TYPE III - OTHER PROJECT ACTIVITIES

Project participants must take into account the general guidance to the methodologies, information on additionality, abbreviations and general guidance on leakage provided at http://cdm.unfccc.int/goto/SSCappmeth.

III.E. Avoidance of methane production from decay of biomass through controlled combustion

Technology/measure

1. This project category comprises measures that avoid the production of methane from biomass or other organic matter that:

(a) Would have otherwise been left to decay under clearly anaerobic conditions throughout the crediting period[1] in a solid waste disposal site without methane recovery, or

(b) Is already deposited in a waste disposal site without methane recovery.

Due to the project activity, decay is prevented through controlled combustion of the wastes of type referred to in paragraph 1(a) and/or 1(b) above. Measures are limited to those that result in emission reductions of less than or equal to 60 kt CO_2 equivalent annually.

2. For the case of stockpile of wastes[1] where in the baseline usually there is a reduction in the amount of waste through regular open burning the use of the FOD model will have to be adjusted to take account of this burning in order to estimate correctly the baseline emission.

3. The project activity does not recover or combust methane unlike AMS III.G. Nevertheless, the location and characteristics of the disposal site in the baseline condition shall be known, in such a way as to allow the estimation of its methane emissions.

4. If the project activity involves combustion of partially decayed waste mined (i.e. removed) from a solid waste disposal site, the project participants shall:

i) Provide justifications for not using methane recovery and combustion as a technology/measure to achieve emission reductions; and

ii) If fresh wastes are generated during the crediting period, demonstrate that there is adequate capacity of the combustion facility to treat the newly generated wastes in addition to the partially decayed wastes removed from the disposal site or alternately justify the reasons for combusting the partially decayed wastes instead of the newly generated wastes.

5. If the combustion facility is used for heat and electricity generation, that component of the project activity shall use a corresponding methodology under type I project activities.

[1] Further work is undertaken to investigate to which extent and in which cases methane emissions may occur from stockpiling biomass residues. Subject to further insights on this issue the methodology may be revised.

Boundary

6. The project boundary are the physical, geographical sites:

(a) where the solid waste would have been disposed or is already deposited and the avoided methane emission occurs in absence of the proposed project activity,

(b) where the treatment of biomass through controlled combustion takes place,

(c) where the final residues of the combustion process will be deposited,

(d) and in the itineraries between them, where the transportation of wastes and combustion residues occurs.

Project Activity Emissions

7. Project activity emissions consist of:

(a) CO_2 emissions related to the combustion of the non-biomass carbon content of the waste (plastics, rubber and fossil derived carbon) and auxiliary fossil fuels used in the combustion facility,

(b) Incremental CO_2 emissions due to incremental distances between the collection points to the controlled combustion site and to the baseline disposal site as well as transportation of combustion residues and final waste from controlled burning site to disposal site,

(c) CO_2 emissions related to the fossil fuel and/or electricity consumed by the project activity facilities, including the equipment for air pollution control required by regulations. In case the project activity consumes grid-based electricity, the grid emission factor (tCO_2e/MWh) should be used, or it should be assumed that diesel generators would have provided a similar amount of electricity, calculated as described in category I.D.

$$PE_y = PE_{y,comb} + PE_{y,transp} + PE_{y,power}$$

Where:

PE_y	project activity direct emissions in the year “y” (tCO_2e)
$PE_{y,comb}$	emissions through combustion of non-biomass carbon in the year “y”(tCO_2e)
$PE_{y,transp}$	emissions through incremental transportation in the year “y”(tCO_2e)
$PE_{y,power}$	emissions through electricity or diesel consumption in the year “y”(tCO_2e)

8. The expected annual quantity (tonnes) and composition of the waste combusted by the project activity during the crediting period shall be described in the project design document, including the biomass and non-biomass carbon content of the waste ($Q_{biomass}$ and $Q_{non\text{-}biomass}$).

