

Scientific and Technical Advisory Panel

The Scientific and Technical Advisory Panel, administered by UNEP, advises the Global Environment Facility
(Version 5)

STAP Scientific and Technical screening of the Project Identification Form (PIF)

Date of screening: April 16, 2014

Screener: Lev Neretin

Panel member validation by: Ralph E. Sims; Annette Cowie
Consultant(s):

I. PIF Information *(Copied from the PIF)*

FULL SIZE PROJECT GEF TRUST FUND

GEF PROJECT ID: 5752

PROJECT DURATION : 5

COUNTRIES : Benin

PROJECT TITLE: Promotion of Sustainable Biomass-based Electricity Generation in Benin

GEF AGENCIES: UNDP

OTHER EXECUTING PARTNERS: Ministry of Energy and Water; Ministry of Environment; Soci t  B ninoise d'nergie Electrique (SBEE); Commune of Kalal 

GEF FOCAL AREA: Multi Focal Area

II. STAP Advisory Response *(see table below for explanation)*

Based on this PIF screening, STAP's advisory response to the GEF Secretariat and GEF Agency(ies):
Consent

III. Further guidance from STAP

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 feedstocks 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 USD0.40/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 feedstocks for the proposed 400kWe 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's 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 baseload " 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.

<i>STAP advisory response</i>	<i>Brief explanation of advisory response and action proposed</i>
1. Consent	<p>STAP acknowledges that on scientific or technical grounds the concept has merit. However, STAP may state its views on the concept emphasizing any issues where the project could be improved.</p> <p>Follow up: The GEF Agency is invited to approach STAP for advice during the development of the project prior to submission of the final document for CEO endorsement.</p>
2. Minor revision required.	<p>STAP has identified specific scientific or technical challenges, omissions or opportunities that should be addressed by the project proponents during project development.</p> <p>Follow up: One or more options are open to STAP and the GEF Agency: (i) GEF Agency should discuss the issues with STAP to clarify them and possible solutions. (ii) In its request for CEO endorsement, the GEF Agency will report on actions taken in response to STAP's recommended actions.</p>
3. Major revision required	<p>STAP has identified significant scientific or technical challenges or omissions in the PIF and recommends significant improvements to project design.</p> <p>Follow-up: (i) The Agency should request that the project undergo a STAP review prior to CEO endorsement, at a point in time when the particular scientific or technical issue is sufficiently developed to be reviewed, or as agreed between the Agency and STAP. (ii) In its request for CEO endorsement, the Agency will report on actions taken in response to STAP concerns.</p>