This version contains two options:

Option 1: Methodology is revised to accommodate project activities where low pressure associated gas is vented prior to the start of the project activity (same as in Option 2). Baseline emissions are considered as emissions from venting and/or emissions from flaring of associated gas.

Option 2: Methodology is revised to accommodate project activities where low pressure associated gas is vented prior to the start of the project activity (same as in Option 1). To ensure a conservative baseline over the whole crediting period, baseline emissions are calculated as emissions from flaring of associated gas. Option 2 is in line with the approach taken in the approved methodology AM0053 "Biogenic methane injection to a natural gas distribution grid", in which baseline emissions are calculated as emissions from flaring of biogas regardless of whether flaring or venting of biogas is identified as the baseline scenario.

Draft revision to the approved baseline and monitoring methodology AM0009

"Recovery and utilization of gas from oil wells that would otherwise be flared or vented"

I. SOURCE, DEFINITIONS AND APPLICABILITY

Sources

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

- NM0026 "Rang Dong Oil Field Associated Gas Recovery and Utilization Project" prepared by Japan Vietnam Petroleum Co. Ltd;
- NM0227 "Recovery of methane from on- and off-shore oil fields that otherwise will be vented into the atmosphere" prepared by SOCAR in collaboration with ICF International.

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 project emissions from electricity consumption";
- "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"

and

"Emissions from a technology that represents an economically attractive course of action, taking into account barriers to investment"

Definitions

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

Associated gas. Natural gas found in association with oil, either dissolved in the oil or as a cap of free gas above the oil.

Processing plant. A facility designed to separate substances or make new substances through chemical, physical or physical-chemical procedures.

Applicability

The methodology is applicable to project activities that recover and utilise associated gas from oil wells that was previously flared or vented.

The methodology is applicable under the following conditions:

- Associated gas at oil wells is recovered and transported to:
    - A processing plant where dry gas, liquefied petroleum gas (LPG), and condensate are produced; and/or,
    - An existing natural gas pipeline without processing.
- All associate gas recovered comes from oil wells that are in operation and are producing oil at the time of the recovery of the associated gas.
- The recovered gas and the products (dry gas, LPG and condensate) are likely to substitute in the market only the same type of fuels or fuels with a higher carbon content per unit of energy;
- The utilization of the associated gas due to the project activity is unlikely to lead to an increase of fuel consumption in the respective market;
- The project activity will not lead to changes (negative or positive) in the volume or composition of oil or high-pressure gas extracted at the production site;
- Data (quantity and fraction of carbon) are accessible on the products of the gas processing plant and on the gas recovered from other oil exploration facilities in cases where these facilities supply recovered gas to the same gas processing plant;
- No gas coming from a gas lift system is uses by the project activity.

In addition, the applicability conditions included in the tools referred to above apply.
Finally, the methodology is only applicable if the identified baseline scenario is the continuation of the current practice of either flaring or venting of the associated gas.

Projection and adjustment of project and baseline emissions on the basis of oil production

Project as well as baseline emissions depend on the quantity of gas recovered, which is linked to the oil production. Oil production may be projected with the help of a reservoir simulator, reflecting the rock and fluid properties in the oil reservoir. As projections of the oil production, the methane content of the gas and other parameters involve a considerable degree of uncertainty, the quantity and composition of the recovered gas are monitored ex post and baseline and project emissions are adjusted respectively during monitoring.

The validating DOE shall confirm that estimated emission reductions reported in the CDM-PDD are based on estimates provided in the survey used for defining the terms of the underlying oil production project as per the production sharing contract.

At verification the verifying DOE shall check the production data for oil and associate gas and compare them with the initial production target as per the information provided in survey used for defining the terms of the underlying oil production project. If the oil production differs significantly from the initial production target, then it should be checked that this is not intentional, and that such a scenario is properly addressed by the production sharing contract between the contracted party(ies).

