a funding proposal.

The actors involved in this project are: (i) the Ministry of Environment and Forest Resources; (ii) the Ministry of Energy; (iii) the electricity company of Guinea Bissau; (iv) the Ministry of Economy and Finance; (v) Ministry of Agriculture (vi) West African Development Bank; (vii) national banks; (viii) rural populations; (ix) organizations and NGOs; (x) solar system installation companies; (xi) financial institutions and international partners.

The Ministry of Energy through the rural electrification department will be responsible for the implementation of the

project in collaboration with the Ministry of the Environment. The ministry in charge of energy outside to participate in the coordination of the project will ensure compliance with its strategy. The EAGB will be responsible for monitoring the project based on agreements between project stakeholders. She will be responsible for performing performance tests on the use of hybrid systems and solar pump kits per year.

The Ministry of Economy and Finance will assist in the creation and implementation of financial mechanisms and incentives, as well as national banks.

Mayors and other local elected officials, regional governors are strong seekers of this project for their localities malfunctioning either by the dilapidated thermal groups, or for lack of fuel to run the groups themselves when they are new.

C. Indicative Financing/Cost Information (max. 3 pages)

C.1. Financing by components (max ½ page)

Please provide an estimate of the total cost per component/output and disaggregate by source of financing.

Component/Output	Indicative cost (USD)	GCF financing	Co-financing			
		Amount (USD)	Financial Instrument	Amount (USD)	Financial Instrument	Name of Institutions
Component 1: Strengthening the regulatory, policy and institutional framework for the promotion of renewable energies and peri-urban and urban electrification	1 000 000	1 000 000	Grant	0		
Component 2: Technical capacity building (technical knowledge and capacity for project development) and support to the public (central and local) and private sectors to provide the best quality of service in peri-urban and urban areas	2 500 000	1 500 000	Grant	1 000 000	Loan	BOAD
Component 3: Application Deployment of Hybrid Solar Technologies in 18 Locations	8 500 000	4 000 000	Grant	4 500 000	Loan and Tax	BOAD and Government of Guinea Bissau
Component 4: Knowledge Sharing, Monitoring and Evaluation and Dissemination of lessons learned	1 500 000	1 000 000	Grant	500 000	Loan	BOAD
Project activities cost	13 500 000	7 500 000		6 000 000		
Project management (8,5%)	1 105 000	675 000	Grant	430 000	Loan	BOAD
Total project cost	14 605 000	8 175 000		6 430 000		
Accredited Entity fees (9%)	735 750	735 750				
Indicative total cost (USD)	15 340 750	8 910 750		6 430 000		

For private sector proposal, provide an overview (diagram) of the proposed financing structure.

C.2. Justification of GCF funding request (max. 1 page)

Explain why the Project/ Programme requires GCF funding, i.e. explaining why this is not financed by the public and/ or private sector(s) of the country.

Although solar energy is a clean energy, electricity producers and private investors in Guinea Bissau (Bissau and the regional cities) find the cost of installing solar power plants exorbitant and beyond their reach. They also lack the technical and organizational framework for their promotion. They always prefer the thermal installations they control

better, despite the GHG emissions generated. Indeed, the analysis of the renewable energy sector in Guinea Bissau reveals that the sector is facing financial difficulties. However, energy needs are higher because of population growth. In addition, the high cost of renovation and the fragility of the production and distribution systems are obstacles to the total coverage of electricity needs. The lack of financial support and the absence of an incentive framework prevents this sector from playing its full role. Consumers are not really aware of the benefits of solar energy and are often skeptical about using solar systems because of the acquisition costs they consider important. Establishing a stronger incentive in the energy sector would also facilitate rural electrification planning through public-private partnership, providing access to solar electrification.

Without the mobilization of financial resources from the GCF, the objectives set in the energy sector by the CDN to promote adaptation and mitigation actions would not be achieved in the targeted areas. Unsustainable coping strategies would continue and GHG emissions will continue to increase. Regional administrations and households will continue to bear the burden of remaining fuel bills in the vicious cycle of poverty, fuel poverty, and crop productivity will continue to decline and access to water for irrigation, Livestock and household needs will remain a problem during drought seasons.

Without the project, fuel consumption for Component 2 alone in a baseline scenario is estimated at 45.33 million liters over the next 20 years and a government subsidy of 7.6 billion CFA is expected. Without the financing of the Green Climate Fund, Guinea Bissau will not be able to finance the project and achieve the expected results in terms of mitigation and adaptation to the adverse effects of climate change. The project is in line with the country's strategic plan. It is also aligned with the CDN. The cost of implementing GHG mitigation activities was estimated at USD 200 million in 2020 and USD 500 million between 2020 and 2030 for foreign aid. Without external financial mobilization, private sector interventions in renewable energy development will be limited. The possibility of orienting these actors towards environmentally friendly rural electrification will take generations. The GCF funding for the implementation of this project is therefore necessary.

