CDM: Recommendation form for Small Scale Methodologies (Version 01.1)

(To be used for presenting questions/proposals/amendments to the simplified methodologies for small-scale CDM project activity categories)

Date of SSC WG meeting:	05−08 March 2012, SSC WG 37
Title/Subject (give a small title or specify the subject of your submission, maximum 200 characters):	Clarification on the N_2O emissions in the latest version of AMS-III.F
Indicative methodology to which your submission relates *(refer the items of Appendix B of the Simplified Modalities and Procedures)*, **if applicable:**	AMS-III.F "Avoidance of methane emissions through composting"
Name of the authors of the query:	Georges Morizot / Gaïa Ludington Institution: Gevalor In collaboration with GoodPlanet Foundation georges.morizot@gevalor.org, gaia.ludington@gevalor.org

Summary of the query:

Please use the space below to summarize the query related to SSC methodologies/categories SSC Modalities and Procedures provide recommendation/analysis of the SSC WG.

Original text from PP:

Gevalor is developing domestic waste composting projects in Africa. Six of them are being developed, in partnership with GoodPlanet, in the frame of Africompost program.

It is well known that domestic waste composting projects are not able to be supported in Africa by the Municipalities lacking from financial resources, nor by the sale of compost, which price is limited. Now, as demonstrated by Rogger and alii, composting is a very interesting alternative, comparatively to LFG (landfill gas flaring) or methanisation, from sustainable development point of view for the treatment of domestic waste.

Now the new methodology AMS III F, version 11, to be submitted to EB in May 11th 2012, which is based on the methodological tool am 04, version 4, for baseline emissions calculations and am 13, version 1, for project emissions. It establishes a very high barrier to the access of domestic waste composting projects to carbon financing: am 04 doesn't take into consideration N_2O emissions and am 13 includes N_2O emissions in the project's emissions.

The scientific information, which is scarce on the topic, demonstrates nevertheless that N_2O emissions during landfilling and composting are governed by microbial nitrification and denitrification processes, with rates controlled by many factors as oxygen availability, pH, temperature, water content, microbial competition, etc. As a result, CH_4 and N_2O generation, microbial consumption and net emission rates routinely exhibit temporal and spatial variability over many orders of magnitude ..." (Climate Change 2007: Working Group III: Mitigation of Climate Change).

In addition, an important part of N_2O in landfill is emitted with the leachate and therefore is not taken into consideration in the gaseous emissions.

Some figures are available:

- Barton and Atwater in their paper titled: Nitrous Oxide emissions and the Anthropogenic Nitrogen in waste water and solid waste compare N_2O emissions in Landfills and in composters: the figures are in the same range of magnitude: 0, 041 t CO_{2e} /tonne for landfill and 0,049 t CO_{2e} /tonne for composters,

while methane emissions for landfill is three times higher (see table 5, page 147 of the paper).

- The Joint research Center from the European Commission mentions a figure for landfilling a figure of 2.71 E-6 kg/kg of N_2O per ton of biodegradable waste (emission to air, without consideration of the leachate), equivalent to about 0, 01 t CO_{2e} /tonne. See http://lca.jrc.ec.europa.eu/lcainfohub/datasets/html/processes/89863fcf-3306-11dd-bd11-0800200c9a66_02.01.000.html

As a consequence taking into consideration N_2O emissions in project emissions (where the parameters could be better controlled than in landfilling) and not in baseline emissions does not seem satisfactory.

Additionally, N_2O emissions monitoring is a sophisticated process, difficult to consider in small scale composting projects, in addition to oxygen monitoring for financial reasons.

It further handicap composting approach wich

It should be noticed in addition that compost application to soils save chemical fertilizers use, an important source of GHG.

Now the effect on emission reductions is dramatic, as shown on two different projects for a ten years period:

	Emissions reductions under AMS III F v10 and tool am 4 v6.0	**Emissions reductions under AMS III F v11, tool am 13 v1 and tool am 4 v6.0**
X (Togo) 25 000 tons of waste treated per year	43 600	17 600
Y (Mozambique) 50 000 tons of waste treated per year	125 200	73 200

The only difference between the two options is NO2 emissions taken into account or not: the drastic fall in VER is obvious.

