CLEAN DEVELOPMENT MECHANISM

AMS-III.D.

Small-scale Methodology

Methane recovery in animal manure management systems

Version 21.0

Sectoral scope(s): 13

United Nations
Framework Convention on
Climate Change

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1. Introduction

1. The following table describes the key elements of the methodology:

Table 1. Methodology key elements

Typical projects	Replacement or modification of existing anaerobic manure management systems in livestock farms, or treatment of manure collected from several farms in a centralized plant to achieve methane recovery and destruction by flaring/combustion or energetic use of the recovered methane
Type of GHG emissions mitigation action	GHG destruction: GHG destruction and displacement of more- GHG -intensive service

2. Scope, applicability, and entry into force

2.1. Scope

2. This methodology covers project activities involving the replacement or modification of anaerobic animal manure management systems in livestock farms to achieve methane recovery and destruction by flaring/combustion or gainful use of the recovered methane. It also covers treatment of manure collected from several farms in a centralized plant.

2.2. Applicability

3. This methodology is only applicable under the following conditions:

(a) The livestock population in the farm is managed under confined conditions;

(b) Manure or the streams obtained after treatment are not discharged into natural water resources (e.g. river or estuaries), otherwise “AMS-III.H Methane recovery in wastewater treatment" shall be applied;

(c) The annual average temperature of baseline site where anaerobic manure treatment facility is located is higher than 5°C;

(d) In the baseline scenario the retention time of manure waste in the anaerobic treatment system is greater than one month, and if anaerobic lagoons are used in the baseline, their depths are at least 1 m;

(e) No methane recovery and destruction by flaring or combustion for gainful use takes place in the baseline scenario.

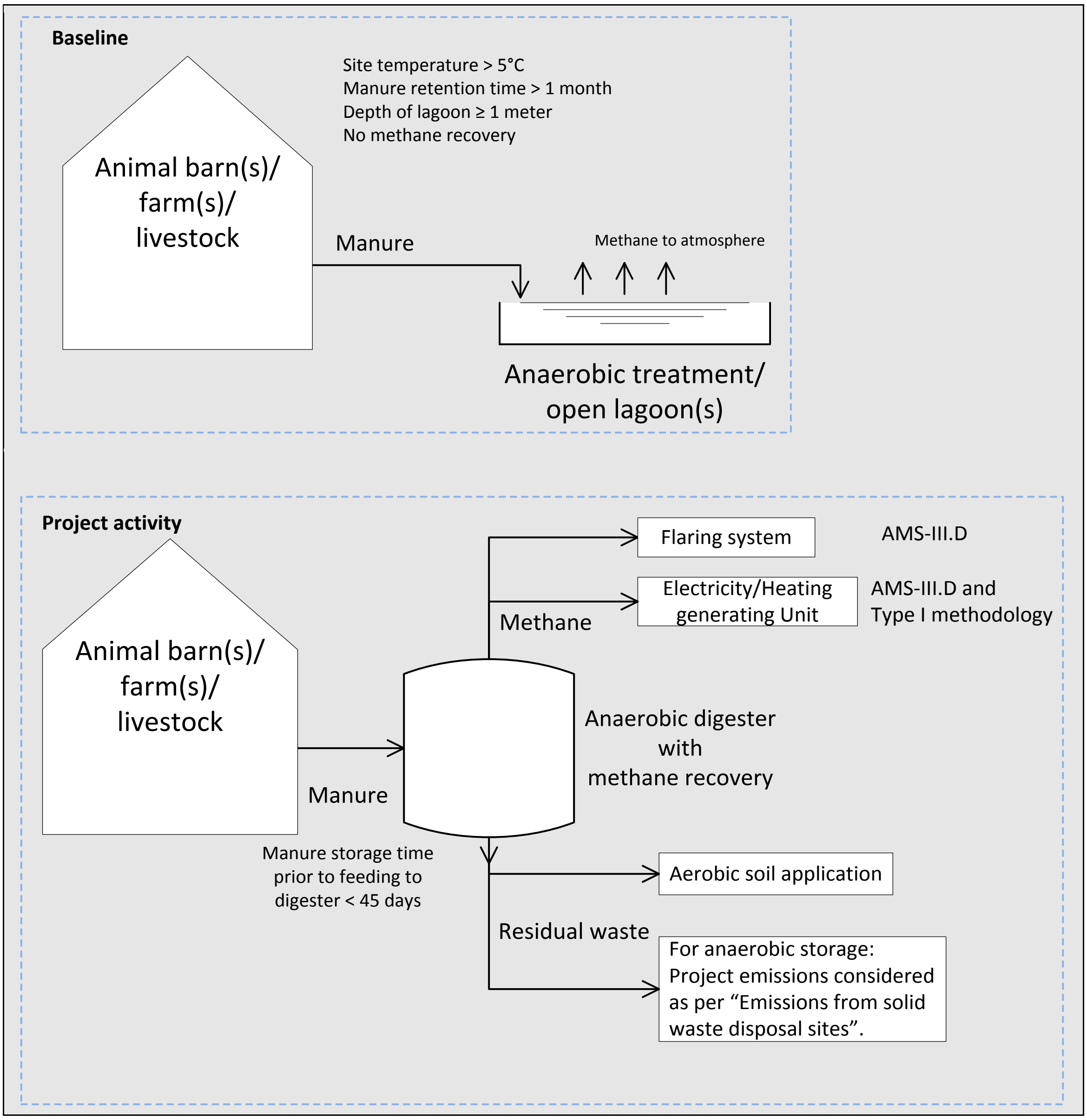
4. The project activity shall satisfy the following conditions:

(a) The residual waste from the animal manure management system shall be handled aerobically, otherwise the related emissions shall be taken into account as per relevant procedures of “AMS-III.AO Methane recovery through controlled anaerobic digestion". In the case of soil application, proper conditions and procedures (not resulting in methane emissions) must be ensured;

(b) Technical measures shall be used (including a flare for exigencies) to ensure that all biogas produced by the digester is used or flared;

(c) The storage time of the manure after removal from the animal barns, including transportation, should not exceed 45 days before being fed into the anaerobic digester. If the project proponent can demonstrate that the dry matter content of the manure when removed from the animal barns is larger than 20%, this time constraint will not apply.

Figure 1. Non-binding best practise example 1: Application of paragraphs 3 and 4



5. Projects that recover methane from landfills shall use "AMS-III.G Landfill methane recovery" and projects for wastewater treatment shall use AMS-III.H. Projects for composting of animal manure shall use "AMS-III.F Avoidance of methane emissions through composting". Project activities involving co-digestion of animal manure and other

organic matters shall use the methodology "AMS-III.AO Methane recovery through controlled anaerobic digestion".

