Approved baseline and monitoring methodology AM0098

"Utilization of ammonia-plant off gas for steam generation"

I. SOURCE, DEFINITIONS AND APPLICABILITY

Sources

This baseline and monitoring methodology is based on elements from the following proposed new methodology:

- NM0346 "Utilization of ammonia-plant off gas for heat generation" prepared by Shimizu Corporation.

This methodology also refers to the latest approved versions of the following tools:

- "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion";
- "Tool to calculate baseline, project and/or leakage emissions from electricity consumption";
- "Tool to determine the baseline efficiency of thermal or electric energy generation systems"; and
- "Combined tool to identify the baseline scenario and demonstrate additionality".

For more information regarding the proposed new methodologies and the tools as well as their consideration by the Executive Board please refer to <http://cdm.unfccc.int/goto/MPappmeth>.

Selected approach from paragraph 48 of the CDM modalities and procedures

"Existing actual or historical emissions, as applicable".

Definitions

For the purpose of this methodology, the following definitions apply:

Ammonia-plant off gas (AOG). The purge gas from the ammonia production process. AOG is a consequence of the continued circulation of the synthesis gas during the ammonia synthesis that results in the accumulation of impure substances (e.g. argon, methane). Since this accumulation prevents the reaction for the ammonia synthesis, a certain rate of the circulation gas needs to be constantly purged outside of the loop as waste (i.e. AOG).

Existing ammonia production plant. A facility that produces ammonia by reforming hydrocarbons and that has historical production records of at least the most recent three years prior to the implementation of the project activity.

Applicability

This methodology is applicable to project activities that collect and utilize ammonia-plant off gas (AOG) for heat generation at an existing ammonia production plant, which would have been otherwise vented.

The methodology is applicable under the following conditions:

- Regulations of the host country do not prohibit the practice of venting gases with the physical and chemical characteristics of the AOG;
- The project activity does not result in changes in the quality or quantity of the products of the existing ammonia production plant;
- Under the project activity, the AOG is only used to generate steam for satisfying heat demands in the existing ammonia production plant and/or nearby facilities in the same project site. The AOG is fed into on-site boilers to generate the steam without being mixed with other fuels ;
- The total amount of AOG has been vented to the atmosphere from the start of operations using current feedstock at the existing ammonia production plant until the implementation of the project activity. This must be demonstrated by both of the following evidences:
    - *Design specifications and layout diagrams.* The project participants shall present the original process plant design specifications and layout diagrams of the facility using current feedstock as provided by the manufacturer, as well as the subsequent modifications to the design specifications and layout diagrams undertaken prior to the implementation of the project activity, showing that the AOG is to be vented;
    - *On-site check.* The DOE shall conduct an on-site check prior to the implementation of the project activity to confirm that no equipment for AOG recovery and utilisation have been installed prior to the implementation of the project activity
- During the most recent three years prior to the implementation of the project activity, the steam demand of the existing ammonia production plant and/or nearby facilities in the same project site is met only using fossil fuels (no blending with biofuels or no use of waste heat).

In addition, the applicability conditions included in the tools referred to above apply.

Finally, the methodology is applicable only if the most plausible baseline scenario, as identified per the “Selection of the baseline scenario and demonstration of additionality” section hereunder, is G2 for the treatment and utilization of the AOG in combination with scenario H2 for the generation of steam.

II. BASELINE METHODOLOGY PROCEDURE

Project boundary

The spatial extent of the project boundary includes the site of the existing ammonia production plant where the AOG is captured and utilized for steam generation.

