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

TYPE III - OTHER PROJECT ACTIVITIES

Project participants shall apply the general guidelines to the SSC CDM methodologies, attachment A to Appendix B of the provided at <http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html> *mutatis mutandis*.

~~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.W. Methane capture and destruction in non-hydrocarbon mining activities

Technology/measure

1. This methodology comprises activities that capture ~~and~~ , utilize and/or destroy methane released directly from holes bored to geological formations specifically for mineral exploration and prospecting.

2. Following conditions are applicable:

(a) Abandoned or decommissioned mines, as well as open cast mines are excluded. Coal extraction mines or oil shale, as well as boreholes or wells opened for gas/oil exploration or extraction do not qualify under this methodology;

(b) Project participants are able to demonstrate that the methane captured would have been emitted to the atmosphere in the absence of the project activity using historic mine records and safety procedures. The exploration plans shall be available as required evidence;

(c) Only methane emitted from structures (adits, boreholes, etc.) designed and installed solely for prospecting of minerals[1] qualify; pre mining drainage related to minerals for which the mine was developed and is being operated does not qualify. Dedicated methane or natural gas extraction is excluded;

(d) Maximum outside diameter of the boreholes included under this methodology should not exceed 134[2] mm;

(e) This methodology is applicable to the following cases:

(i) Structures installed, or boreholes drilled before end of 2001; or

(ii) Structures installed, or boreholes drilled after 2001 ~~but a minimum of 5 years prior to the submission of the project activity for validation~~, where it can be demonstrated that the structures or the boreholes were part of an exploration plan. The assessment of the reserve mapping programme must be conducted by an independent external reserve mapping expert;

[1] Reference to 'mineral' in this methodology is to be considered as 'non hydrocarbon mineral'.

[2] In the case boreholes or wells opened for gas/oil exploration or extraction, excluded per paragraph 2(a), the outside diameter of the boreholes or wells will be greater than 150 mm.

(f) This methodology is applicable if baseline scenario for methane capture, and destruction is a total venting ~~atmospheric release~~ of methane into the atmosphere. In cases of projects under paragraph 2 (e) (ii), it shall be demonstrated using the related and relevant procedures prescribed in the "General Guidelines to small scale CDM methodologies", that the most plausible baseline scenario for the recovered methane is the total venting of methane. The assessment shall include flaring of the methane as one of the alternatives. That is, the methodology is not applicable to project activities where part of the methane ~~released~~ vented is already or would have been combusted or used for an application before the implementation of the project activity;

(g) The methodology requires that baseline scenario is compliant with national or local safety requirement or local regulations.

~~3. The methodology is applicable to project activities that capture and destroy methane within the project boundary. That means, there will be no transportation, distribution or selling of methane or natural gas to users outside the mining site.~~

3. This methodology excludes measures that would increase the amount of methane emissions from the boreholes beyond the natural release as would occur in the baseline. This means forced extraction by pumping; the use of CO_2 or any other fluid/gas to enhance methane drainage is excluded. If a fan or compressor for a flare or methane utilization equipment is used, the lowest possible fan/compressor capacity should be established under which flare/compressor can properly operate.

~~4. This methodology is not applicable if a combustion facility is used for heat and/or electricity generation. Should there be a case for generation of electricity or thermal energy from the methane, a request for revision of this methodology may be submitted in accordance with the procedures.~~

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

Boundary

~~5. The project boundary is the actual area of the borehole or venting shaft and the infrastructure under the project activity (e.g. pipes, flares, fans, fire breaks, fences and security).~~

5. The spatial extent of the project boundary comprises of:

(a) The entire area where the exploration and prospecting for mineral has been carried out in accordance with the approved reserve mapping programme.

(b) All equipment installed and used as part of the project activity for the extraction, compression, and storage of methane at the project site, its transportation to off-site users and the off-site users;

(c) Flaring, captive power and heat generation facilities installed and used as part of the project activity;

(d) Power plants connected to the electricity grid, where the project activity exports or imports power from the grid, as per the definition of an electricity system in the latest approved version of the "Tool to calculate the emission factor for an electricity system".

Baseline

6. Baseline emissions consist of:

(a) methane that would have been vented into the atmosphere;

(b) CO_2 emissions from the production of power and/or heat and/or vehicle fuel displaced.

