TYPE III - OTHER PROJECT ACTIVITIES

Follow the link to find General guidance / Abbreviations

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] (~~deeper than 1 meter, with a residence time of more than one year and temperature above 15 deg C,~~ without methane recovery), are substituted by aerobic systems. The project activity does not recover or combust methane in wastewater treatment facilities (unlike III H). Measures shall both reduce anthropogenic emissions by sources, and directly emit less than 15 kilo tonnes of carbon dioxide equivalent annually.

Boundary

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

Project Activity Direct Emissions

3. Total annual project activity related emissions shall be less than or equal to 15 kilo tonnes of CO_2 equivalent. 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 from the decay of the sludge generated by the aerobic systems, if the sludge is left to decay anaerobically and disposed in a landfill without methane recovery.

$$PE_y = PE_{y,power} + PE_{y,sludge}$$

where:

PE_y: project activity emissions in the year "y" (tonnes of CO_2 equivalent)
$PE_{y,power}$ emissions through electricity consumption or diesel consumption in the year "y"
$PE_{y,sludge}$ emissions through anaerobic decay of the sludge produced in the year "y"

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

where:

$PE_{y,sludge}$ Methane emissions in the anaerobic decay of the sludge generated in the wastewater system in the year "y" (tonnes of CO_2 equivalent)

[1] Anaerobic lagoons are ponds deeper than 1 meter, without aeration, temperature above 15 deg C, and with a volumetric loading rate of Chemical Oxygen Demand above 0.1 kg COD/(m3.day).

S_y	Metered amount of sludge generated by the wastewater treatment in the year y (tonnes).
$DOC_{s,y}$	Degradable organic content of the sludge generated by the wastewater treatment in the year y (mass fraction). It can be measured by sampling and analysis of the sludge produced, or the IPCC default value for solid wastes of 0.3 is used.
DOC_F	Fraction of DOC dissimilated to biogas in the landfill (IPCC default value is 0.77).
F	Fraction of CH_4 in landfill gas (IPCC default is 0.5).
GWP_CH_4	Global Warming Potential for CH_4 (21)

Baseline

4. 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.

5. The baseline emissions from the lagoon are estimated based on the chemical oxygen demand (COD) of the effluent that would enter the lagoon in the absence of the project activity, the maximum methane producing capacity (Bo) and a methane conversion factor (MCF) that expresses what proportion of the effluent would be anaerobically digested in the open lagoons. These CH_4 emissions from wastewater should be calculated according to the IPCC Guidelines as follows:

$$BE_y = COD_y * Bo * MCF * GWP\_CH_4$$

where:

BE_y	Baseline emissions in the year "y" (tonnes of CO_2 equivalent).
COD_y	Chemical oxygen demand of effluent entering the lagoons in the year y (tonnes). It shall be directly measured, since the effluent that goes into the lagoon in the baseline situation is the same as the one that goes into the aerobic system in the project situation.
Bo	Maximum methane producing capacity. A value of 0.21 kg CH4/kg COD is used.
MCF	Methane conversion factor (fraction). The MCF default value to be adopted for projects in Africa, Asia and Latin America & Caribbean shall be 0.738, and for North America, Australia and New Zealand shall be 0.574.
GWP_CH_4	Global Warming Potential for CH_4 (value of 21)

Leakage

6. 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

7. 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.

$$ER_y = BE_y – (PE_y + Leakage_y)$$

where:

ER_y Emission reduction in the year "y" (tonnes of CO_2 eq.)

8. The amount of COD treated in the wastewater treatment plant shall be measured regularly. The wastewater flow shall be recorded. Through representative sampling and analysis, the COD content of the wastewater flowing to the treatment plant shall be recorded.

$$COD_y = Q_{WW,y} * COD_{m,y}$$

where:

COD_y	Chemical oxygen demand of effluent entering the wastewater treatment plant in the year "y" (tonnes).
$Q_{WW,y}$	Volume of wastewater treated by the plant in the year y (m^3).
$COD_{m,y}$	Average chemical oxygen demand of the effluent entering the wastewater treatment plant in the year y (tonnes/m^3).

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 ($DOC_{s,y}$) will be measured by representative sampling and analysis, in case the default value is not used.