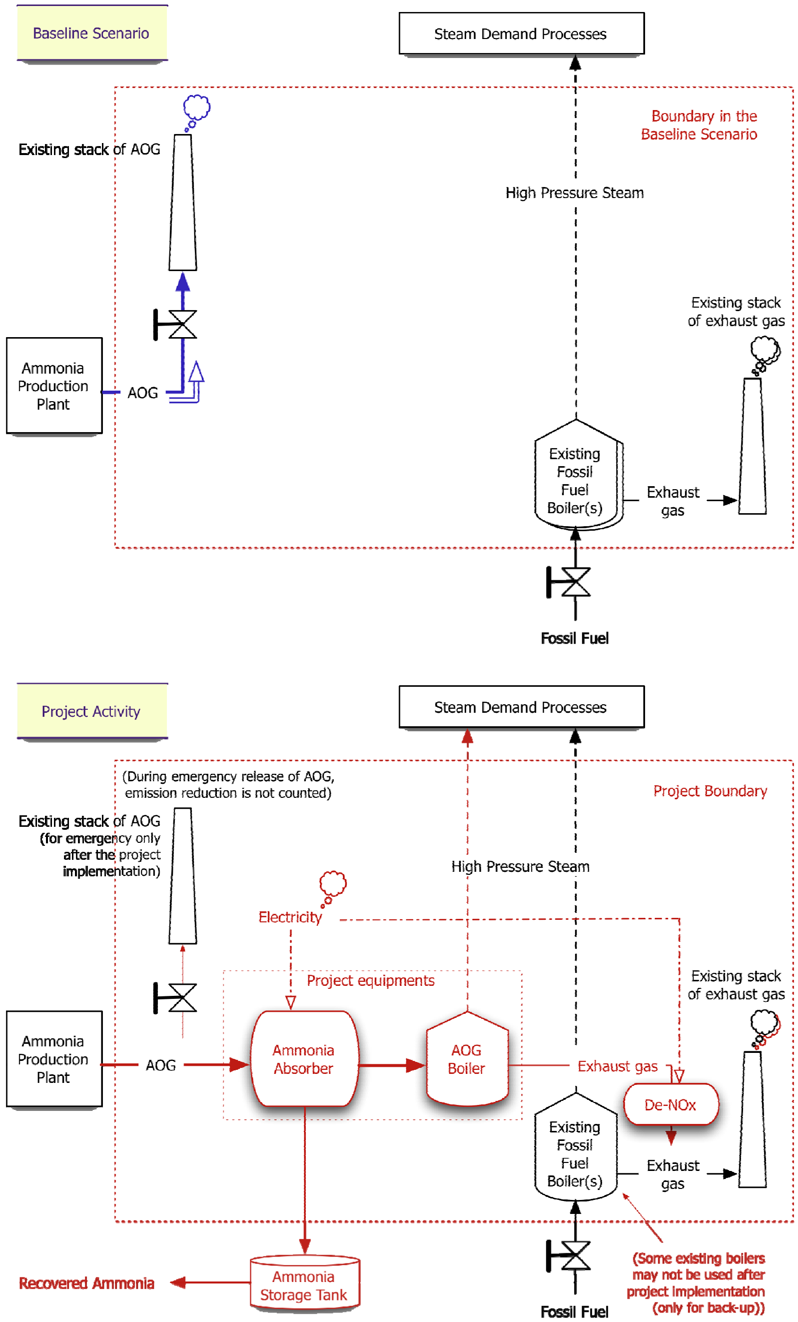

Figure 1: Project boundary

The greenhouse gases included in or excluded from the project boundary are shown in Table 1.

Table 1: Emissions sources included in or excluded from the project boundary

	Source	Gas	Included?	Justification / Explanation
Baseline emissions	Venting of AOG to the atmosphere	CO_2	No	Excluded for simplification. This is conservative
		CH_4	Yes	Main emission source
		N_2O	No	Excluded for simplification. This is conservative
	Combustion of fossil fuels for steam generation	CO_2	Yes	Main emission source
		CH_4	No	Excluded for simplification. This is conservative
		N_2O	No	Excluded for simplification. This is conservative
Project emissions	Combustion of AOG for steam generation	CO_2	Yes	Main emission source
		CH_4	No	Excluded for simplification
		N_2O	No	Excluded for simplification
	Consumption of electricity for the recovery and treatment of AOG	CO_2	Yes	Main emission source
		CH_4	No	Excluded for simplification
		N_2O	No	Excluded for simplification
	Combustion of fossil fuels for the recovery and treatment of AOG	CO_2	Yes	Main emission source
		CH_4	No	Excluded for simplification
		N_2O	No	Excluded for simplification
	Venting of CH_4	CO_2	No	Not applicable
		CH_4	Yes	Main emission source
		N_2O	No	Not applicable

Selection of the baseline scenario and demonstration of additionality

The selection of the baseline scenario and the demonstration of additionality should be conducted using the latest approved version of the "Combined tool to identify the baseline scenario and demonstrate additionality". The following additional guidance should be used when applying the tool:

When applying Sub-step 1a of the tool, alternative scenarios should be separately determined regarding:

(a) The treatment and utilization of the ammonia-plant off gas (AOG), and

(b) The generation of steam.