6. Utilization of the recovered biogas in one of the options detailed in AMS-III.H is also eligible under this methodology. The respective procedures in AMS-III.H shall be followed in this regard. If the recovered biogas is used to power auxiliary equipment of the project activity, it should be taken into account accordingly, using zero as its emission factor; however, energy used for such purposes is not eligible as an SSC CDM Type I project component.

7. New facilities (Greenfield projects) and project activities involving capacity additions compared to the baseline scenario are only eligible if they comply with the related and relevant requirements in the "General guidelines for SSC CDM methodologies".

8. The requirements concerning demonstration of the remaining lifetime of the replaced equipment shall be met as described in the "General guidelines for SSC CDM methodologies".

9. Measures are limited to those that result in aggregate emission reductions of less than or equal to 60 kt CO_2 equivalent annually from all Type III components of the project activity.

2.3. Entry into force

10. The Month of entry into force is the date of the publication of the EB 96 meeting report on 22 September 2017.

2.4. Applicability of sectoral scopes

11. For validation and verification of CDM projects and programme of activities by a designated operational entity (DOE) using this methodology, application of sectoral scope 13 is mandatory.

3. Normative references

12. Project participants shall take into account the "General guidelines for SSC CDM methodologies" and the "Guidelines on the demonstration of additionality of small-scale project activities" (Attachment A to Appendix B) provided at: <http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html> *mutatis mutandis.*

13. This methodology also refers to the latest approved versions of the following methodologies and tools:

(a) "ACM0010: Consolidated baseline methodology for GHG emission reductions from manure management systems";

(b) AM0073: GHG emission reductions through multi-site manure collection and treatment in a central plant";

(c) "AMS-III.F: Avoidance of methane emissions through composting";

(d) "AMS-III.G: Landfill methane recovery";

(e) "AMS-III.H: Methane recovery in wastewater treatment";

(f) “AMS-III.AO: Methane recovery through controlled anaerobic digestion";

(g) Methodological Tool: “Project and leakage emissions from anaerobic digesters”;

(h) Methodological Tool: “Project emissions from flaring”;

(i) *“*Tool to calculate baseline, project and/or leakage emissions from electricity consumption”;

(j) “Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion”.

4. Baseline methodology

4.1. Project boundary

14. The project boundary includes the physical, geographical site(s) of:

(a) The livestock;

(b) Animal manure management systems (including centralised manure treatment plant where applicable);

(c) Facilities which recover and flare/combust or use methane.

4.2. Additionality

15. Project activities may demonstrate the additionality by showing that there is no regulation in the host country, applicable to the project site, that requires the collection and destruction of methane from livestock manure. If so, it is not required to apply the *“*Guidelines on the demonstration of additionality of small-scale project activities*”.*

16. This additionality condition also applies to Greenfield project activities. Furthermore, for project activities applying this methodology in combination with a Type I methodology, that has an energy component whose installed capacity is less than 5 MW, this procedure for additionality demonstration also applies to that component.

4.3. Baseline emissions

17. The baseline scenario is the situation where, in the absence of the project activity, animal manure is left to decay anaerobically within the project boundary and methane is emitted to the atmosphere. Baseline emissions (BE_y) are calculated by using one of the following two options:

(a) Using the amount of the waste or raw material that would decay anaerobically in the absence of the project activity, with the most recent IPCC Tier 2 approach (please refer to the chapter ‘Emissions from Livestock and Manure Management’ under the volume ‘*Agriculture, Forestry and other Land use’ of the 2006 IPCC Guidelines for National Greenhouse Gas Inventories*). For this calculation, information about the characteristics of the manure and of the management systems in the baseline is required. Manure characteristics include the amount of volatile solids (VS) produced by the livestock and the maximum amount of methane that can be potentially produced from that manure (B_o);

(b) Using the amount of manure that would decay anaerobically in the absence of the project activity based on direct measurement of the quantity of manure treated together with its specific volatile solids (*SVS*) content.

18. If option in paragraph 17(a) is chosen, baseline emissions are determined as follows:

$$BE_y = GWP_{CH4} \times D_{CH4} \times UF_b \times \sum_{j,LT} MCF_j \times B_{0,LT} \times N_{LT,y} \times VS_{LT,y} \times MS\%_{Bl,j}$$ Equation (1)

Where:

BE_y	=	Baseline emissions in year *y* (t CO_2e)
GWP_{CH4}	=	Global Warming Potential (GWP) of CH_4 applicable to the crediting period (t CO2e/t CH_4)
D_{CH4}	=	CH_4 density (0.00067 t/m^3 at room temperature (20 ºC) and 1 atm pressure)
LT	=	Index for all types of livestock
j	=	Index for animal manure management system
MCF_j	=	Annual methane conversion factor (*MCF*) for the baseline animal manure management system j
$B_{0,LT}$	=	Maximum methane producing potential of the volatile solid generated for animal type *LT* (m^3 CH_4/kg-dm)
$N_{LT,y}$	=	Annual average number of animals of type *LT* in year *y* (numbers)
$VS_{LT,y}$	=	Volatile solids production/excretion per animal of livestock *LT* in year *y* (on a dry matter weight basis, kg-dm/animal/year)
$MS\%_{Bl,j}$	=	Fraction of manure handled in baseline animal manure management system *j*
UF_b	=	Model correction factor to account for model uncertainties (0.94)[1]

(a) The maximum methane-producing capacity of the manure (B_o) varies by species and diet. The preferred method to obtain B_o measurement values is to use data from country-specific published sources, measured with a standardised method (B_o shall be based on total as-excreted *VS*). These values shall be compared to IPCC default values and any significant differences shall be explained. If country specific B_o values are not available, default values from tables 10 A-4 to 10 A-9 of *2006 IPCC Guidelines for National Greenhouse Gas Inventories volume 4 Chapter 10* can be used, provided that the project participants assess the suitability of those data to the specific situation of the treatment site;

(b) *VS* are the organic material in livestock manure and consist of both biodegradable and non-biodegradable fractions. For the calculations the total VS excreted by each animal species is required.

[1] Reference: FCCC/SBSTA/2003/10/Add.2, page 25.

(i) The preferred method to obtain VS is to use data from nationally published sources. These values shall be compared with IPCC default values and any significant differences shall be explained.