7. Baseline emissions for methane capture and utilization or destruction can be calculated as per the equation below:

$$BE_y = BE_{MR,y} + BE_{Use,y} \quad \textbf{(1)}$$

Where:

BE_y	Baseline emissions in year *y* (tCO_2e/y)
$BE_{MR,y}$	Baseline emissions from the venting of methane into the atmosphere in year *y* that is avoided by the project activity (tCO_2e/y)
$BE_{Use,y}$	Baseline emissions from the production of power and/or heat and/or vehicle fuel displaced by the project activity in year *y* (tCO_2e/y)

Baseline emissions from the venting of methane into the atmosphere

8. ~~In the baseline scenario methane is emitted to atmosphere.~~ The baseline emissions from the venting of methane into the atmosphere $BE_{MR,y}$ are calculated *ex post* as the methane in the residual gas multiplied with the global warming potential for methane. The baseline emissions from the venting of methane into the atmosphere are calculated in accordance with the procedures of "Tool to determine project emission from flaring gases containing methane":

$$BE_{MR,y} = \sum_{h=1}^{8760} TM_{RG,h} * \frac{GWP_{CH4}}{1000} \quad \textbf{(2)}$$

Where:

~~BE_y~~	~~Baseline emissions in year *y* (tCO_2e)~~
$TM_{RG,h}$	Mass flow rate of methane in the residual gas (in the Tool it is defined as the gas stream flowing to the flare and/or for utilization) in the hour *h* (kg/h)
GWP_{CH4}	Global warming potential for methane (value of 21)
~~1/1000~~	~~Factor to convert kg/y to tonne/y~~

9. The *ex ante* baseline emissions is calculated based on measured data prior to the project activity. This requires sampling to assess the expected flow and composition of the residual gas. Such sampling should cover a sufficiently long period of at least one year. If the measurements detect any long time trend of decreasing flow or concentration, this should be taken into account for conservative estimations for the crediting period.

Baseline emissions from the production of power and/or heat and/or vehicle fuel replaced by the project activity

10. Baseline emissions from the production of power, heat and vehicle fuel displaced can be calculated as per the equation below:

$$BE_{Use,y} = EG_{ELEC,PJ,y} * EF_{ELEC} + EG_{HEAT,PJ,y} * EF_{HEAT} + VFUEL_y * EF_{V,y} + ABS_y * \frac{COP_{ABS}}{COP_{ELEC}} * EF_{ELEC} \quad (3)$$

Where:

$EG_{ELEC,PJ,y}$	Electricity generated by the project activity in year *y* (MWh)
EF_{ELEC}	Emission factor for electricity generation (grid, captive or a combination) replaced by project activity (tCO_2/MWh)
$EG_{HEAT,PJ,y}$	Heat generation by project activity in year *y* (GJ)
EF_{HEAT}	Emission factor for heat generation replaced by the project activity (tCO2/GJ)
$VFUEL_y$	Vehicle fuel provided by the project activity in year *y* (GJ),
$EF_{V,y}$	Emission factor for vehicle fuel replaced by project activity (tCO2/GJ)
ABS_y	Chilling produced in project activity by absorption chillers in year *y* (MWh)
COP_{ABS}	Coefficient of performance of the absorption chillers (MW thermal input/MW thermal output)
COP_{ELEC}	Coefficient of performance of the electrical chillers used in the baseline chillers (MW electrical input/MW thermal output)

Grid emission factor

11. In cases where power supply from the grid would be replaced by the project activity, the emission factor for displaced electricity $EF_{ELEC} = EF_{grid}$ is calculated as per the procedures provided in AMS-I.D.

Captive power generation emission factor

12. In cases where captive power generation would be replaced by the project activity, the emission factor for displaced electricity $EF_{ELEC} = EF_{captive}$ is calculated as follows:

$$EF_{captive} = \frac{EF_{CO2}}{Eff_{captive}} \times \frac{44}{12} \times \frac{3.6}{1000} \quad (4)$$

Where:

$EF_{captive}$	Emission factor for baseline captive power generation (tCO_2/MWh)
EF_{CO2}	CO_2 emissions factor of fuel[3] used in captive power generation (tC/TJ)
$Eff_{captive}$	Efficiency of the captive power generation (%)
44/12	Carbon to carbon dioxide conversion factor
3.6/1000	TJ to MWh conversion factor

Combination of grid power and captive power emissions factor

13. In cases where both captive and grid power would have been used in the baseline, then the emissions factor is the weighted average of the emission factor for the grid and for the captive power generation:

$$EF_{ELEC} = s_{grid} \cdot EF_{grid} + s_{captive} \cdot EF_{captive} \quad (5)$$

