Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories

TYPE III - OTHER PROJECT ACTIVITIES

Project participants shall take into account the general guidance to the methodologies, information on additionality, abbreviations and general guidance on leakage provided at http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html.

III.I. Avoidance of methane production in wastewater treatment through replacement of anaerobic lagoons by aerobic systems

Technology/measure

1. This project category comprises measures that avoid the production of methane from biogenic organic matter in wastewaters being treated in anaerobic lagoons. Due to the project activity, the anaerobic lagoons[1] (without methane recovery), are substituted by aerobic systems. The project activity does not recover or combust methane in wastewater treatment facilities (unlike III.H).

2. Measures are limited to those that result in emission reductions of less than or equal to 60 kt CO_2 equivalent annually.

Boundary

3. The project boundary is the physical, geographical site where the wastewater treatment takes place.

Project Activity Emissions

4. Project activity emissions consists of:

(i) CO_2 emissions related to the power used by the project activity facilities. Emission factors for grid electricity or diesel fuel use shall be calculated as described in category I.D;

(ii) Methane emissions during the aerobic wastewater treatment;

(iii) Methane emissions from the decay of the sludge generated by the aerobic systems, if the sludge is disposed to decay anaerobically in a landfill without methane recovery.

$$\mathbf{PE_y = PE_{y,power} + PE_{y,ww,treatment} + PE_{y,sludge}}$$

where:

$\mathbf{PE_y}$ project activity emissions in the year "y" (tCO_2e)

$\mathbf{PE_{y,power}}$ emissions on account of electricity or diesel consumption in the year "y"

[1] Anaerobic lagoons are ponds deeper than 2 meters, without aeration, ambient temperature above 15^0C, at least during part of the year, on a monthly average basis, and with a volumetric loading rate of Chemical Oxygen Demand above 0.1 kg $COD.m^{-3}.day^{-1}$.

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$PE_{y,ww,treatment}$ emissions from the aerobic wastewater treatment in the year "y"[1]

$PE_{y,sludge}$ emissions from anaerobic decay of the sludge produced in the year "y"

$$PE_{y,ww,treatment} = Q_{ww,y} * COD_y * Bo * MCF_{aerobic} * GWP\_CH_4$$

where:

$Q_{ww,y}$ Volume of the wastewater treated during the year "y" (m^3)

COD_y Chemical oxygen demand of effluent entering the lagoons in the year y (tonnes).

B_o methane producing capacity for the wastewater (IPCC default value for domestic wastewater of 0.21 kg CH_4/kg.COD)[2]

$MCF_{aerobic}$ methane correction factor for the wastewater treatment in aerobic systems (MCF higher value of 0.1 for well managed systems, or 0.4 for poorly managed or overloaded systems as per table III.H.1 in category III.H)

GWP_CH_4 Global Warming Potential for CH_4 (value of 21)

$$PE_{y,sludge} = S_y * DOC_{y,s} * MCF_s * DOC_F * F * 16/12 * GWP\_CH_4$$

where:

$PE_{y,sludge}$ Methane emissions from the anaerobic decay of the final sludge generated in the wastewater system in the year "y" (tCO_2e)

S_y Amount of sludge generated by the wastewater treatment in the year y (tonnes).

$DOC_{y,s}$ Degradable organic content of the sludge generated by the wastewater treatment in the year y (fraction). It shall be measured by sampling and analysis of the sludge produced, and estimated ex-ante using the IPCC default values of 0.05 for domestic sludge (wet basis, considering a default dry matter content of 10 percent) or 0.09 for industrial sludge (wet basis, assuming dry matter content of 35 percent).

MCF_s Methane correction factor of the landfill that receives the final sludge, estimated as described in category AMS III.G.

DOC_F Fraction of DOC dissimilated to biogas (IPCC default value is 0.5).

F Fraction of CH_4 in landfill gas (IPCC default is 0.5).

[1] These methane emissions occur due to anaerobic pockets that may occur in aerobic systems, and are considered in 2006 IPCC Guidelines. Methane emissions through inefficiency of the wastewater treatment and presence of degradable organic carbon in treated wastewater will be neglected, since they would also be accounted for in the baseline scenario, and would approximately cancel each other.

[2] The IPCC default value of 0.25 kg CH_4/kg COD was corrected to take into account the uncertainties. For domestic waste water, a COD based value of $B_{o,ww}$ can be converted to BOD_5 based value by dividing it by 2.4 i.e. a default value of 0.504 kg CH_4/kg BOD can be used.

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Baseline

5. The baseline scenario is the situation where, in the absence of the project activity, degradable organic matter in wastewater is treated in anaerobic lagoons and methane is emitted to the atmosphere. Baseline emissions are calculated as the amount of methane produced in the anaerobic system that was replaced with aerobic system.

6. The baseline emissions from the lagoon are estimated using the procedure defined under category AMS III.H.:

$$\mathbf{BE_y = \sum(Q_{ww,y,m} * COD_{y,m}) * Bo * MCF_{lagoon} * GWP\_CH_4}$$

where:

$\mathbf{BE_y}$	Baseline emissions in the year "y" (tCO_2e).
$\mathbf{Q_{ww,y,m}}$	Volume of the wastewater treated during the months m, during year "y", for the months with ambient average temperature above 15°C (m^3).
$\mathbf{COD_{y,m}}$	Chemical oxygen demand of effluent entering the lagoons in the year y (tonnes/m^3) for the months with ambient average temperature above 15ºC.
$\mathbf{MCF_{lagoon}}$	methane correction factor for the wastewater treatment in anaerobic lagoons (MCF lower value of 0.8 as per table III.H.1 under AMS III.H).

Leakage

7. If the aerobic treatment technology is equipment transferred from another activity or if the existing equipment is transferred to another activity, leakage effects at the site of the other activity are to be considered.

Monitoring

8. The emission reduction achieved by the project activity will be measured as the difference between the baseline emission and the sum of the project emission and leakage.

$$\mathbf{ER_y = BE_y - (PE_y + Leakage_y)}$$

where:

$\mathbf{ER_y}$	Emission reduction in the year "y" (tCO_2e)

The amount of COD treated in the wastewater treatment plant shall be measured regularly. The wastewater flow shall be recorded.

9. The yearly amount of sludge produced (Sy) shall be directly measured by weight or indirectly by its volume and density. Its degradable organic content ($DOC_{y,s}$) will be measured by representative sampling and analysis, in case the default value is not used.

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Project activity under a programme of activities

The following conditions apply for use of this methodology in a project activity under a programme of activities:

10. In case the project activity involves the replacement of equipment, and the leakage effect of the use of the replaced equipment in another activity is neglected, because the replaced equipment is scrapped, an independent monitoring of scrapping of replaced equipment needs to be implemented. The monitoring should include a check if the number of project activity equipment distributed by the project and the number of scrapped equipment correspond with each other. For this purpose scrapped equipment should be stored until such correspondence has been checked. The scrapping of replaced equipment should be documented and independently verified.