(ii) If data from nationally published sources are not available, country-specific *VS* excretion rates can be estimated from feed intake levels, via the enhanced characterisation method (tier 2) described in section 10.2 in *2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 4 chapter 10*, using the equation (2) below.

$$VS_{LT,y} = \left[GE_{LT} \times \left(1 - \frac{DE_{LT}}{100}\right) + (UE \times GE_{LT})\right] \times \left[\left(\frac{1 - ASH}{ED_{LT}}\right)\right] \times nd_y$$ Equation (2)

Where:

$VS_{LT,y}$	=	Annual volatile solid excretions for livestock *LT* entering all animal waste management systems on a dry matter weight basis (kg-dm/animal/yr)
GE_{LT}	=	Daily average gross energy intake (MJ/animal/day)
DE_{LT}	=	Digestible energy of the feed (per cent)
UE	=	Urinary energy (fraction of GE_{LT})
ASH	=	Ash content of manure (fraction of the dry matter feed intake)
ED_{LT}	=	Energy density of the feed fed to livestock type *LT* (MJ/kg-dm)
nd_y	=	Number of days treatment plant was operational in year *y*

(iii) If country specific VS values are not available IPCC default values from *2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 4 chapter 10 table 10 A-4 to 10 A-9* can be used provided that the project participants assess the suitability of those data to the specific situation of the treatment site particularly with reference to feed intake levels;

(c) Project participants may adjust default IPCC values for *VS* for a site-specific average animal weight. If so, it shall be well explained and documented. The following equation shall be used:

$$VS_{LT,y} = \left(\frac{W_{site}}{W_{default}}\right) \times VS_{default} \times nd_y$$ Equation (3)

Where:

W_{site}	=	Average animal weight of a defined livestock population at the project site (kg)
$W_{default}$	=	Default average animal weight of a defined population, this data is sourced from IPCC 2006 (kg)
$VS_{default}$	=	Default value for the volatile solid excretion rate per day on a dry-matter basis for a defined livestock population (kg-dm/animal/day)

nd_y	=	Number of days treatment plant was operational in year *y*

(d) B_o or *VS* values applicable to developed countries can be used provided the following four conditions are satisfied:

(i) The genetic source of the livestock originates from an Annex I Party;

(ii) The farm uses formulated feed rations (*FFR*) which are optimized for the various animal(s), stage of growth, category, weight gain/productivity and/or genetics;

(iii) The use of *FFR* can be validated (through on-farm record keeping, feed supplier, etc.);

(iv) The project specific animal weights are more similar to developed country IPCC default values.

(e) In the case of sequential treatment stages, the reduction of the volatile solids during a treatment stage is estimated based on referenced data for different treatment types. Emissions from the next treatment stage are then calculated following the approach outlined above, but with volatile solids adjusted for the reduction from the previous treatment stages by multiplying by (1 - *RVS*), where *RVS* is the relative reduction of volatile solids from the previous stage. The relative reduction of volatile solids (*RVS*) depends on the treatment technology and should be estimated in a conservative manner. Default values for different treatment technologies can be found in the table in the Appendix;

(f) Methane Conversion Factors (*MCF*) values are determined for a specific manure management system and represent the degree to which B_o is achieved. Where available country-specific *MCF* values that reflect the specific management systems used in particular countries or regions shall be used. Alternatively, the IPCC default values provided in table 10.17 of *2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 4 Chapter 10* can be used. The site annual average temperature is taken from official data at the nearest meteorological station, or from data available from historical on site observations;

(g) The annual average number of animals ($N_{LT,y}$) is determined as follows:

$$N_{LT,y} = N_{da,y} \times \left(\frac{N_{p,y}}{365}\right) \quad \text{Equation (4)}$$

Where:

$N_{da,y}$	=	Number of days animal is alive in the farm in the year *y* (numbers)
$N_{p,y}$	=	Number of animals produced annually of type *LT* for the year *y* (numbers)

19. If option in paragraph 17(b) is chosen, baseline emissions are determined based on directly measured quantity of manure and its specific volatile solids content, as follows:

$$BE_y = GWP_{CH4} \times D_{CH4} \times UF_b \times \sum_{j,LT} MCF_j \times B_{0,LT} \times Q_{manure,j,LT,y} \times SVS_{j,LT,y}$$ Equation (5)

Where:

$Q_{manure,j,LT,y}$	=	Quantity of manure treated from livestock type *LT* and animal manure management system *j* (tonnes/year, dry basis)
$SVS_{j,LT,y}$	=	Specific volatile solids content of animal manure from livestock type *LT* and animal manure management system *j* in year *y* (tonnes/tonnes, dry basis)
MCF_j	=	Annual methane conversion factor (MCF) for the baseline animal manure management system *j*, as per paragraph 18 above
$B_{0,LT}$	=	Maximum methane producing potential of the volatile solid generated for animal type *LT* (m^3 CH_4/kg-dm), as per paragraph 18 above

4.4. Project activity emissions

20. Project activity emissions consist of:

(a) Physical leakage of biogas in the manure management systems which includes production, collection and transport of biogas to the point of flaring/combustion or gainful use ($PE_{PL,y}$);

(b) Emissions from flaring or combustion of the gas stream ($PE_{flare,y}$);

(c) CO_2 emissions from use of fossil fuels or electricity for the operation of all the installed facilities ($PE_{power,y}$);

(d) CO_2 emissions from incremental transportation distances;

(e) Emissions from the storage of manure before being fed into the anaerobic digester ($PE_{storage,y}$).

$$PE_y = PE_{PL,y} + PE_{flare,y} + PE_{power,y} + PE_{transp,y} + PE_{storage,y}$$ Equation (6)

Where:

PE_y	=	Project emissions in year *y* (t CO_2e)
$PE_{PL,y}$	=	Emissions due to physical leakage of biogas in year *y* (t CO_2e)
$PE_{flare,y}$	=	Emissions from flaring or combustion of the biogas stream in the year *y* (t CO_2e)
$PE_{power,y}$	=	Emissions from the use of fossil fuel or electricity for the operation of the installed facilities in the year *y* (t CO_2e)
$PE_{transp,y}$	=	Emissions from incremental transportation in the year *y* (t CO_2e), as per relevant paragraph in AMS-III.AO
$PE_{storage,y}$	=	Emissions from the storage of manure (t CO_2e)

21. Project emissions due to physical leakage of biogas from the animal manure management systems used to produce, collect and transport the biogas to the point of flaring or gainful use are estimated as:

(a) 10% of the maximum methane producing potential of the manure fed into the management systems implemented by the project activity:[2]

(i) If the option in paragraph 17(a) is chosen, it is determined as:

$$PE_{PL,y} = 0.10 \times GWP_{CH4} \times D_{CH4} \times \sum_{i,LT} B_{0,LT} \times N_{LT,y} \times VS_{LT,y} \times MS\%_{i,y}$$ Equation (7)

Where:

$MS\%_{i,y}$	=	Fraction of manure handled in system *i* in year *y* If the project activity involves sequential manure management systems, the procedure specified in paragraph 18(e) shall be used to estimate the project emissions due to physical leakage of biogas in each stage

(ii) If the option in paragraph 17(b) is chosen, it is determined as:

$$PE_{PL,y} = 0.10 \times GWP_{CH4} \times D_{CH4} \times \sum_{i,LT} B_{0,LT} \times Q_{manure,LT,y} \times SVS_{LT,y} \times MS\%_{i,y}$$ Equation (8)

(b) Optionally, the relevant procedure in the methodological tool “Project and leakage emissions from anaerobic digesters” may be followed. In such a case, $PE_{PL,y}$ is equivalent to $PE_{CH4,y}$ in the tool.