Where:

EF_{ELEC}	CO_2 baseline emission factor for the electricity displaced due to the project activity (tCO_2/MWh).
EF_{grid}	CO_2 baseline emission factor for the grid electricity displaced due to the project activity (tCO_2/MWh).
$EF_{captive}$	CO_2 baseline emission factor for the captive electricity displaced due to the project activity (tCO_2/MWh)
s_{grid}	Share of the electricity demand supplied by the grid imports over the last 3 years (%)
$s_{captive}$	Share of the electricity demand supplied by captive power over the last 3 years (%)

Heat generation emission factor

14. In cases where heat generation is replaced by the project activity, the emission factor for displaced heat generation is calculated as follows:

$$EF_{heat} = \frac{EF_{CO2}}{Eff_{heat}} \times \frac{44}{12} \times \frac{1}{1000} \quad (6)$$

[3] In the case where several fossil fuels are used for power generation, the fuel with the lowest emission factor should be used for the calculations of the baseline emissions.

Where:

EF_{heat}	Emission factor for heat generation (tCO_2/GJ)
EF_{CO2}	CO_2 emissions factor of fuel[4] used in heat generation (tC/TJ)
Eff_{heat}	Efficiency of a boiler used for the heat generation (%)
44/12	Carbon to carbon dioxide conversion factor
1/1000	TJ to GJ conversion factor

15. To estimate efficiency of thermal or electrical energy generation system the relevant provisions of the most recent version of "Tool to determine the baseline efficiency of thermal or electrical energy generation systems" shall be followed.

Vehicle fuel use emissions factor

16. If the project activity includes supply of methane for the use as vehicle fuel, the emissions factor for displaced vehicle fuel use in the baseline is calculated as follows:

$$EF_{V,y} = \frac{EF_{CO2,i,y}}{Eff_V} \times \frac{44}{12} \times \frac{1}{1000} \qquad \textbf{(7)}$$

Where:

$EF_{V,y}$	Emissions factor for vehicle fuel replaced by project activity (tCO2/GJ)
$EF_{CO2,i,y}$	CO_2 emissions factor of fuel used for vehicle operation during year y (tC/TJ)
Eff_V	Vehicle engine efficiency (%)
44/12	Carbon to Carbon Dioxide conversion factor
1/1000	TJ to GJ conversion factor

17. To estimate vehicle engine efficiency, project participants should select the highest value among the following three values as a conservative approach:

(a) Measured fuel efficiency prior to the start of the project activity;

(b) Measured fuel efficiency during monitoring;

(c) Manufacturer's specifications for efficiency of vehicle.

Leakage

18. If the methane recovery and combustion technology is equipment transferred from another activity. ~~or if the existing equipment is transferred to another activity,~~ leakage is to be considered.

Project activity emissions

[4] In the case where several fossil fuels are used for heat generation, the fuel with the lowest emission factor should be used for the calculations of the baseline emissions.

19. Project activity emissions consist of:

(a) Any grid electricity or fossil fuel used in the project equipment. The emissions associated with grid electricity consumption should be calculated in accordance to ~~AMS-I.D.~~ "Tool to calculate baseline, project and/or leakage emissions from electricity consumption";

(b) The CO_2 emissions from the combusted methane are calculated and included as project emissions because the methane is from fossil origin;

(c) Emissions from un-combusted methane is calculated in accordance with the "Tool to determine project emission from flaring gases containing methane."

20. Project emissions can be determined as follows:

$$PE_y = PE_{ME,y} + PE_{MD,y} + PE_{UM,y} \quad \textbf{(8)}$$

Where:

PE_y	Project emissions in year *y* (tCO_2e/y)
$PE_{ME,y}$	Project emissions from energy use to capture and use methane in year *y* (tCO_2e/y)
$PE_{MD,y}$	Project emissions from methane destroyed in year *y* (tCO_2e/y)
$PE_{UM,y}$	Project emissions from un-combusted methane in year *y* (tCO_2e/y)

21. Project emissions from energy use ($PE_{ME,y}$) to capture and destroy methane in year *y* shall be determined as follows:

$$PE_{ME,y} = PE_{ELEC,y} + PE_{FF,y} \quad \textbf{(9)}$$

Where:

$PE_{ELEC,y}$	Project emissions from the use of electricity for the operation of the facilities installed in the project activity in year *y* calculated in accordance to ~~AMS-I.D~~ "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" (tCO_2 e/y)
$PE_{FF,y}$	Project emissions from the combustion of fossil fuels for the operation of the facilities installed in the project activity in year *y* calculated in accordance with the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" (tCO_2e)