The expected consumption of auxiliary fuel for the incineration process (Q_{fuel}) should also be reported in the project design document. CO_2 emissions from the combustion of the non-biomass (i.e., fossil) carbon content of the wastes and from the auxiliary fossil fuel consumed will be estimated assuming the complete oxidation of carbon to CO_2 in the combustion.

$$PE_{y,comb} = Q_{y,non\text{-}biomass} * 44/12 + Q_{y,fuel} * EF_{y,fuel}$$

Where:

$Q_{y,non\text{-}biomass}$ Non-biomass carbon of the waste combusted in the year "y" (tonnes of carbon)

$Q_{y,fuel}$ Quantity of auxiliary fossil fuel used in the year "y" (tonnes)

$EF_{y,fuel}$ CO_2 emission factor for the combustion of the auxiliary fossil fuel (tonnes CO_2 per tonne fuel, according to latest IPCC Guidelines)

9. Project activity emissions from trucks for incremental collection activities will be estimated and considered as project activity emissions.

$$PE_{y,transp} = (Q_y/CT_y) * DAF_w * EF_{CO2} + (Q_{y,ash}/CT_{y,ash}) * DAF_{ash} * EF_{CO2}$$

Where:

Q_y quantity of waste combusted in the year "y" (tonnes)

CT_y average truck capacity for waste transportation (tonnes/truck)

DAF_w average incremental distance for waste transportation (km/truck)

EF_{CO2} CO_2 emission factor from fuel use due to transportation (tCO_2/km, IPCC default values or local values)

$Q_{y,ash}$ quantity of combustion residues produced in the year "y" (tonnes)

$CT_{y,ash}$ average truck capacity for combustion residues transportation (tonnes/truck)

DAF_{ash} average distance for combustion residues transportation (km/truck)

Baseline

10. The baseline scenario is the situation where, in the absence of the project activity, organic waste matter is left to decay within the project boundary and methane is emitted to the atmosphere. The yearly baseline emissions are the amount of methane that would have been emitted from the decay of the cumulative quantity of the waste diverted or removed from the disposal site, to date, by the project activity, calculated as the methane generation potential using the first order decay model (FOD) described in AMS III.G.

11. In the case of project activities combusting only freshly generated wastes, the baseline emissions at any year "y" during the crediting period is calculated using the amount and composition of wastes combusted since the beginning of the project activity (year "x=1") up to the year "y", using the first order decay model as referred to in AMS III.G. Baseline emissions shall exclude methane emissions that would have to be removed to comply with national or local safety requirement or legal regulations.

$$BE_y = BE_{CH4,SWDS,y} - MD_{reg,y} * GWP\_CH_4$$

Where:

BE_y Baseline emissions at year "y" during crediting period (tCO_2e)

$BE_{CH4,SWDS,y}$ Yearly Methane Generation Potential of the wastes diverted to be disposed in the landfill from the beginning of the project (x=1) up to the year "y", calculated according to AMS III.G (tCO2e).

$MD_{reg,y}$	methane that would be destroyed or removed in the year "y" for safety or legal regulation
GWP_CH_4	Global Warming Potential for methane (value of 21)

12. In the case of project activities that combust wastes that have partially decayed in a disposal site, the calculation of the yearly methane generation potential of the wastes combusted from the project beginning (x=1) up to the year "y" will consider the age of the wastes at the start of the project. One of the following options may be used:

(a) Estimate the mean age of the wastes contained in the disposal site in the beginning of the project activity ("ā"). It may be estimated as the weighted average age considering the yearly amount of wastes deposited in the SWDS since its beginning of operation up to the year prior to the start of the project:

$$\bar{a} = \frac{1 \cdot A_1 + 2 \cdot A_2 + 3 \cdot A_3 + \ldots + a \cdot A_a}{A_1 + A_2 + A_3 + \ldots + A_a} = \frac{\sum_{a=1}^{a\max} A_a \cdot a}{\sum_{a=1}^{a\max} A_a}$$

Where:

ā	weighted mean age of the wastes present in the SWDS prior to the project start,
a	years before project start, starting in the first year of waste disposal (a=1) up to the maximal age of the wastes contained in the SWDS at the project start (a=amax.)
A_a	total amount of waste deposited in the SWDS in each year "a". It shall be obtained from recorded data of waste disposals, or estimated according to the level of the activity that generated the wastes (for example, considering the amount of wood processed by a sawmill in each year "a", and estimating the amount of wastes generated and disposed in the SWDS in that year).