22. In the case of flaring of the recovered biogas, project emissions are estimated using the procedures described in the methodological tool “Project emissions from flaring”. If the recovered biogas is combusted for electrical/thermal energy production or for other gainful use, the methane destruction efficiency can be considered as 100%. However, this use of the recovered biogas shall be included in the project boundary and its output shall be monitored in order to ensure that the recovered biogas is actually destroyed, even if the emission reductions from this component are not claimed.

Box 1. Non-binding best practice example 2: Monitoring of energy output as per paragraph 21

The project activity is to capture methane from manure that would be released to the atmosphere in the baseline scenario, in a swine farm. The methane is used to generate steam in a biogas fuelled boiler in an on-site food processing facility. The project participant would like to consider a methane destruction efficiency of 100% in the boiler. Hence on top of monitoring the required parameters as described in Section 5 below, the project participant will also monitor the steam output from the boiler.

[2] 2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 4 Chapter 10 guidelines specify a default value of 10% of the maximum methane producing potential (Bo) for the physical leakages from anaerobic digesters.

23. Project emissions from electricity and fossil fuel consumption are determined by following the methodological tool “Project and leakage emissions from anaerobic digesters”, where $PE_{Power,y}$ is the sum of $PE_{EC,y}$ and $PE_{FC,y}$ in the tool.

24. Project emissions on account of storage of manure before being fed into the anaerobic digester shall be accounted for if both condition (a) and condition (b) below are satisfied:

(a) The storage time of the manure after removal from the animal barns, including transportation, exceeds 24 hours before being fed into the anaerobic digester;

(b) The dry matter content of the manure when removed from the animal barns is less than 20%.

25. The following method shall be used to calculate project emissions from manure storage:

$$PE_{storage} = GWP_{CH4} \times D_{CH4} \times \sum_{LT,l}\left[\frac{365}{AI_l} \times \sum_{d=1}^{AI}\left(N_{LT} \times VS_{LT,d} \times MS\%_l \times \left(1 - e^{-k(AI_l - d)}\right) \times MCF_i \times B_{0,LT}\right)\right]$$ Equation (9)

Where:

$PE_{storage}$	=	Project emissions on account of manure storage in year *y* (t CO_2e)
AI_l	=	Annual average interval between manure collection and delivery for treatment at a given storage device *l* (days)
$VS_{LT,d}$	=	Amount of volatile solid production by type of animal *LT* in a day (kg VS/head/d)
$MS\%_l$	=	Fraction of volatile solids (%) handled by storage device *l*
k	=	Degradation rate constant (0.069)
d	=	Days for which cumulative methane emissions are calculated; d can vary from 1 to 45 and to be run from 1 up to AI_l
MCF_l	=	Annual methane conversion factor for the project manure storage device l from Table 10.17, Chapter 10, Volume 4

4.5. Leakage

26. It is determined by following the relevant procedure in the methodological tool “Project and leakage emissions from anaerobic digesters”.

4.6. Emission reductions

27. The emission reductions achieved by the project activity will be determined ex post through direct measurement of the amount of methane fuelled, flared or gainfully used. It

is likely that the project activity involves manure treatment steps with higher methane conversion factors (*MCF*) than the *MCF* for the manure treatment systems used in the baseline situation, therefore the emission reductions achieved by the project activity are limited to the ex post calculated baseline emissions minus the project emissions using the actual monitored data for the project activity (i.e. $N_{LT,y}$, $MS\%_{i,y}$, $MS\%_{l}$, AI_{l}, as well as $VS_{LT,y}$ in cases where adjusted values for animal weight are used). The emission reductions achieved in any year are the lowest value of the following:

$$ER_{y,ex\,post} = min[(BE_{y,ex\,post} - PE_{y,ex\,post}), (MD_y - PE_{power,y,ex\,post})] \quad \text{Equation (10)}$$

Where:

$ER_{y,ex\,post}$	=	Emission reductions achieved by the project activity based on monitored values for year *y* (t CO_2e)
$BE_{y,ex\,post}$	=	Baseline emissions calculated using equation 1 (for projects using option in paragraph 17(a)) using ex post monitored values of $N_{LT,y}$ and if applicable $VS_{LT,y}$. For projects using option in paragraph 17(b), the ex post monitored values for $Q_{manure,j,LT,y}$ and $SVS_{j,LT,y}$ are used
$PE_{y,ex\,post}$	=	Project emissions calculated using equation 6 using ex post monitored values of $N_{LT,y}$, $MS\%_{i,y}$, $MS\%_{l}$, AI_{l}, $Q_{res\,waste,y}$ and if applicable $VS_{LT,y}$
MD_y	=	Methane captured and destroyed or used gainfully by the project activity in year *y* (t CO_2e)
$PE_{power,y,ex\,post}$	=	Emissions from the use of fossil fuel or electricity for the operation of the installed facilities based on monitored values in the year *y* (t CO_2e)

28. Biogas flared or combusted, *(MD_y)* shall be determined using the flare efficiency and methane content of biogas.

$$MD_y = BG_{burnt,y} \times w_{CH4,y} \times D_{CH4} \times FE \times GWP_{CH4} \quad \text{Equation (11)}$$

Where:

$BG_{burnt,y}$	=	Biogas flared or combusted in year *y* (m^3)
$w_{CH4,y}$	=	Methane content in biogas in the year *y* (volume fraction)
FE	=	Flare efficiency in the year *y* (fraction)

29. The method for integration of the terms in equation above to obtain the results for one year of measurements within the confidence level, as well as the methods and instruments used for metering, recording and processing the data obtained, shall be described in the project design document and monitored during the crediting period.