In the following, guidance is provided on which alternative scenarios should be assessed in applying the tool.

Alternative scenarios for the treatment and utilization of AOG

The alternative scenarios for the treatment and utilization of AOG should include, but not be limited to, *inter alia*:

G1: The project activity not implemented as a CDM project;

G2: Continuation of the current practice (*i.e.*, venting of AOG to the atmosphere) during the entire crediting period;

G3: Continuation of the current practice (*i.e.*, venting of AOG to the atmosphere) and implementation of the project activity not as a CDM project at a later point in time (e.g. due to changes in relevant regulations, availability of new technologies, financing aspects, *etc*);

G4: Flaring of AOG;

G5: Utilization of AOG for energy purposes other than steam generation at the existing ammonia production facility (e.g. power generation, fuel in the reformer);

G6: Use of separation technology to separate methane from the recirculation loop of ammonia synthesis to prevent / significantly reduce generation of AOG thereby enabling use of hydrogen in the AOG for ammonia synthesis.

G7: Utilization of AOG as feedstock at the existing ammonia production facility;

G8: Sale of AOG to a third party.

Alternative scenarios for steam generation

The alternative scenarios for steam generation should include, but not be limited to, *inter alia*:

H1: The project activity not implemented as a CDM project;

H2: Continuation of the current practice of using the same fossil fuel(s) for steam generation as historically;

H3: Continuation of the current practice of using the same fossil fuel(s) for steam generation as historically, and implementation of the project activity not as a CDM project at a later point in time (e.g. due to changes in relevant regulations, availability of new technologies, financing aspects, *etc*);

H4: Switch from the current fossil fuel to a different fuel for steam generation.

For steam generation, the technical conditions such as compatibility of burner and/or boiler as well as the possibility of fuel mix and the fuel accessibility should be considered.

In case that a barrier analysis is applied

If Step 2 of the tool is applied, *i.e*. a barrier analysis is conducted, the "Guidelines for objective demonstration and assessment of barriers"[1] approved by the Executive Board shall be followed in order to ensure the objectivity in the assessment of whether the CDM alleviates the claimed barriers.

The barrier analysis should pertain to the application of the AOG as utilized in the proposed project activity, rather than in which cases it can not be utilized. For example: the project participants should demonstrate barriers for the utilization of AOG to generate steam in on-site boilers without mixing the AOG with other fuels rather than using it in the reformer.

In case that an investment analysis is applied

If Step 3 of the tool is applied, i.e. an investment analysis is conducted, while calculating the financial indicator all relevant costs shall be included (e.g. equipment to recover and treat AOG), as well as all revenues including savings in fuel costs purchased for steam generation and, if applicable, feedstock due to the recovery of ammonia from AOG.

Common practice analysis

When applying Step 4 of the tool, the project participants should assess whether utilization of AOG for energy purposes is common practice in the relevant geographical area. In case, there are less than five ammonia production plants in the relevant geographical area, the geographic area shall be expanded to include at least five ammonia production plants.

Emission Reductions

Annual emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y \quad (1)$$

Where:

ER_y	=	Emissions reductions in year y (tCO_2e)
BE_y	=	Baseline emissions in year y (tCO_2e)
PE_y	=	Project emissions in year y (tCO_2e)

Baseline Emissions

Baseline emissions (BE_y) comprises two emission sources: (1) emissions from venting of methane contained in the AOG that is recovered and utilized under the project activity, and (2) emissions from combustion of fossil fuels in on-site boilers for steam generation.