II. BASELINE METHODOLOGY PROCEDURE

Project boundary

The project boundary encompasses:

- Project oil wells where the associated gas is collected;
- The site where the associated gas was flared or vented in the absence of the project activity;
- The gas recovery and delivery infrastructure, including new collection and transmission pipelines, reservoirs, control and measurement equipment and compressors;
- The processing facility using the recovered associated gas.

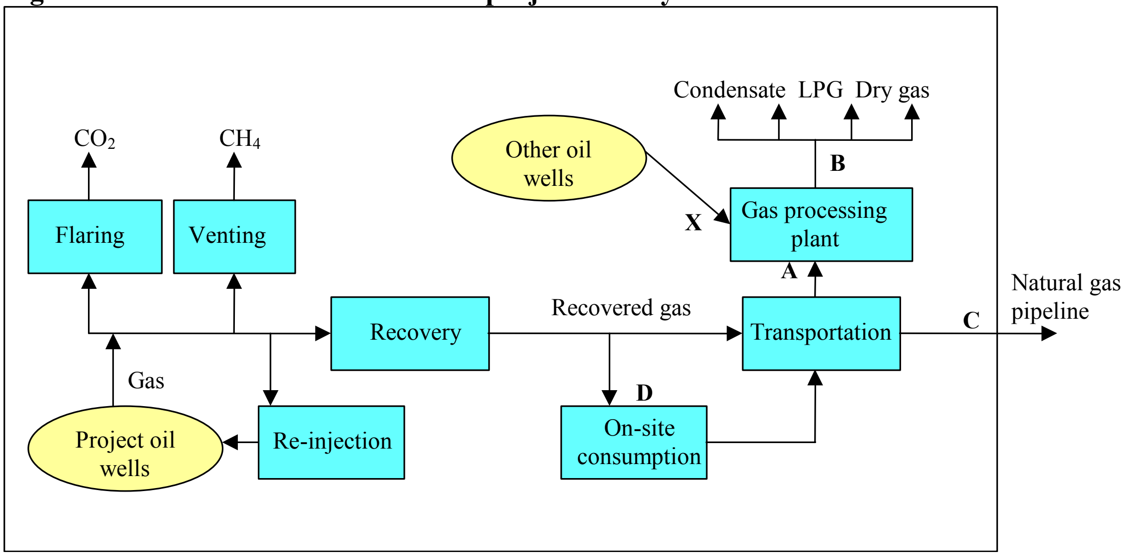
The greenhouse gases included in or excluded from the project boundary are shown in Table 1.

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

	Source	Gas	Included?	Justification / Explanation
Baseline	Venting of associated gas (if applicable)	CO_2	No	Assumed negligible
		CH_4	Yes	Main source of emissions in the baseline
		N_2O	No	Assumed negligible
	Flaring of associated gas (if applicable)	CO_2	Yes	Main source of emissions in the baseline
		CH_4	No	It is assumed that flaring results in complete oxidation of carbon in associated gas, resulting in a conservative baseline
		N_2O	No	Assumed negligible
	Consumption of other fossil fuels in place of the recovered gas	CO_2	No	Recovered gas replaces an equivalent amount of natural gas or fuel with higher carbon intensity in the system with same or higher emissions from combustion
		CH_4	No	
		N_2O	No	
	Fugitive emissions from natural gas consumed in place of recovered gas	CO_2	No	Recovered gas replaces an equivalent amount of natural gas or fuel with higher carbon intensity in the system with same or higher emissions from combustion
		CH_4	No	
		N_2O	No	
Project Activity	Fugitive emissions during collection and transportation of the recovered gas	CO_2	No	Assumed negligible
		CH_4	Yes	Included
		N_2O	No	Assumed negligible
	Fugitive emissions from accidents	CO_2	No	Assumed negligible
		CH_4	Yes	Fugitive CH_4 emissions may occur if there is an equipment failure in equipment transporting associated gas to the processing plant in the project scenario.
		N_2O	No	Assumed negligible

	Energy use for recovery, transportation and processing of the recovered gas	CO_2	Yes	Energy is produced from the recovered gas and/or the combustion of fossil fuels and import of electricity from the grid
		CH_4	No	Assumed negligible
		N_2O	No	Assumed negligible

Figure 1: Schematic illustration of the project activity



The project area may encompass several wells under a Production Sharing Contract (PSC) with a production target.