30. Alternatively, if project activities utilize the recovered methane for power generation, MD_y may be calculated as follows, based on the amount of monitored electricity generation, without monitoring methane flow and concentration:

$$MD_y = \frac{EG_y \times 3600}{NCV_{CH4} \times EE_y} \times D_{CH4} \times GWP_{CH4} \quad \text{Equation (12)}$$

Where:

EG_y	=	Total electricity generated from the recovered biogas in year *y* (MWh)
3600	=	Conversion factor (1 MWh = 3600 MJ)
NCV_{CH4}	=	NCV of methane (MJ/Nm^3) (use default value: 35.9 MJ/Nm^3)
EE_yy	=	Energy conversion efficiency of the project equipment, which is determined by adopting one of the following criteria: - Specification provided by the equipment manufacture. The equipment shall be designed to utilize biogas as fuel, and efficiency specification is for this fuel. If the specification provides a range of efficiency values, the highest value of the range shall be used for the calculation; - Default efficiency of 40 %.

31. Project proponents shall provide evidence to a validating DOE that only the biogas recovered through the project manure management system is used for power generation; no other gas or fuels except a start-up fuel[3] are used.

32. In case of project activities covered under paragraph 6, the relevant procedure in AMS-III.H shall be followed.

33. Project activities where a portion of the biogas is destroyed through flaring and the other portion is used for energy may consider applying the flare efficiency to the portion of the biogas used for energy, if separate measurements of the respective flows are not performed. When the amount of methane that is combusted for energy and that is flared is separately monitored, or when only the biogas flow to the flare is monitored and the biogas used for energy is calculated based on electricity generation, a destruction efficiency of 100% can be used for the amount that is combusted for energy.

34. Where applicable, the proper soil application (not resulting in methane emissions) of the residual waste shall be monitored.

35. The monitoring plan should include on-site inspections for each individual farm included in the project boundary where the project activity is implemented for each verification period.

36. If the option in paragraph 17(a) is chosen for baseline emission determination,

(a) The PDD shall describe the system used for monitoring the fraction of the manure handled in the animal manure management system ($MS\%_{,i,y}$), the average weight of the livestock (W_{site}) and the livestock population ($N_{LT,y}$) taking into account the average number of days the animals are alive in the farm in a specific year. The consistency between these values and indirect information (records of sales, records of food purchases) shall be assessed. Significant changes in livestock population and average weight shall be explained;

[3] If a fuel is defined as a start-up fuel, it should not represent more than 1% of the total fuel utilized in the process, on energy basis.

(b) If developed country *VS* values are being used the following shall be monitored:

(i) Genetic source of the production operations livestock originates from an Annex I Party;

(ii) The formulated feed rations (*FFR*). If equation 3 is used to estimate the value $VS_{default}$ (kg-dm/animal/day), the default average animal weight of a defined population (kg) shall be recorded and archived.

5. Monitoring methodology

37. Relevant parameters shall be monitored as indicated in section 5.1 below. The applicable requirements specified in the "General Guidelines for SSC CDM methodologies" (e.g. calibration requirements, sampling requirements) are also an integral part of the monitoring guidelines specified below and therefore shall be referred by the project participants.

5.1. Data and parameters monitored

Data / Parameter table 1.

Data / Parameter:	$\mathbf{VS_{LT,y}}$
Data unit:	kg dry matter/animal/year
Description:	Volatile solids for livestock *LT* entering the animal manure management system in year *y*
Source of data:	-
Measurement procedures (if any):	Only required when data from national published source are not available or IPCC default value from *2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 4 chapter 10 table 10 A-4 to 10 A-9* are not used. When country-specific excretion rates is to be estimated from feed intake levels as indicated in the paragraph 18(b), via the enhanced characterisation method (Tier 2) described in section 10.2 in *2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 4 chapter 10*, parameters of GE_{LT}, DE_{LT}, *UE*, *ASH* and ED_{LT} shall be monitored as detailed below to derive this value. When developed country values are to be used in the project, relevant parameters specified in the paragraph 18(d) and 36(b) shall be monitored/documented. If IPCC default values are to be adjusted for a site-specific average animal weight as specified in paragraph 18(c), the average animal weight of a defined livestock population at the project site (W_{site}) shall be monitored as detailed in the table 4 below.
Monitoring frequency:	Annually
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 2.

Data / Parameter:	$N_{da,y}$
Data unit:	Number
Description:	Number of days animal is alive in the farm in the year *y*
Source of data:	-
Measurement procedures (if any):	The PDD should describe the system for monitoring the number of livestock population. The consistency between the value and indirect information (records of sales, records of food purchases) should be assessed sales, records of food purchases) should be assessed
Monitoring frequency:	Annually, based on monthly records
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 3.

Data / Parameter:	$N_{p,y}$
Data unit:	Number
Description:	Number of animals produced annually of type *LT* for the year *y*
Source of data:	-
Measurement procedures (if any):	The PDD should describe the system on monitoring the number of livestock population. The consistency between the value and indirect information (records of sales, records of food purchases) should be assessed
Monitoring frequency:	Annually, based on monthly records
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 4.

Data / Parameter:	W_{site}
Data unit:	kg
Description:	Average animal weight of a defined livestock population at the project site
Source of data:	-
Measurement procedures (if any):	When IPCC values of VS are adjusted for site specific animal weight as per para 16(c) and equation 3 sampling procedures can be used to estimate this variable as per the “Standard for sampling and surveys for CDM project activities and Programmes of Activities”
Monitoring frequency:	Annually
QA/QC procedures:	-
Any comment:	-

Box 2. Non-binding best practice example 3: Procedure to measure W_{site}

The project activity will collect and treat the manure from dairy cattle by anaerobic digestion process, and use the biogas generated during the treatment process for electricity generation. The project participant would like to use the sampling procedures from the approved methodology ACM0010": "Consolidated baseline methodology for GHG emission reductions from manure management systems" version 10 (Parameter 29). The following provides an illustration for the sampling plan:

Sampling design

1. Objective and reliability requirements: The objective of the sampling plan is to determine the average weight of the cattle. The confidence/precision level of 90/10 will be applied.
2. Target population: The target population is the 30,000 cattle in the farm, classified into 5 age categories, i.e. dry cow, milk cow, young cow, growing cow and calf.
3. Sampling method: Stratified random sampling will be carried out. The cattle population will be classified into 5 age categories as above.

