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: September 25, 2015 Screener: Virginia Gorsevski

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

I. PIF Information *(Copied from the PIF)*
FULL SIZE PROJECT GEF TRUST FUND
GEF PROJECT ID: 9057
PROJECT DURATION : 5
COUNTRIES : Brazil
PROJECT TITLE: Biogas Applications for the Brazilian Agro-industry
GEF AGENCIES: UNIDO
OTHER EXECUTING PARTNERS: Ministry of Science, Technology and Innovation (MCTI), Itaipu Binacional / ClBiogÃ¡s-ER
GEF FOCAL AREA: Climate Change

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): **Concur**

III. Further guidance from STAP

The objective of this project is to stimulate biogas plant development nationally. It aims to demonstrate a medium to large scale plant (up to 3000 m3 biogas per day), which is planned. However, the design and size will be defined after a feasibility study. The barriers and threats are defined, however, few references are used and no assessment is planned of existing plants that are referred to under Section 2.

The problem of barriers to deployment is clear.

Outcomes on technical know-how and business models should closely liaise with Germany (already mentioned at the top of page 9), Denmark, the UK, etc. â€“ all have considerable experience with large-scale community based biogas projects using multi-feedstocks.

On-farm biogas plants usually fail due to lack of attention and maintenance. For this reason, a biogas plant needs to be large enough to warrant at least one full-time operator. The scale of the proposed demonstration plant as indicated in the PIF should be sufficient for this. Feedstocks will need to be brought to the central site. This issue has not been evaluated, nor whether back-loading of the nutrient effluent is possible.

This is a 5 year project. This should allow time for detailed assessments of other plants (in Brazil and elsewhere), the selection of the design and site, construction and MRV.

The sum of the outputs is likely to contribute to the outcomes identified in this project proposal. However, it is not clear why US$11.5M on product equipment development and testing of prototypes is needed since there are many plants operating successfully of varying designs of anaerobic digesters and ancillary equipment using agro-industrial wastes as feedstocks. Who is going to undertake the R&D on product development? The proposed Biogas Innovation Centre (BIC) is planned, but who will it employ, and what will be the facilities for constructing and testing plant equipment? Providing information to encourage wide deployment is a good role for this plant, but it cannot be pre-assumed that there will be a need to develop new equipment in a mature and well-developed market.

Component 4 relating to M&E is very general. STAP recommends that the project proponents develop specific indicators for monitoring and evaluating project impacts such as the volume of fossil fuels replaced by biogas production (also converted into GHG reductions); the amount of fossil fuel energy capacity retired

from the grid; the amount of avoided GHG emissions with the increasing use of bio-based feedstocks/waste; market development indicators as well as human capacity indicators.

In terms of baseline, the Government of Brazil has the goal of reducing agricultural emissions 38% lower than baseline. The national target for 4.4 M m3 of residues digested by 2020 which is presumably above current use. The number of biogas plants now operating is another baseline. However, there is no indication of the number of plants planned by a given timeline.

In terms of incremental costs, the proposed incremental activities will potentially lead to the delivery of global environmental benefits including 3.57 Mt CO2-e mitigation in Table F. Section 5 of Component 2 shows this is 1.7 Mt over 20 year life of the proposed demonstration plant with vehicle fuelling facility and 1.87 indirect (consequential) emissions. These calculations are based on a "European state-of-the-art" plant but the scale (e g. m3 digester; t feedstock/yr) is not given.

The project is not particularly innovative as this is a mature market. It will be unlikely to contribute to the scientific knowledge to help the GEF, though it is unclear if large-scale biogas plants have been supported in the past by the GEF.

The risks listed are valid and comprehensive and socio-economic issues are defined and supported by verifiable sources.

It is not clear that the project taps relevant knowledge / learning from other projects. Several past GEF projects have supported biogas plants which is a mature technology. Will they be evaluated by project proponents to obtain lessons learned? An effort should be made to review past GEF biogas projects to learn from them. See The demonstration project in this PIF will be monitored; however, it is not clear how information will be disseminated, which would be helpful for sharing lessons for future initiatives.

Key question for biogas plants is who will undertake maintenance as biogas is corrosive? Also how will the co-product of effluent for soil nutrient amendment be exploited?

What innovative ideas are to be tested? Spending maybe US$1M on an extensive review of the 25 current plants operating in Brazil and elsewhere, and those that have failed, would be money better spent. Assessment of mixed feedstocks needs undertaking as part of the feasibility study.

Planning the development of a biogas calculation tool would simply reinvent what has been widely done by many others. Funds can be saved by a simple literature review for such calculators. See for example, the following:

Triolo, J. M., Sommer, S. G., MÃ¸ller, H. B., Weisbjerg, M. R., & Jiang, X. Y. (2011). A new algorithm to characterize biodegradability of biomass during anaerobic digestion: Influence of lignin concentration on methane production potential. Bioresource Technology, 102(20).

Lee, K., Chantrasakdakul, P., Kim, D., Kim, H. S., & Park, K. Y. (2013). Evaluation of methane production and biomass degradation in anaerobic co-digestion of organic residuals. International Journal of Biological, Ecological and Environmental Sciences (IJBEES), 2(3), 2277-4394.

Labatut, R. A., Angenent, T. L., & Scott, R. N. (2010). Biochemical methane potential and biodegradability of complex organic substrates. Bioresource Technology, 102, 2255-2264.

Labatut, R. A., & Scott, N. R. (2008). Experimental and predicted methane yields from the anaerobic co-digestion of animal manure with complex organic substrates. Paper presented at the 2008 ASABE Annual International Meeting, Paper number 08, American Society of Agricultural and Biological Engineers, Rhode Island, June 29 â€“ July 2, 2008.

Nielfa, A., Cano, R., & Fdz-Polanco, M. (2014). Theoretical methane production generated by the co-digestion of organic fraction municipal solid waste and biological sludge. Biotechnology Reports.

STAP advisory response	*Brief explanation of advisory response and action proposed*
1. Concur	In cases where STAP is satisfied with the scientific and technical quality of the proposal, a simple "Concur" response will be provided; the STAP may flag specific issues that should be pursued

	rigorously as the proposal is developed into a full project document. At any time during the development of the project, the proponent is invited to approach STAP to consult on the design prior to submission for CEO endorsement.
2. Minor issues to be considered during project design	STAP has identified specific scientific /technical suggestions or opportunities that should be discussed with the project proponent as early as possible during development of the project brief. The proponent may wish to: (i) Open a dialogue with STAP regarding the technical and/or scientific issues raised. (ii) Set a review point at an early stage during project development, and possibly agreeing to terms of reference for an independent expert to be appointed to conduct this review. The proponent should provide a report of the action agreed and taken, at the time of submission of the full project brief for CEO endorsement.
3. Major issues to be considered during project design	STAP proposes significant improvements or has concerns on the grounds of specified major scientific/technical methodological issues, barriers, or omissions in the project concept. If STAP provides this advisory response, a full explanation would also be provided. The proponent is strongly encouraged to: (i) Open a dialogue with STAP regarding the technical and/or scientific issues raised; (ii) Set a review point at an early stage during project development including an independent expert as required. The GEF Secretariat may, based on this screening outcome, delay the proposal and refer the proposal back to the proponents with STAP's concerns. The proponent should provide a report of the action agreed and taken, at the time of submission of the full project brief for CEO endorsement.