[1] Annex 13, EB 50.

$$BE_{y} = BE_{CH4,venting,y} + BE_{CO2,steam,y} \tag{2}$$

Where:

BE_y	=	Baseline emissions in year *y* (tCO_2e)
$BE_{CH4,venting,y}$	=	Baseline emissions from venting of methane contained in the AOG recovered and utilized under the project in year *y* (tCO_2e)
$BE_{CO2,steam,y}$	=	Baseline emissions from combustion of fossil fuels for steam generation in year *y* (tCO_2e)

Baseline emissions from venting of methane contained in the AOG recovered and utilized under the project activity

Baseline emissions from venting of methane contained in the AOG that is recovered and utilized under the project activity are to be calculated as follows:

$$BE_{CH4,venting,y} = AOG_{y} \cdot w_{CH4,y} \cdot \rho_{CH4} \cdot GWP_{CH4} \tag{3}$$

with

$$AOG_{y} = \min\left\{\left(\frac{AOG_{recovered,y}}{AM_{y}}\right), CAP_{hist}\right\} \cdot \min\left\{AM_{y}; \frac{AM_{x} + AM_{x-1} + AM_{x-2}}{3}\right\} \tag{4}$$

and

$$CAP_{hist} = \min\left\{\left(\frac{AOG_{x}}{AM_{x}}\right), \left(\frac{AOG_{x-1}}{AM_{x-1}}\right), \left(\frac{AOG_{x-2}}{AM_{x-2}}\right)\right\} \tag{5}$$

and

$$w_{CH4,y} = \min\left\{w_{PJ,CH4,y}; w_{CH4,x}; w_{CH4,x-1}; w_{CH4,x-2}\right\} \tag{6}$$

Where:

$BE_{CH4,venting,y}$	=	Baseline emissions from venting of methane contained in the AOG recovered and utilized under the project in year *y* (tCO_2e)
AOG_y	=	Volume of AOG eligible for crediting at standard conditions in year *y* (Sm^3)
$w_{CH4,y}$	=	Volume fraction of methane in the AOG at standard conditions in year *y* (Sm^3 CH_4 / Sm^3 AOG)
$w_{PJ,CH4,y}$	=	Average volume fraction of methane in the AOG recovered in the project activity at standard conditions in year *y* (Sm^3 CH_4 / Sm^3 AOG)
$w_{CH4,x}$ $w_{CH4,x-1}$ $w_{CH4,x-2}$	=	Average volume fraction of methane in the AOG at standard conditions in years x, x-1 and x-2 (Sm^3 CH_4 / Sm^3 AOG)
ρ_{CH4}	=	Density of methane at standard conditions (tCH_4 / Sm^3 CH_4)
GWP_{CH4}	=	Global warming potential of methane valid for the commitment period (tCO_2e/tCH_4)
$AOG_{recovered,y}$	=	Volume of AOG recovered and used for steam generation by the project activity at standard conditions in year *y* (Sm^3 AOG)
AM_y	=	Total production of ammonia in year *y* (tNH_3)

CAP_{hist}	=	Historical cap on the ratio between the amount of AOG vented and the amount of ammonia produced based on data from the last three years prior the implementation of the project activity (Sm^3 AOG / t NH_3)
$AOG_{x,}$ $AOG_{x-1,}$ $AOG_{x-2,}$	=	Volume of AOG vented by the existing ammonia production facility at standard conditions in years x, x-1, and x-2 (Sm^3)
$AM_{x,}$ $AM_{x-1,}$ $AM_{x-2,}$	=	Total production of ammonia in years x, x-1, and x-2 (tNH_3)
x	=	Most recent year prior to the implementation of the project activity (year)

Baseline emissions from combustion of fossil fuels for steam generation

Baseline emissions from combustion of fossil fuels for steam generation are to be calculated as follows:

$$BE_{CO2,steam,y} = \frac{Q_{heat,PJ,y}}{\eta_{boiler,BL}} \cdot EF_{FF,BL} \quad \textbf{(7)}$$

Where:

$BE_{CO2,steam,y}$	=	Baseline emissions from combustion of fossil fuels for steam generation in year *y* (tCO_2)
$Q_{heat,PJ,y}$	=	Net quantity of heat generated from AOG combustion in year *y* (GJ)
$\eta_{boiler,BL}$	=	Efficiency of the baseline boiler (ratio)
$EF_{FF,BL}$	=	Emission factor of the fossil fuel used for steam generation in the existing ammonia production plant in the last three years prior the implementation of the project activity (tCO_2/GJ)

In case that more than one type of fossil fuels has been utilized for steam generation, in the existing ammonia production plant, during the last three years prior the implementation of the project activity, the lowest emission factor among the emission factors of the utilized fossil fuels is to be used as $EF_{FF,BL}$.