   Sample size: Approximate equation from the section 2.1.8 of Appendix 1 of *"Guideline: Sampling and surveys for CDM project activities and programmes of activities" version 03.0* is used. A coefficient of variation (V) of 1 is used. The sample size is calculated as 271. After applying a response rate of 90% and 10% contingency, the sample size is rounded up to 333. (*Please see Appendix 1 of "Guideline: Sampling and surveys for CDM project activities and programmes of activities" version 03.0 for the example of the calculation of sampling size. Or alternatively use the sample size calculator available at <https://cdm.unfccc.int/Reference/Guidclarif/index.html>*.
5. Sampling frame: Sampling frame is worked out independently by taking categories as sampling unit. Sampled group will be changed in each monitoring period. Based on the data available on 13/12/2012, when some cows have not been put into the farm, the sample size for each age category is determined as follows:

Category	Number of animal up to 13/12/2012	Percentage	Number of animal expected	Sample size based on number of animal expected
Milk cow	7373	30%	9093	101
Dry cow	4188	17%	5165	57
Young cow	6282	26%	7748	86
Growing cow	3444	14%	4248	47
Calf	3037	12%	3746	42
Total	24324	100%	30000	333

Data

1. Field Measurements: For each sampled cow, the weight will be monthly monitored with the scale installed at the farm by project owner.
2. Quality Assurance/Quality Control: Every technician to monitor the sampled cow will fill in the date and signature; the monitor forms will be collected, summarized and kept by the project participant. In addition, the scale will be calibrated annually.
3. Data analysis: The primary monitoring data are collected and used to calculate GHG emission reductions.

Implementation plan

The project participant will establish the detailed measurement plan and train the employees in the farm to collect the data, and the data shall be summarized and analyzed by the CDM manager.

Data / Parameter table 5.

Data / Parameter:	$\mathbf{BG_{burnt,y}}$
Data unit:	m^3
Description:	Biogas volume in year *y*
Source of data:	-
Measurement procedures (if any):	The amount of biogas recovered and fuelled, flared or used gainfully shall be monitored ex post, using flow meters. If the biogas flared and fuelled (or utilized) is continuously monitored separately, the two fractions can be added to determine the biogas recovered. In that case, recovered biogas need not be monitored separately. The system should be built and operated to ensure that there is no air ingress into the biogas pipeline. The methane content measurement shall be carried out close to a location in the system where a biogas flow measurement takes place, and on the same basis (wet or dry)
Monitoring frequency:	Annually, based on continuous flow measurement with accumulated volume recording (e.g. hourly/daily accumulated reading)
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 6.

Data / Parameter:	$\mathbf{w_{CH4}}$
Data unit:	%
Description:	Methane content in biogas in the year *y*
Source of data:	-
Measurement procedures (if any):	The fraction of methane in the biogas should be measured with a continuous analyser (values are recorded with the same frequency as the flow) or, with periodical measurements at a 90/10 confidence/precision level by following the “Standard for sampling and surveys for CDM project activities and Programme of Activities”, or, alternatively a default value of 60% methane content can be used. Option chosen should be clearly specified in the PDD. It shall be measured using equipment that can directly measure methane content in the biogas - the estimation of methane content of biogas based on measurement of other constituents of biogas such as CO_2 is not permitted. The methane content measurement shall be carried out close to a location in the system where a biogas flow measurement takes place, and on the same basis (wet or dry)
Monitoring frequency:	-
QA/QC procedures:	-
Any comment:	-

Box 3. Non-binding best practice example 4: Application of the default value of methane content in biogas

The project activity will capture methane from manure in a covered anaerobic lagoon in a poultry farm. The captured methane will be used for electricity generation in a gas engine. The project participant opts to use the default value of 60% dry basis instead of measuring the methane content. Therefore, the project participant monitors the flow of biogas ($B_{burnt,y}$) on a dry basis.

Data / Parameter table 7.

Data / Parameter:	**T**
Data unit:	ºC
Description:	Temperature of the biogas at the flow measurement site
Source of data:	-
Measurement procedures (if any):	As per the relevant procedure in AMS-III.H
Monitoring frequency:	-
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 8.

Data / Parameter:	**P**
Data unit:	Pa
Description:	Pressure of the biogas at the flow measurement site
Source of data:	-
Measurement procedures (if any):	As per the relevant procedure in AMS-III.H
Monitoring frequency:	-
QA/QC procedures:	-
Any comment:	-

Box 4. Non-binding best practice example 5: Measurement of temperature and pressure of the biogas (Data/Parameter table 7 and 8)

The project participant wishes to carry out sampling to determine the temperature of the biogas with 90/10 confidence/precision level. The project proponent estimates the average temperature of the biogas (*mean*) to be 34 °C. Based on the information from other CDM projects or other projects in the region, the project participant estimates the standard deviation (*SD*) to be 6 °C. The number of measurements required to meet the 90/10 reliability is calculated according to:

$$\boldsymbol{n} = \left(\frac{\boldsymbol{t_{n-1}} \times \boldsymbol{SD}}{\boldsymbol{0.1} \times \boldsymbol{mean}}\right)^{\boldsymbol{2}}$$

Where t_{n-1} is the value of the t-distribution for 90% confidence for a sample size of n. However, the sample size is not yet known, and so the first step is to use the value for 90% confidence when the sample is large, i.e. 1.645, and then refine the calculation:

$\boldsymbol{n} = \left(\frac{\mathbf{1.645} \times \mathbf{6}}{\mathbf{0.1} \times \mathbf{34}}\right)^{\mathbf{2}} = \mathbf{8.4}$, rounded up to 9. The exact value for t_{n-1} can be acquired from any set of general statistical tables or using standard statistical software. For a sample size of 9 the value is 1.860. The calculation now gives $\boldsymbol{n} = \left(\frac{\mathbf{1.860} \times \mathbf{6}}{\mathbf{0.1} \times \mathbf{34}}\right)^{\mathbf{2}} = \mathbf{10.77}$, which rounds up to 11. This process is iterated until there is no change to the value of n. Here the repeated calculation would result in a t-value of 1.812 and the calculation would yield n = 10.22, which would be rounded up to 11. The sample size calculation suggests that to accommodate 11 measurements per year, sampling every five weeks should be sufficient for 90/10 reliability. For simplification, monthly measurement, corresponding to 12 measurements per year, will be done.

For the biogas pressure, the same sampling plan also applies. Considering the expected biogas pressure of 900 mbar and the SD of 120 mbar, the calculation results in 7 measurements per year. For simplification, the sampling for biogas pressure will be done on a monthly basis, corresponding to 12 measurements per year, carried out at the same time as the measurement for the biogas temperature.

Data / Parameter table 9.

Data / Parameter:	**FE**
Data unit:	%
Description:	The flare efficiency
Source of data:	-
Measurement procedures (if any):	As per the tool “Project emissions from flaring”. Regular maintenance shall be carried out to ensure optimal operation of flares
Monitoring frequency:	-
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 10.