If the yearly amount of waste deposited in the SWDS cannot be estimated, then an arithmetic mean age may be used (ā = 0.5 * amax). By using this option, the baseline emissions at any year "y" during the crediting period are calculated using the same formula as provided in the last paragraph, nevertheless, the exponential term for the First Order Decay Model "exp [-k_j.(y-x)]" will be corrected for the mean age, and will be substituted by "exp[-k_j.(y-x-ā)]".

(b) Calculate the yearly methane generation potential of the SWDS as described in AMS III.G, considering the total amount and composition of wastes deposited since its start of operation. The methane generation potential of the wastes removed to be combusted up to the year "y" in the crediting period will be estimated as proportional to the mass fraction of these wastes, relative to the initial amount:

$$BE_y = \frac{\sum_{x=1}^{y} A_x}{A} BE_{CH4,SWDS,y} - MDreg,y * GWP\_CH4$$

Where:

A_x	Amount of wastes removed to be combusted in the year "x" (tonnes)
A	Total amount of wastes present in the SWDS at the beginning of the project activity (tonnes)
$BE_{CH4,SWDS,y}$	Yearly methane generation potential of the SWDS at the year "y", considering all the wastes deposited in it since its beginning of operation, and without considering any removal of wastes by the project activity.

(c) Estimate the quantity and the age distribution of the wastes removed each year "x" during the crediting period[2], and calculate the methane generation potential of these wastes in the year "y". For example, in the year x=2 of the project activity, the amount "A_2" was removed to be combusted, and this amount can be divided into "$A_{2,n}$" parts, each part belonging to the age "n". In the year "y" the methane generation potential of the portions removed from the SWDS may be estimated as:

$$BE_y = \sum_{n=n\min}^{n\max} BE_{CH4,SWDS,y,n} - MDreg,y * GWP\_CH4$$

Where:

$BE_{CH4,SWDS,y,n}$	Yearly methane generation potential of the wastes removed since the beginning of the project activity "x=1" up to the year "y" during the crediting period, segregated according to its age "n" at the time of removal (tCO2e). It is calculated using the tool referred to in III-G, substituting the exponential term for the First Order Decay Model "exp [$-k_j$.(y-x)]" by "exp[$-k_j$.(y-x-n)]".

Leakage

13. If the controlled combustion 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

[2] Age distribution is the discrete partitioning of the waste by age (i.e., the number of years since it was generated and deposited at the site). The estimation of the age of the portions of waste being removed from the disposal site and combusted each year may be done by topographical modelling of the wastes present in the relevant sections of the disposal site. This approach should include segregation of the wastes into even-age layers or volumetric blocks based on historical or constructive data (design of the disposal site). This information on quantity, composition, and age may be based on (a) historical records of the yearly mass and composition of waste deposited in the section of the disposal site where waste is being removed for combustion; or (b) historical production data for cases in which the waste at the site is dominated by relatively homogeneous industrial waste materials (e.g., waste by-products from sawmills or finished wood product manufacturing). Option (b) that uses historical industrial production data should apply the following steps. Step1: Estimate the total mass of waste at the disposal site in the section where it is to be removed based on the section's volume and the average density of the waste. Step 2: Apportion the mass of waste in this section into waste types and ages using historical records on the output of products produced in a given year from the industrial facility and factors for the average mass of waste by-products produced per unit of each product.

14. 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" (tCO_2e)

15. The amount of waste combusted by the project activity in each year (Q_y) shall be measured and recorded, as well as its composition through representative sampling, to provide information for estimating the baseline emissions. The quantity of auxiliary fuel used ($Q_{,fuel}$) and the non-biomass carbon content of the waste combusted ($Q_{,non\text{-}biomass}$) shall be measured, the latter by sampling. The total quantity of combustion residues ($Q_{y,ash}$) and the average truck capacity (CT_y) shall be measured. The electricity consumption and/or generation shall be measured. The distance for transporting the waste in the baseline and the project scenario shall also be recorded.

In the case of project activities processing newly generated biomass wastes, the project participants shall demonstrate annually, through the assessment of common practices at proximate waste disposal sites, that the amount of waste combusted in the project activity facilities would have been disposed in a solid waste disposal site without methane recovery in the absence of the project activity and it would decay anaerobically in the disposal site throughout the crediting period.

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:

16. 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.