Project Emissions

Project emissions (PE_y) comprise three emission sources: (1) emissions due to the combustion of AOG for steam generation, (2) emissions due to the consumption of fossil fuels and electricity for the recovery and treatment of AOG for its subsequent use as fuel for steam generation, and (3) emissions due to venting of CH_4 remaining in the gaseous stream vented to the atmosphere out of the ammonia recovery unit of AOG.

$$PE_y = PE_{AOG,combustion,y} + PE_{AOG,treatment,y} + PE_{AOG,CH4,y} \quad \textbf{(8)}$$

Where:

PE_y	=	Project emissions in year *y* (tCO_2e)
$PE_{AOG,combustion,y}$	=	Project emissions due to the combustion of AOG for steam generation in year *y* (tCO_2e)

$PE_{AOG,treatment,y}$	=	Project emissions from the recovery and treatment of AOG in year *y* (tCO_2e)
$PE_{AOG,CH4,y}$	=	Project emissions due to venting of CH_4 remaining in the gaseous stream vented to the atmosphere out of the ammonia recovery unit of AOG in the year *y* (tCO_2e)

Project emissions from the combustion of AOG

Project emissions from the combustion of AOG are to be calculated as follows:

$$PE_{AOG,combustion,y} = AOG_{recovered,y} \cdot \rho_{C,AOG,y} \cdot \frac{44}{12} \quad \textbf{(9)}$$

Where,

$PE_{AOG,combustion,y}$	=	Project emissions due to the combustion of AOG in year *y* (tCO_2e)
$AOG_{recovered,y}$	=	Volume of AOG recovered and used for steam generation by the project activity at standard conditions in year *y* (Sm^3 AOG)
$\rho_{C,AOG,y}$	=	Carbon density of AOG at standard conditions (t C/Sm^3 AOG)

Project emissions from the recovery and treatment of AOG

For the process of recovering and treating the AOG in order to utilize it as fuel for steam generation in an on-site boiler, electricity and fossil fuels are consumed, for example from the operation of ammonia absorber units and other ancillary equipment, and the related emissions are to be accounted for as project emissions. To calculate the project emissions from the recovery and treatment of AOG attributable to the project activity ($PE_{AOG,treatment,y}$), apply:

(a) The latest approved version of the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion", to calculate the emissions from fossil fuel combustion attributable to the project activity; and

(b) The latest approved version of the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption", to calculate the emissions from electricity consumption attributable to the project activity.

The parameter $PE_{AOG,treatment,y}$ corresponds to the sum of the parameters (1) $PE_{FC,j,y}$ in the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion", where *j* are the processes that fire fossil-fuels attributable to the project activity, and (2) $PE_{EC,y}$ in the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption".

Project emissions due to venting of CH_4

The process of recovery of ammonia out of the AOG prior to its combustion in the boilers might emit methane into atmosphere at the exhaust of the ammonia recovery section. The emission due to venting of residual CH_4 in the project activity is calculated as follows:

$$PE_{AOG,CH4,y} = Q_{Exhaust,y} \cdot w_{Exhaust,CH4,y} \cdot \rho_{CH4} \cdot GWP_{CH4} \quad \textbf{(10)}$$

Where:

$PE_{AOG,CH4,y}$	=	Project emissions due to venting of CH4 remaining in the gaseous stream vented to the atmosphere out of the ammonia recovery unit of AOG in the year *y* (tCO_2)
$Q_{Exhaust,y}$	=	Volume of gaseous stream vented to the atmosphere out of the ammonia recovery section of AOG at standard conditions in year *y* (Sm^3)
$w_{Exhaust,CH4,y}$	=	Volume fraction of methane in the exhaust out of ammonia recovery section at standard conditions in year *y* (Sm^3 CH_4 / Sm^3)
ρ_{CH4}	=	Density of methane at standard conditions (t CH_4 / Sm^3 CH_4)
GWP_{CH4}	=	Global warming potential of methane valid for the commitment period (tCO_2e/tCH_4)

Leakage Emissions

No leakage emissions are accounted for in this methodology.