Data / Parameter:	$\mathbf{Q_{manure,LT,y}}$
Data unit:	Tonnes-dm/year
Description:	Quantity of manure treated from livestock type *LT* at animal manure management system *j*
Source of data:	-

Measurement procedures (if any):	As the case in paragraph 17(b), manure weight shall be directly measured or alternatively manure volume can be measured together with the density determined from representative sample (90/10 precision). The quantity of animal manure from different farms and different animal types shall be recorded separately for crosscheck. Recording of the baseline animal manure management system where the animal manure would have been treated anaerobically is also required
Monitoring frequency:	Annually, based on daily measurement and monthly aggregation
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 11.

Data / Parameter:	**$SVS_{j,LT,y}$**
Data unit:	tonnes VS/tonnes--dm
Description:	Specific volatile solids content of animal manure from livestock type *LT* and animal manure management system *j* in year *y*
Source of data:	-
Measurement procedures (if any):	If animal manure is treated in a centralized plant, as the case in paragraph 17(b), testing shall be performed according to the guideline in annex 2 of AM0073. It can be on sample basis by following the “Standard for sampling and surveys for CDM project activities and programme of activities“, with a maximum margin of error of 10% at a 90% confidence level
Monitoring frequency:	Annually
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 12.

Data / Parameter:	**-**
Data unit:	-
Description:	Parameters related to project emissions from incremental transportation distances in year *y*
Source of data:	-
Measurement procedures (if any):	Used to calculate $PE_{transp,y}$. As per the relevant procedure in AMS-III.AO
Monitoring frequency:	-
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 13.

Data / Parameter:	**-**
Data unit:	-
Description:	Parameters related to project emissions from flaring of the residual gas stream in year *y*

Source of data:	-
Measurement procedures (if any):	Used to calculate $PE_{flare,y}$. As per the tool “Project emissions from flaring”
Monitoring frequency:	-
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 14.

Data / Parameter:	**-**
Data unit:	-
Description:	Parameters related to emissions from electricity and/or fuel consumption in year *y*
Source of data:	-
Measurement procedures (if any):	Used to calculate $PE_{power,y}$. As per the procedure in the “Tool to calculate baseline, project and/or leakage emissions from electricity consumption” and/or “Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion”. Alternatively it shall be assumed that all relevant electrical equipment operate at full rated capacity, plus 10% to account for distribution losses, for 8760 hours per annum
Monitoring frequency:	-
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 15.

Data / Parameter:	**$MS\%_{i,y}$**
Data unit:	%
Description:	Fraction of manure handled in system *i* in project activity in year *y*
Source of data:	-
Measurement procedures (if any):	If animal manure is treated in different treatment systems manure weight delivered to each system shall be directly measured or alternatively manure volume can be measured together with the density determined from representative sample (90/10 precision). The quantity of animal manure from different farms and different animal types shall be recorded separately for cross-check. Recording of the baseline animal manure management system where the animal manure would have been treated anaerobically is also required
Monitoring frequency:	Annually, based on daily measurement and monthly aggregation
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 16.

Data / Parameter:	**AL_l**
Data unit:	Days

Description:	Annual average interval between manure collection and delivery for treatment at a given storage device *l*
Source of data:	-
Measurement procedures (if any):	It is to be used to calculate possible project emissions due the storage of animal manure, as per paragraph 25
Monitoring frequency:	Annually, based on monthly records
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 17.

Data / Parameter:	nd_y
Data unit:	Days
Description:	Number of days that the animal manure management system was operational
Source of data:	-
Measurement procedures (if any):	If any farm has no operations on a given day it needs to be documented (e.g. logbook) and taken into account for the calculation of $BE_{ex\ post}$
Monitoring frequency:	Annually, based on daily records and monthly aggregation
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 18.

Data / Parameter:	$MS\%_l$
Data unit:	%
Description:	Fraction of volatile solids handled by storage device *l*
Source of data:	-
Measurement procedures (if any):	It is to be used to calculate possible project emissions due the storage of animal manure, as per paragraph 25
Monitoring frequency:	Monthly
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 19.

Data / Parameter:	$B_{0,LT}$
Data unit:	$m^3\ CH_4$/kg-dm
Description:	Maximum methane producing potential of the volatile solid generated for animal type *LT*
Source of data:	-
Measurement procedures (if any):	Only when developed country values are to be used in the project, in such a case relevant parameters specified in the paragraph 18(d) shall be monitored/documented
Monitoring frequency:	Annually

QA/QC procedures:	-
Any comment:	-

Data / Parameter table 20.

Data / Parameter:	**GE_{LT}**
Data unit:	MJ/day
Description:	Daily average gross energy intake
Source of data:	-
Measurement procedures (if any):	Only when country-specific excretion rates are to be estimated from feed intake levels as indicated in the para 16(b), via the enhanced characterisation method (Tier 2) described in section 10.2 in *2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 4 chapter 10*
Monitoring frequency:	Annually
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 21.

Data / Parameter:	**DE_{LT}**
Data unit:	%
Description:	Digestible energy of the feed
Source of data:	-
Measurement procedures (if any):	If IPCC Tier 2 is used for VS determination. IPCC 2006 Table 10.2, Chapter 10, Volume 4
Monitoring frequency:	-
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 22.

Data / Parameter:	**UE**
Data unit:	Fraction of GE
Description:	Urinary energy, expressed as fraction of *GE*
Source of data:	-
Measurement procedures (if any):	If IPCC Tier 2 is used for VS determination. Typically, 0.04GE can be considered urinary energy excretion by most ruminants (reduce to 0.02 for ruminants fed with 85% or more grain in the diet or for swine). Use country-specific values where available
Monitoring frequency:	-
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 23.

Data / Parameter:	**ASH**
Data unit:	Fraction of the dry matter feed intake
Description:	Ash content of the manure calculated as a fraction of the dry matter feed intake
Source of data:	-
Measurement procedures (if any):	If IPCC Tier 2 is used for VS determination. Use country-specific values where available
Monitoring frequency:	-
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 24.

Data / Parameter:	$\mathbf{ED_{LT}}$
Data unit:	MJ/kg-dm
Description:	Energy density of the feed in MJ/kg fed to livestock type LT
Source of data:	-
Measurement procedures (if any):	If IPCC Tier 2 is used for VS determination. IPCC notes the energy density of feed, ED, is typically 18.45 MJ/kg-dm, which is relatively constant across a wide variety of grain-based feeds. The project proponent will record the composition of the feed to enable the DOE to verify the energy density of the feed
Monitoring frequency:	-
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 25.

Data / Parameter:	$\mathbf{EG_y}$
Data unit:	MWh
Description:	Total electricity generated from the recovered biogas in year *y*
Source of data:	-
Measurement procedures (if any):	Only required for project activities that utilize the recovered methane for power generation as per paragraph 30
Monitoring frequency:	-
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 26.