Identification of the baseline scenario and demonstration of additionality

Project participants shall apply the following steps to identify the baseline scenario:

Step 1: Identify plausible alternative scenarios

Plausible alternative baseline scenarios could include, *inter alia*:

1) Release of the associated gas into the atmosphere at the oil production site (venting);
2) Flaring of the associated gas at the oil production site;
3) On-site use of the associated gas for power generation;
4) On-site use of the associated gas for liquefied natural gas production;
5) Injection of the associated gas into an oil or gas reservoir;
6) Recovery, transportation, processing and distribution of the associated gas and products thereof to end-users without being registered as a CDM project activity;
7) Recovery, transportation and utilization of the associated gas as feedstock for manufacturing of a useful product.

Venting, as a possible alternative can only be included in the list if the project participants provide documented evidence that 100% of the associated gas from oil wells used by the project activity has been vented for at least the last 5 years. The evidence of venting of the associated gas can be based, inter alia, on data from the satellite imagery database.[1]

Step 2: Evaluate legal aspects
In evaluating legal aspects, the following issues should be addressed:

- Are the alternatives permitted by law or other (industrial) agreements and standards?
- Are there laws or other regulations (e.g. environmental regulations) which implicitly restrict certain alternatives?

All baseline alternatives shall be in compliance with all applicable legal and regulatory requirements, even if these laws have objectives other than GHG reductions. If an alternative does not comply with all applicable legislation and regulations, such an alternative should be eliminated unless it is demonstrated, based on an examination of current practice in the country or region in which the law or regulation applies, that applicable legal or regulatory requirements are systematically not enforced and that non-compliance is widespread.

Step 3: Evaluate the economic attractiveness of alternatives
The economic attractiveness is assessed for those alternative scenarios that are feasible in technical terms and that are identified as permitted by law or other (industrial) agreements and standards in Step 2. The economic attractiveness is assessed by determining an expected Internal Rate of Return (IRR) of each alternative scenario. The IRR should be determined using, *inter alia*, the following parameters:

- Overall projected gas production;
- The projected quantity of gas recovered, excluding gas flared, vented or consumed on-site;
- The agreed price for the delivery of recovered gas (e.g. from a Production Sharing Contract);
- The net calorific value of the gas;
- Capital expenditure for gas recovery facilities, pipelines, etc. (CAPEX);
- Operational expenditure (OPEX);
- Any profit sharing agreements and cost recovery, including cost savings through the substitution of products by the recovered gas, if applicable.

If venting of the associated gas at a given location is not outright banned but instead is subject to taxes or fines, the impact of these taxes and fines should be considered in the IRR calculation.
The alternative scenario that is economically the most attractive course of action is considered as the baseline scenario. The project activity can be considered additional, if the IRR of the project activity is lower than the hurdle rate of the project participants (typically about 10%). The DOE should verify what value for the IRR is typical for this type of investment in the respective host country. The calculations should be described and documented transparently.

[1] Global gas flaring estimates database hosted by the NOAA Satellite and Information Service http://www.ngdc.noaa.gov/dmsp/interest/gas_flares.html

Note: The methodology is only applicable if the identified baseline scenario is the continuation of the current practice of either flaring or venting of the associated gas.