Data and parameters not monitored

In addition to the parameters listed in the tables below, the provisions on data and parameters not monitored in the tools referred to in this methodology apply.

Data / Parameter:	AOG_x, AOG_{x-1}, AOG_{x-2}
Data unit:	Sm^3
Description:	Volume of AOG vented by the existing ammonia production facility at standard conditions in years x, x-1, and x-2
Source of data:	Operational and Maintenance records of the existing ammonia production plant for the most recent three years prior the implementation of the project activity
Measurement procedures (if any):	Measured by a volume flow meter and corrected to standard conditions (i.e. temperature of 273.15 K and an absolute pressure of 100 kPa)
Any comment:	-

Data / Parameter:	AM_x, AM_{x-1}, AM_{x-2},
Data unit:	tNH_3
Description:	Total production of ammonia in years x, x-1, and x-2
Source of data:	Production records of the existing ammonia production plant for the most recent three years prior the implementation of the project activity
Measurement procedures (if any):	Measured by volume flow meter or other gauge for volume measurement of liquid ammonia and converted to mass units by multiplying by the density of the ammonia produced
Any comment:	-

Data / Parameter:	$w_{CH4,x}$, $w_{CH4,x-1}$, $w_{CH4,x-2}$
Data unit:	Sm^3 CH_4 / Sm^3 AOG
Description:	Average volume fraction of methane in the AOG at standard conditions in years x, x-1 and x-2
Source of data:	Plant records
Measurement procedures (if any):	Laboratory analysis
Any comment:	-

Data / Parameter:	ρ_{CH4}
Data unit:	t CH_4 / Sm^3 CH_4
Description:	Density of methane at standard conditions
Source of data:	Use a value at standard conditions (i.e. temperature of 273.15 K and an absolute pressure of 100 kPa) of 0.0007168 tCH_4/m^3CH_4.
Measurement procedures (if any):	-
Any comment:	-

Data / Parameter:	GWP_{CH4}
Data unit:	tCO_2e/tCH_4
Description:	Global warming potential of methane valid for the commitment period
Value to be applied:	Default value of 21 for the first commitment period under the Kyoto Protocol
Measurement procedures (if any):	-
Any comment:	-

Data / parameter:	$EF_{FF,BL}$
Data unit:	tCO_2/GJ
Description:	Emission factor of the fossil fuel used for steam generation in the existing ammonia production plant in the most recent three years prior the implementation of the project activity
Source of data:	Use the fossil fuel type with the lowest CO_2 emission factor among all fossil fuel types used in the existing ammonia production plant for steam generation in the most recent three years prior to the implementation. Either conduct measurements or use accurate and reliable local or national data where available. Where such data is not available, use IPCC default emission factors (country-specific, if available) if they are deemed to reasonably represent local circumstances. Choose the value in a conservative manner and justify the choice
Measurement procedures (if any):	Measurements shall be carried out at reputed laboratories and according to relevant international standards
Any comment:	-

Data / Parameter:	$\eta_{boiler,BL}$
Data unit:	Ratio
Description:	Efficiency of the baseline boiler
Source of data:	The efficiency of the baseline boiler shall be determined by either using: (a) the latest version of the "Tool to determine the baseline efficiency of thermal or electric energy generation systems" approved by the CDM Executive Board, or (b) a conservative default value of 1. In applying the tool, a constant efficiency should be determined. In the case that the project activity can displace steam generation in several baseline boilers, the highest efficiency among the applicable boilers should be used
Measurement procedures (if any):	-
Any comment:	-

III. MONITORING METHODOLOGY

Describe and specify in the CDM-PDD all monitoring procedures, including the type of measurement instrumentation used, the responsibilities for monitoring and QA/QC procedures that will be applied. Where the methodology provides different options (e.g. use of default values or on-site measurements), specify which option will be used. All meters and instruments should be calibrated regularly as per industry practices.

All data collected as part of monitoring should be archived electronically and be kept at least for 2 years after the end of the last crediting period. 100% of the data should be monitored if not indicated differently in the comments in the tables below.

In addition, the monitoring provisions in the tools referred to in this methodology apply.