Data / Parameter:	$\mathbf{EE_y}$
Data unit:	%
Description:	Energy Conversion Efficiency of the project equipment
Source of data:	-

Measurement procedures (if any):	As per paragraph 30 Specification provided by the equipment manufacture. The equipment shall be designed to utilize biogas as fuel, and the efficiency specification is for this fuel. If the specification provides a range of efficiency values, the highest value of the range shall be used for the calculation
Monitoring frequency:	-
QA/QC procedures:	-
Any comment:	-

6. Project activity under a programme of activities

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

(a) If 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.

Appendix. Anaerobic unit process performance

Table. Anaerobic unit process performance

Anaerobic Treatment	HRT	COD	TS	VS	TN	P	K
	days	Per cent Reduction					
Pull plug pits	4-30	—	0-30	0-30	0-20	0-20	0-15
Underfloor pit storage	30-180	—	30-40	20-30	5-20	5-15	5-15
Open top tank	30-180	—	—	—	25-30	10-20	10-20
Open pond	30-180	—	—	—	70-80	50-65	40-50
Heated digester effluent prior to storage	12-20	35-70	25-50	40-70	0	0	0
Covered first cell of two cell lagoon	30-90	70-90	75-95	80-90	25-35	50-80	30-50
One-cell lagoon	>365	70-90	75-95	75-85	60-80	50-70	30-50
Two-cell lagoon	210+	90-95	80-95	90-98	50-80	85-90	30-50
HRT=hydraulic retention time; COD=chemical oxygen demand; TS=total solids; VS=volatile solids; TN=total nitrogen; P=phosphorus; K=potassium; — =data not available.							

Source: Moser and Martin, 1999

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Document information*

Version	*Date*	*Description*
21.0	22 September 2017	EB 96, Annex 9 Revision to clarify options to estimate volatile solids.
20.1	23 October 2015	Editorial revision to reflect the decision of EB 85 to classify the methodology under sectoral scope 13 and to include a table of content.
20.0	16 October 2015	EB 86, Annex 15 Revision to include non-binding best practice examples.
19.0	23 November 2012	EB 70, Annex 31. To include simplified requirements for project activities that utilize the recovered methane for power generation; and to include further guidance on additionality demonstration for project applying this methodology.

* This document, together with the 'General Guidance' and all other approved SSC methodologies, was part of a single document entitled: Appendix B of the Simplified Modalities and Procedures for Small-Scale CDM project activities until version 07.

Version	*Date*	*Description*
18	29 September 2011	EB 63, Annex 22. To include the monitoring table to clarify the monitoring requirements.
17	26 November 2010	EB 58, Annex 20. To cover centralized treatment of animal manure collected from different farms and to include provisions for determining baseline emissions based on the direct measurement of manure quantity and volatile solids.
16.1	01 June 2010	Editorial revision in paragraph 2(c): • To change storage time from 5 days to 45 days.
16	26 March 2010	EB 53, Annex 16. To include additional guidance for long term storage of manure after removal from the animal barns.
15	17 July 2009	EB 48, Annex 18. To provide additional guidance on consideration of the storage time of animal manure taking into account the fact that the manure could be transported from locations other than the location of the anaerobic digester.
14	14 March 2008	EB 38, Annex 11. To: • Clarify the use of the tier 2 approach of 2006 IPCC guidelines for emission reduction calculations for manure management systems; and • Expand the applicability of the methodology to include the possibility of pipeline transport of the recovered and upgraded biogas to the end-users, similar to the revision recommended to AMS-III.H.
13	27 July 2007	EB 33, Annex 32. Revision of the approved small-scale methodology AMS-III.D to allow for its application under a programme of activities (PoA).
12	04 May 2007	EB 31, Annex 22. To clarify that in the monitoring plan on-site inspections are to be conducted for each individual farm and includes additional guidance on how to determine the efficiency of the flaring process in an enclosed flare and in an open flare; To assign scope 15 to this methodology and exclude this methodology from sectoral scopes 10 and 13, and to clarify that that DOE functions (validation, verification etc.) of project activities applying earlier versions can only be performed by DOEs accredited to all of the sectoral scopes to which the earlier versions of these methodologies respectively belong to.

Version	*Date*	*Description*
11	23 December 2006	EB 28, Meeting report, Para. 64. To remove the interim applicability condition that is 25 ktCO_2e/y limit from all Type III categories.
10	28 July 2006	EB 25, Annex 25. To expand its applicability to cover project activities that change manure management practices that is from ‘lagoon’, ‘liquid/slurry’, ‘solid storage’ or ‘drylot’ to ‘anaerobic digestion’ for the treatment of swine or cattle manure.
9	12 May 2006	EB 24, Meeting report, Para. 64. To introduce the interim applicability condition that is 25kt CO_2e/y limit for all Type III categories.
8	03 March 2006	EB 23, Annex 25. To clarify its applicability and align it with AMS-III.F, AMS-III.G, AMS-III.H and AMS-III.I.

Decision Class: Regulatory
Document Type: Standard
Business Function: Methodology
Keywords: animal manure management systems, methane, simplified methodologies, type (iii) projects

History of the document: Appendix B of the Simplified Modalities and Procedures for Small-Scale CDM project activities

Appendix B of the Simplified Modalities and Procedures for Small-Scale CDM project activities contained both the General Guidance and Approved Methodologies until version 07. After version 07 the document was divided into separate documents: ‘General Guidance’ and separate approved small-scale methodologies (AMS).

Version	*Date*	*Description*
07	25 November 2005	EB 22, Para. 59. References to “non-renewable biomass” in Appendix B deleted.
06	20 September 2005	EB 21, Annex 22. Guidance on consideration of non-renewable biomass in Type I methodologies, thermal equivalence of Type II GWhe limits included.
05	25 February 2005	EB 18, Annex 6. Guidance on ‘capacity addition’ and ‘cofiring’ in Type I methodologies and monitoring of methane in AMS-III.D included.
04	22 October 2004	EB 16, Annex 2. AMS-II.F was adopted, leakage due to equipment transfer was included in all Type I and Type II methodologies.

Version	*Date*	*Description*
03	30 June 2004	EB 14, Annex 2. New methodology AMS-III.E was adopted.
02	28 November 2003	EB 12, Annex 2. Definition of build margin included in AMS-I.D, minor revisions to AMS-I.A, AMS-III.D, AMS-II.E.
01	21 January 2003	EB 7, Annex 6. Initial adoption. The Board at its seventh meeting noted the adoption by the Conference of the Parties (COP), by its decision 21/CP.8, of simplified modalities and procedures for small-scale CDM project activities (SSC M&P).

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