22. Project emissions from methane destroyed in year *y* ($PE_{MD,y}$) shall be determined as follows:

~~$$PE_{MD,y} = \sum_{h=1}^{8760} TM_{RG,h} * (\eta_{flare,h}) * \frac{CEF_{CH4}}{1000} \quad \textbf{(4)}$$~~

$$PE_{MD,y} = (MD_{FL,y} + MD_{ELEC,y} + MD_{HEAT,y} + MD_{GAS,y}) * (CEF_{CH4} + r * CEF_{NMHC}) \quad (10)$$

~~Where:~~

~~CEF_{CH4}~~	~~Carbon emission factor for combusted methane (2.75 tCO_2/tCH_4)~~
~~$\eta_{flare,h}$~~	~~Flare efficiency in hour *h*, according to the "Tool to determine project emission from flaring gases containing methane"~~
~~*1/1000*~~	~~Factor to convert kg/y to tonne/y~~

Where:

$PE_{MD,y}$	Project emissions from methane destroyed in year *y* (tCO_2e/y)
$MD_{FL,y}$	Amount of methane destroyed through flaring in year *y* (tCH_4/y)
$MD_{ELEC,y}$	Amount of methane destroyed through power generation in year *y* (tCH_4/y)
$MD_{HEAT,y}$	Amount of methane destroyed through heat generation in year *y* (tCH_4/y)
$MD_{GAS,y}$	Amount of methane destroyed after being supplied to gas grid or for vehicle use in year *y* (tCH_4/y)
CEF_{CH4}	Carbon emission factor for combusted methane (2.75 tCO_2/tCH_4)
CEF_{NMHC}	Carbon emission factor for combusted non methane hydrocarbons (the concentration varies and, therefore, to be obtained through periodical analysis of captured methane) ($tCO_2/tNMHC$)
r	Relative proportion of NMHC compared to methane, $r = PC_{NMHC} / PC_{CH4}$
PC_{CH4}	Concentration (in mass) of methane in extracted gas (%), measured on wet basis
PC_{NMHC}	NMHC concentration (in mass) in extracted gas (%), measured on wet basis

23. In each end-use, the amount of gas destroyed depends on the efficiency of combustion:

$$MD_{FL,y} = MMES_{FL,y} - (PE_{flare,y} / GWP_{CH4}) \quad (11)$$

Where:

$MD_{FL,y}$	Amount of methane destroyed through flaring in year *y* (tCH_4)
$MMES_{FL,y}$	Amount of methane sent to flare in year *y* (tCH_4)
$PE_{flare,y}$	Project emissions of non-combusted CH_4, expressed in terms of tCO_2e, from flaring of the residual gas stream in year *y* (tCO_2e)

24. The project emissions of non-combusted CH_4 expressed in terms of CO_2e from flaring of the residual gas stream ($PE_{flare,y}$) shall be calculated following the procedures described in the "Tool to determine project emissions from flaring gases containing methane".

25. The project emissions of methane destruction/oxidation in power plant are calculated as per the equation below:

$$MD_{ELECy} = MMES_{ELEC,y} * Eff_{ELEC} \quad \textbf{(12)}$$

Where:

$MMES_{ELEC,y}$	Amount of methane sent to power plant in year *y* (tCH_4)
Eff_{ELEC}	Efficiency of methane destruction/oxidation in power plant (taken as 99.5% from IPCC)

26. The project emissions of methane destruction/oxidation in heat plant are calculated as per the equation below:

$$MD_{HEAT,y} = MMES_{HEAT,y} * Eff_{HEAT} \quad \textbf{(13)}$$

Where:

$MMES_{HEAT,y}$	Amount of methane sent to heat plant in year *y* (tCH_4)
Eff_{HEAT}	Efficiency of methane destruction/oxidation in heat plant (taken as 99.5% from IPCC)

27. The project emissions of methane supplied to gas grid for vehicle use or heat/power generation off-site are calculated as per the equation below:

$$MD_{GAS,y} = MMES_{GAS,y} * Eff_{GAS} \quad \textbf{(14)}$$

Where:

$MMES_{GAS,y}$	Amount of methane supplied to gas grid for vehicle use or heat/power generation off-site in year y(tCH_4)
Eff_{GAS}	Overall efficiency of methane destruction/oxidation through gas grid to various combustion end uses, combining fugitive emissions from the gas grid and combustion efficiency at end user (taken as 98.5% from IPCC)[5]