The following documents have been attached to this form:

- Rogger et alii

- Barton et Atwater

- Excel files, with emission reductions calculations.

Recommendation by the SSC WG:

Please use the space below to provide amendments / change (in your expert view, if necessary).

Please refer to paragraph 30 of the meeting report of the SSC WG 37 <http://cdm.unfccc.int/Panels/ssc_wg>.

Answer to authors of query by the SSC WG:

Please use the space below to provide answer to the authors of the above query.

The small-scale working group of the CDM Executive Board would like to thank the author for the submission.

The SSC WG agreed not to modifiy the methodology with respect to treatment of direct N_2O emissions for landfill versus composting process, i.e., for landfill, only methane emissions shall be accounted, whereas for composting, both methane and nitrous oxide shall be accounted.

The underlying reasons are:

- In 2006 IPCC Guideline(Volume 5, chapter 3), N_2O emissions from SWDS are not accounted for by stating that "No methodology is provided for N_2O emissions from SWDS because they are not significant"[1];
- From a biological point of view, there is an important difference between landfill versus the composting process. N_2O is generally produced when nitrogen compounds from biological decay are exposed to alternating aerobic (oxygen rich) and anoxic (oxygen poor) conditions. Landfills are intrinsic anaerobic by nature, while during composting the waste decays in aerobic conditions. Nonetheless, anaerobic pockets are not easily avoided completely when aeration is not optimal. As a result, conditions in the landfill are unfavourable for direct N_2O generation, whereas compositing process may favor N_2O generation. The only region of the landfill where N_2O might be generated is in the top-layers, where aerobic conditions might occur;
- For landfills, direct N_2O emissions are much lower than methane emissions (expressed in CO_2 equivalents). The difference might be one to two orders of magnitude. N_2O emissions are generally in the order of magnitude of 1 mg/m^2/hr.[2] CH_4 emissions can be 1000mg/m^2/hr. The difference in radiative forcing is about 15, so the impact of N_2O is about 60 times less. For composting, N_2O emissions are higher than CH_4 emissions(expressed in CO_2 equivalents). In the quoted Composting Tool, conservative emission factors were proposed for methane of 2.0 kg per ton waste (wet) and 0.2 kg N_2O per ton waste (wet).So when expressed in CO_2-eq., the effect of N_2O is 1.5 times the effect of CH_4.

In addition, the SSC WG agree to further point out that:

- In the article of *P. Barton et. al* (as provided by the submission author), it is said that landfills produce leachate that contains high amounts of NH_3 and nitrogen compounds, and may indeed result in indirect N_2O emissions. However, these emissions are difficult to be calculated or estimated with the existing tools or models. Leachate, when not collected and subject to biological treatment, normally flows down by gravity and tends to remain in anaerobic zones and/or in the groundwater. However, if those emissions can be conservatively estimated for the baseline landfill where the wastes would otherwise be disposed, their avoidance may be attributed to the composting process or to any process that diverts the waste disposal from the landfill. The author of the submission may propose procedures for that estimation.
- In terms of N_2O emission quantification, the quoted Composting Tool also provides default values in case the project proponent is not willing to do the monitoring.

Signature of SSC WG Chair: Mr. Peer Stiansen

Date: 08/06/2012

Signature of SSC WG Vice-Chair: Ms. Fatou Gaye

Date: 08/06/2012

SECTION TO BE FILLED IN BY THE UNFCCC SECRETARIAT	
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[1] http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/5_Volume5/V5_3_Ch3_SWDS.pdf
[2] J. Rinne et al, Nitrous Oxide Emissions from a Municipal Landfill, Environ. Sci. Technol. 2005, 39, 7790-7793

History of the document

Version	Date	Nature of revision(s)
01.1	12 April 2012	Editorial changes to include new logo and other improvements.
01.0	2005	Initial publication.
Decision Class: Regulatory **Document Type**: Form **Business Function**: Methodology		