Describe alternative funding options for the same activities being proposed in the Concept Note, including an analysis of the barriers for the potential beneficiaries to access to finance and the constraints of public and private sources of funding.

Guinea's local capital market in Bissau is not strong enough. Stock markets are non-existent while the domestic market is dominated by institutional investors (such as banks, insurance companies, pension funds) and private investors. 4 commercial banks, 15 agencies and more than 100 microfinance institutions are present in the country, but the high cost of credit and the limited access to financing seriously hampers the entrepreneurial activity, which lacks dynamism. Interest rates are the highest in the region, at between 10 and 14 percent, while about 3 percent of the population has access to banking services. A large informal sector (only 25 per cent of the money in circulation passes through formal financial institutions), poor infrastructure, lack of regulations to guarantee investments and lack of collateral generate enormous problems for development of the financial sector. Meanwhile, institutional investors who are unaware of mitigation and adaptation projects to the effects of climate change and require complex guarantees. Procedures and interest rates of around 13% limit access to loans. In the absence of an incentive regulatory framework and a reliable information system, it is difficult for local governments and households to mobilize financial resources at the national level.

Justify the rationale and level of concessionality of the GCF financial instrument(s) as well as how this will be passed on to the end-users and beneficiaries. Justify why this is the minimum required to make the investment viable and most efficient considering the incremental cost or risk premium of the Project/ Programme (refer to Decisions B.12/17; B.10/03; and B.09/04 for more details). The justification for grants and reimbursable grants is mandatory.

Guinea Bissau is one of the Low Developed Countries (LDCs). The country is heavily indebted. These debts represent 42.1% of GDP⁴ in 2018. These debts have been restructured with the HIPC Initiative. This requires the country to receive authorizations from the International Monetary Fund (IMF) to incur new debts. But the IMF does not allow the country to take high-rate loans even if they are concessional. The IMF prefers grants for the country. This limits Guinea Bissau in its development and particularly in its initiatives to fight against climate change. With regard to climate-related projects, and given the urgency of the needs on the ground, traditional donors in Guinea Bissau are trying to find donations to finance these projects or, at least, to improve the loans they give to the country. The request for a grant to the GCF to finance this project is a must necessity if the country wants to carry out the project.

In the case of private sector proposal, concessional terms should be minimized and justified as per the Guiding principles applicable to the private sector operations (Decision B.05/07).

C.3. Sustainability and replicability of the project (exit strategy) (max. 1 page)

⁴ FMI - World Economic Outlook Database - <http://www.expert-comptable-international.info/fr/pays/>

Please explain how the project/programme sustainability will be ensured in the long run and how this will be monitored, after the project/programme is implemented with support from the GCF and other sources.

At the institutional level, the sustainability of the project will come from the collaboration established between several ministries and the ability to integrate the concept of renewable energy as a means of integrated rural development, which is declared a priority for the Bissau Guinean government as indicated by the master plan of energy.

By improving the policy and regulatory framework to incentivize it, the project will create an enabling environment for private sector investment in renewable energy systems in rural areas well beyond its implementation period. Private sector confidence will also be encouraged by the network of services able to supply and maintain solar equipment and build technical capacity. Adequate capacity and training for local operations and maintenance will be provided to ensure long-term sustainability.

The project, with the expected results, can be replicated in other localities of Guinea Bissau to significantly improve the rate of access to energy services (currently 19%) for low-carbon socio-economic development.

For non-grant instruments, explain how the capital invested will be repaid and over what duration of time.

D. Supporting documents submitted (OPTIONAL)

- Map indicating the location of the project/programme
- Diagram of the theory of change
- Economic and financial model with key assumptions and potential stressed scenarios
- Pre-feasibility study
- Evaluation report of previous project
- Results of environmental and social risk screening

Self-awareness check boxes

Are you aware that the full Funding Proposal and Annexes will require these documents? Yes No

- Feasibility Study
- Environmental and social impact assessment or environmental and social management framework
- Stakeholder consultations at national and project level implementation including with indigenous people if relevant
- Gender assessment and action plan
- Operations and maintenance plan if relevant
- Loan or grant operation manual as appropriate
- Co-financing commitment letters

Are you aware that a funding proposal from an accredited entity without a signed AMA will be reviewed but not sent to the Board for consideration? Yes No