[5] The Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories give a standard value for the fraction of carbon oxidised for gas combustion of 99.5% (Reference Manual, Table 1.6, page 1.29). It also gives a value for emissions from processing, transmission and distribution of gas which would be a very conservative estimate for losses in the grid and for leakage at the end user (Reference Manual, Table 1.58, page 1.121). These emissions are given as 118,000kgCH4/PJ on the basis of gas consumption, which is 0.6%. Leakage in the residential and commercial sectors is given as 0 to 87,000kgCH4/PJ, which is 0.4%, or in industrial plants and power station the losses are 0 to 175,000kg/CH4/PJ, which is 0.8%. These leakage estimates are additive. Eff_{GAS} can now be calculated as the product of these three efficiency factors, giving a total efficiency of (99.5% * 99.4% * 99.6%) 98.5% for residential and commercial sector users, and (99.5% * 99.4% * 99.2%) 98.1% for industrial plants and power stations.

Project emissions from un-combusted methane

28. Not all of the methane sent to the flare or used to generate power and heat will be combusted, so a small amount will escape to the atmosphere. These emissions are calculated using the following:

$$PE_{UM,y} = [GWP_{CH4} \times \sum_{i} MMES_{i,y} \times (1 - Eff_i)] + PE_{flare,y} \quad (15)$$

Where:

$PE_{UM,y}$	Project emissions from un-combusted methane in year y (tCO_2e)
i	Use of methane (power generation, heat generation, supply to gas grid to various combustion end uses)
$MMES_{i,y}$	Methane sent to use i in year y (tCH_4)
Eff_i	Efficiency of methane destruction in use i (%)
$PE_{flare,y}$	Project emissions of non-combusted CH_4 expressed in terms of CO_2e from flaring of the residual gas stream (tCO_2e)

~~30. Project emissions from un-combusted methane in year y shall be determined as follows:~~

$$PE_{UM,y} = \sum_{h=1}^{8760} TM_{RG,h} * (1 - \eta_{flare,h}) * \frac{GWP_{CH4}}{1000} \quad (5)$$

~~**Monitoring**~~

Emission reductions

29. The emission reduction achieved by the project activity will be measured as the difference between the baseline emissions and the project emissions and leakage.

$$ER_y = BE_y - PE_y - LE_y \quad (16)$$

Where:

ER_y	Emission reductions in year y (tCO_2e)
LE_y	Leakage emissions in year y (tCO_2e)

~~31. The amount of methane actually flared should be monitored in accordance with the "Tool to determine project emission from flaring gases containing methane".~~

~~32. This methodology requires monitoring of the consumption of grid electricity and/or fossil fuel by the project.~~

Monitoring

30. Relevant parameters shall be monitored as indicated in the table 1 below. The applicable requirements specified in the "General Guidelines to 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 to by the project participants.

Table 1: Parameters for monitoring during the crediting period.

No.	Parameter	Description	Unit	Monitoring/recording Frequency	Measurement Methods and Procedures
1	$TM_{RG,h}$	Mass flow rate of methane in the residual gas	kg/h	As per the "Tool to determine project emissions from flaring gases containing methane"	As per the "Tool to determine project emissions from flaring gases containing methane"
2	Eff_V	Vehicle engine efficiency	%	As per paragraph 17	As per paragraph 17
3	$EG_{ELEC,PJ,y}$	Electricity generated by the project activity in year *y*	MWh	Continuous monitoring, hourly measurement and at least monthly recording	Measurements are undertaken using energy meters. If applicable, measurement results shall be cross checked with records for sold/purchased electricity (e.g. invoices/receipts)
4	$EG_{HEAT,PJ,y}$	Heat generation by project activity in year *y*	GJ	Continuous monitoring, aggregated annually	Heat generation is determined as the difference of the enthalpy of the steam or hot fluid and/or gases generated by the heat generation

No.	Parameter	Description	Unit	Monitoring/recording Frequency	Measurement Methods and Procedures
					equipment and the sum of the enthalpies of the feed-fluid and/or gases blow-down and if applicable any condensate returns. The respective enthalpies should be determined based on the mass (or volume) flows, the temperatures and, in case of superheated steam, the pressure. Steam tables or appropriate thermodynamic equations may be used to calculate the enthalpy as a function of temperature and pressure.
5	$VFUEL_y$	Vehicle fuel provided by the project activity in year *y*	GJ	Monitored on a daily basis	Measurements are undertaken using flow meters that record gas volumes, pressure and temperature. The energy content of the methane is then determined using net calorific value and density of methane. As per revised 1996 IPCC guideline, the calorific value of methane is 48MJ/kg and the density of methane under normal conditions of temperature and pressure is 0.67kg/m^3.
6	ABS_y	Cooling output produced in project activity by absorption chillers in year *y*	MWh	Continuous monitoring, hourly measurement and at least monthly recording	Based on actual measurements of chilled water mass flow rate and differential temperature of inlet and outlet of the Chiller.