Data and parameters monitored

Data / Parameter:	$AOG_{recovered,y}$
Data unit:	Sm^3 AOG
Description:	Volume of AOG recovered and used for steam generation by the project activity at standard conditions in year *y*
Source of data:	Onsite measurements
Measurement procedures (if any):	Use volume flow meters installed at the inlet of the AOG boiler and correct the value to standard conditions (i.e. temperature of 273.15 K and an absolute pressure of 100 kPa)
Monitoring frequency:	Continuously
QA/QC procedures:	Flow meters should be subject to a regular maintenance and testing regime to ensure accuracy
Any comment:	-

Data / Parameter:	Chemical composition of AOG
Data unit:	Vol. %
Description:	Chemical composition of the ammonia-plant off gas (AOG)
Source of data:	Laboratory componential analysis.
Measurement procedures (if any):	Laboratory analysis of the ammonia-plant off gas (AOG) by using gas-chromatography or an equivalent method
Monitoring frequency:	Daily
QA/QC procedures:	Check the consistency of the data by comparing the data from previous days/months/years
Any comment:	-

Data / Parameter:	AM_y
Data unit:	tNH_3
Description:	Total production of ammonia in year *y*
Source of data:	On-site measurements.
Measurement procedures (if any):	Measured by volume flow meter or other gauge for volume measurement of liquid ammonia, and converted to mass units (i.e. tons) by multiplying by the density of the produced ammonia
Monitoring frequency:	Continuously
QA/QC procedures:	Checked against the sales record
Any comment:	-

Data / Parameter:	$w_{PJ,CH4,y}$
Data unit:	Sm^3 CH_4 / Sm^3 AOG
Description:	Average volume fraction of methane in the AOG recovered in the project activity at standard conditions in year *y*
Source of data:	Laboratory analysis
Measurement procedures (if any):	Gas-chromatography by a certified laboratory
Monitoring frequency:	Daily
QA/QC procedures:	Check the consistency of the data by comparing the data with those for previous days/months/years
Any comment:	-

Data / Parameter:	$\rho_{C,AOG,y}$
Data unit:	t C/Sm^3 AOG
Description:	Carbon density of AOG at standard conditions
Source of data:	Measurements by the project participants
Measurement procedures (if any):	Measurements should be undertaken in line with national or international fuel standards.
Monitoring frequency:	Daily
QA/QC procedures:	Check the consistency of the data by comparing the data with those for previous days/months/years
Any comment:	-

Data / Parameter:	$Q_{heat,PJ,y}$
Data unit:	GJ
Description:	Net quantity of heat generated from AOG combustion in year *y*
Source of data:	Measurements by the project participants
Measurement procedures (if any):	The amount of heat generation is determined as the enthalpy of the steam or hot water generated by the boiler(s) minus the enthalpy of the feed-water to the boiler. 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
Monitoring frequency:	Daily
QA/QC procedures:	Check the consistency of the data with the measurement results in the previous years
Any comment:	For boilers, it is expressed as the difference between the steam supplied and the feed water to the boiler, both in energy units

Data / Parameter:	$w_{Exhaust,CH4,y}$
Data unit:	Sm^3 CH_4 / Sm^3
Description:	Volume fraction of methane in the exhaust out of ammonia recovery section at standard conditions in year *y*
Source of data:	Plant records
Measurement procedures (if any):	Laboratory analysis
Any comment:	-

Data / Parameter:	$Q_{Exhaust,y}$
Data unit:	Sm^3
Description:	Volume of gaseous stream vented to the atmosphere out of the ammonia recovery section of AOG at standard conditions in year *y*
Source of data:	Onsite measurements
Measurement procedures (if any):	Use volume flow meters installed at the outlet of ammonia recovery unit of AOG and correct the value to standard conditions (i.e. temperature of 273.15 K and an absolute pressure of 100 kPa)
Monitoring frequency:	Continuously
QA/QC procedures:	Flow meters should be subject to a regular maintenance and testing regime to ensure accuracy
Any comment:	-

IV. REFERENCES AND ANY OTHER INFORMATION

Not applicable.

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History of the document

Version	**Date**	**Nature of revision(s)**
01.0.0	EB 63, Annex 8 29 September 2011	Initial adoption.
Decision Class: Regulatory **Document Type**: Standard **Business Function**: Methodology		