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: May 08, 2015 Screener: Lev Neretin

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: 9048
PROJECT DURATION : 4
COUNTRIES : Ethiopia
PROJECT TITLE: Ethiopian Urban NAMA: Creating Opportunities for Municipalities to Produce and Operationalise Solid Waste Transformation (COMPOST)

GEF AGENCIES: UNDP
OTHER EXECUTING PARTNERS: Ministry of Urban Development, Housing and Construction (MUDHCo)
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

1. Solid waste treatment and disposal is a growing problem in Ethiopian cities, as it is elsewhere in the world, as city populations increase, including informal settlements. Any means of reducing methane emissions from municipal wastes (that equated to 3 Gt CO2-eq in 2013) is to be commended. Sadly the previous attempts to develop landfill gas plants in Ethiopia have failed. Therefore the concern now is that endeavors to encourage waste-to-compost rather than waste-to-energy may also fail for similar reasons of lack of trained operators and equipment. So why will composting, even though a simpler technology, succeed where landfill gas has failed?

2. In this regard it is a good approach to closely integrate the private sector within the project. However, the question begs whether the private sector was also involved with the failed landfill gas projects. Careful scrutiny of those projects is therefore recommended in order that a similar demise does not happen to this investment in composting. What might have been done differently in the two failed landfill gas projects in order to achieve success? Such a review would be particularly useful given another sanitary landfill gas plant is being proposed in Addis Ababa.

3. Linking solid waste management with urban green infrastructure (UGI) is an interesting move. The project title only specifies waste management and compost and UGI is not mentioned. Perhaps the project title should be amended given the statement in Section 3 "The project aims to integrate urban greenery and waste management to support sustainable urban development and urban agriculture and peri-urban forest management".

4. The link between ISWM and UGI appears to be the use of the compost to "displace and supplement chemical fertilizers in urban agriculture and peri-urban forestry" but this only became clear (at least to me â€“ maybe I missed it) at the bottom of page 11.

5. The nutritional value of the compost in terms of N,P,K units per tonne is not presented â€“ and there are many forms of compost and many forms of chemical fertilizer. Usually compost is lower in nutrients per unit of weight than chemical fertilizers. So how many kg of artificial fertilizers would 1 tonne of compost produced in Ethiopia likely displace? It states on page 17 that the analysis used "a conservative emission factor of 36

kgCO2e for the displacement of chemical fertilizer for each tonne of compost that is applied". Is that per dry tonne or per wet tonne? What N,P,K compound fertilizer blend would be displaced specifically?

6. What source was used for that emission factor? Replacing chemical fertilizer with organic manure without crop losses could indeed lead to GHG emission reductions (1). However, whether soils would be a carbon source or sink depends on a number of factors. For example, one study assessed the impact of organic and inorganic fertilizer use on GHG emissions in tropical forestry and found out that organic wastes (sewage sludge compost and sewage sludge treatments) had significantly higher soil C fluxes than when using mineral fertilizer. The variation in fluxes between treatments with organic residues was influenced by differences in the physical and chemical compositions of the wastes and the amounts of labile carbon added (2). Assuming the compost has a reasonable N value of 2-3%, why would N2O not be produced as for artificial fertilizers? How much N2O emissions would actually be avoided per tonne of compost? There is a gap in the proposal relating to the potential nutritional value of the compost such that an accurate assessment of GHG emission reduction potential is not really possible. Laboratory testing of the compost will be needed once produced to verify these estimates (3).

7. Land is required for making the compost adjacent to the landfill site. Is this available in the 6 cities? Will mechanical handling equipment be included or will it require a lot of manual labor to pile the solid waste, turn the compost, collect it and transport it to the site?

8. It states on page 18: "trees will absorb atmospheric pollutants such as ammonia and nitrogen dioxide". This is a complex soil/plant interaction process as for example, nitrogen dioxide absorption rates depend on the pant size and leaf area. So can proponents be confident the total volume of these gases will be absorbed â€“ or perhaps it will be only a portion?

9. Overall it appears to be a good project but further analysis of the nutrients in the compost to determine how much chemical fertilizer N,P,K equivalent as well as more robust assessment of resulting GHG emissions in urban agriculture should be undertaken.

10. STAP also has concerns about the quality of municipal solid waste (MSW) sorting for composting and use in peri-urban agriculture. Unlike agricultural manure, MSW is contaminated with hazardous chemicals and other potentially harmful substances for food production such as heavy metals. How will the chemical and biological quality of the compost be monitored and enforced to avoid potential negative impacts on agricultural produce? Furthermore, it seems the project proponents consider only MSW sources for composting. Within Ethiopian agriculture, some 60 percent of the output is from crops, with livestock and forestry producing 30 percent and 7 percent respectively (FAO country profile). Ethiopia's livestock population (2002) is the largest in Africa, with 30,000,000 cattle, 24,000,000 sheep, 18,000,000 goats, 7,000,000 equines, 1,000,000 camels and 53,000,000 poultry. It would be logical to support combining MSW and manure for composting in peri-urban agriculture. The supply chain could be shorter and more efficient than from using MSW alone for composting. STAP recommends project proponents to consider this possibility at least around some of the selected cities.

11. Finally, STAP wishes to raise the question of sustainable demand for composting among both urban and peri-urban agriculture and traditional small-scale farmers. Market analysis is recommended during project preparation to assure that supply and demand sides of the market are balanced.

REFERENCES USED:
1. Haitao Liu, J.L., Xiao Li, Yanhai Zheng, Sufei Feng, Gaoming Jiang. 2015. Mitigating greenhouse gas emissions through replacement of chemical fertilizer with organic manure in a temperate farmland. Science Bulletin, 60(6), 598-606.
2. Danilo Ignacio de Urzedo, Mariana Pires Franco, Leonardo Machado Pitombo, Janaina Braga do Carmo, 2013. Effects of organic and inorganic fertilizers on greenhouse gas (GHG) emissions in tropical forestry. Forest Ecology and Management, 310: 37â€“44.
3. See for example http://www.soilandplantlaboratory.com/pdf/articles/CompostAGuideForUsing.pdf but there is a wealth of literature available.

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.