No.	Parameter	Description	Unit	Monitoring/recording Frequency	Measurement Methods and Procedures
7	COP_{ABS}	Coefficient of performance of the absorption chillers used in the project activity	MW thermal input/MW thermal output	fixed	Manufacturer's specification on the performance of the absorption chillers should be used
8	COP_{ELEC}	Coefficient of performance of the electrical chillers used in the baseline chillers	MW electrical input/MW thermal output	fixed	Manufacturer's specification on the performance of the electric chillers should be used
9	$PE_{ELEC,y}$	Project emissions from the use of electricity for the capture, transportation, compression and utilisation or destruction of borehole methane in the project activity in year *y*	tCO2	As per the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption"	As per the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption"
10	$PE_{FF,y}$	Project emissions from the combustion of fossil fuels for the capture, transportation, compression and utilisation or destruction of borehole methane in the project activity in year *y*	tCO2	Calculated in accordance with the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion"	Calculated in accordance with the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion"
11	$MMES_{FL,y}$	Amount of methane sent to flare in year *y*	tCH4	Measured continuously and recorded hourly	Measurements are undertaken using flow meters that record gas volumes, pressure and temperature.

No.	Parameter	Description	Unit	Monitoring/recording Frequency	Measurement Methods and Procedures
12	$PE_{flare,y}$	Project emissions of non-combusted CH_4, expressed in terms of $tCO2e$, from flaring of the residual gas stream in year *y*	tCO2e	As per the "Tool to determine project emissions from flaring gases containing methane".	As per the "Tool to determine project emissions from flaring gases containing methane".
13	$MMES_{ELEC,y}$	Amount of methane sent to power plant in year *y*	tCH4	Measured continuously and recorded hourly	Measurements are undertaken using flow meters that record gas volumes, pressure and temperature.
14	$MMES_{HEAT,y}$	Amount of methane sent to heat plant in year *y*	tCH4	Measured continuously and recorded hourly	Measurements are undertaken using flow meters that record gas volumes, pressure and temperature.
15	$MMES_{GAS,y}$	Amount of methane supplied to gas grid for vehicle use or heat/power generation off-site in year *y*	tCH4	Measured continuously and recorded hourly	Measurements are undertaken using flow meters that record gas volumes, pressure and temperature.
16	CEF_{NMHC}	Carbon emission factor for combusted non methane hydrocarbons	tCO2/tNMHC	Annually	Periodical analyses of the fractional composition of the captured gas
17	PC_{CH4}	Concentration (in mass) of methane in extracted gas, measured on wet basis	%	Monitored continuously and recorded hourly/daily	Monitored on a wet basis by gas analysis device (e.g. concentration meters, optical /calorific). The methane concentration can be measured in volume percent. Using the flowrate of the gas, the volumetric concentrations of the

No.	Parameter	Description	Unit	Monitoring/recording Frequency	Measurement Methods and Procedures
					components in the gas and molar masses; the volume percent can be converted into a mass percent.
18	PC_{NMHC}	NMHC concentration (in mass) in extracted gas	%	Annually	Monitored on a wet basis by gas analysis device (e.g. concentration meters, optical/calorific). If the concentration is established through sampling gas samples should be taken every 3 months in the first year. The frequency can be reduced to twice a year afterwards. If the methane concentration falls below the 75% indicated by the analysis taken prior to the project activity or the average concentration in that year then the gas shall be sampled again and the new NMHC concentration shall be used. Measurement of the gas samples should be undertaken in laboratories according to relevant national/international standards.

Project activity under a programme of activities

This methodology is not applicable to project activities under a programme of activities.

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History of the document

Version	Date	Nature of revision
02	EB 65, Annex # 25 November 2011	To include: - Newly drilled exploration boreholes; - Recovery and utilization of methane from exploration boreholes.
01	EB 42, Annex 15 26 September 2008	Initial adoption.