Conditions for venting as the baseline scenario

Venting as the baseline scenario is only eligible if the following conditions are all met. For all conditions, project participants have to provide documented evidence in the CDM-PDD:

- 100% of the associated gas that is used by the project activity is low pressure gas (1-3 atm). The pressure is to be measured at the exit point of the gas from the oil well. Project proponents are not allowed to reduce the gas pressure;
- 100% of the associated gas that is used by the project activity has been vented at least for 5 years prior to the start of the project activity. A written statement confirming this shall be provided in the CDM-PDD;
- No flaring at all has happened at the project oil well at least for 5 years previous to the registration of the project activity. This shall be documented in the CDM-PDD using, *inter alia,* satellite images integrated over time. The satellite pictures provided shall cover at least 90% of the 5 year period[2];
- It can be demonstrated that 50% or more of the oil wells in the country do not flare associated gas and do not utilize low pressure associated gas (Number of oil wells where associated gas is not flared or utilised (ONF) / Total number of oil wells (OT) > 50%). Oil wells that flare gas shall be documented in the CDM-PDD using satellite images integrated over time. The satellite pictures provided shall cover at least 90% of the one year period prior to the start of the project activity. The oil wells that do not flare associated gas or do not utilize low pressure associated gas have to be listed by name and exact location in the CDM-PDD. Other relevant CDM project activities are not taken into account when conducting this analysis.

An independent institution with relevant expertise in interpretation of satellite images shall provide a written confirmation in the CDM-PDD stating that the methodology chosen and all the conclusions drawn from satellite images are adequate.

Compliance with national/local laws and regulations

For the host countries where national/local laws or regulations requiring flaring or utilization of the associated gas exist but are not enforced, the rate of compliance with these laws and regulations shall be monitored on an annual basis. The evidence of non-compliance shall be based on data on legal action and enforcement mechanisms implemented under the prevailing regulation as well as data on practices applied to handling of the associated gas in other oil wells in the country.

[2] If project participants wish to use other means of verification such as ground or aerial photos in the absence of satellite pictures for a specific location, they may request a revision to the approved methodology.

The relevant laws and regulations are considered enforced if more than 50% of the oil wells comply with these instruments. Other relevant CDM project activities are to be included in the analysis only if the CDM has been used in more than 50% of the cases where the legislation or regulation has been enforced.

In cases where there are regulations that mandate flaring or utilization of the associated gas, which are not enforced, the baseline scenario is identified as a gradual development, which is determined annually. The compliance rate in year y is defined as:

$\text{Compliance Rate}_y = \max\{\text{Compliance Rate}_{N,y}; \text{Compliance Rate}_{L,y}\}$

$$\text{Compliance Rate}_{N,y} = 1 - \frac{ONF_{N,y}}{OT_{N,y}} \quad (1)$$

$$\text{Compliance Rate}_{L,y} = 1 - \frac{ONF_{L,y}}{OT_{L,y}} \quad (2)$$

Where:

$ONF_{N,y}$	=	Number of oil wells in the country that did not flare associated gas and did not utilise low pressure associated gas in year *y*
$OT_{N,y}$	=	Total number of oil wells in the country in year *y*
$ONF_{L,y}$		Number of oil wells in the local area that did not flare associated gas and did not utilise low pressure associated gas in year *y*
$OT_{L,y}$		Total number of oil wells in the local area in year *y*

If there are national and local laws or regulations, the compliance rate for the national level as well as for the local level shall be determined. The higher of both shall be used as compliance rate for the calculation of baseline emissions. Other CDM projects are taken into account to determine the compliance rate.
In every year during the crediting period, the compliance rate shall be lower than 50%. If it exceeds 50% the project activity shall use flaring as a baseline to calculate emission reductions.

Baseline emissions

Option 1.
a) Baseline emissions from flaring of the associated gas

If the identified baseline scenario is flaring of the associated gas[3], it is assumed that all carbon in the gas is completely oxidized to carbon dioxide.

In practice, flaring is often conducted under sub-optimal combustion conditions and part of the gas is not combusted, but released as methane and other volatile gases. However, measurement of the quantity of methane released from flaring is difficult. Hence, for the purpose of determining baseline emissions, it is assumed that all carbon in the gas is converted into carbon dioxide. This is a conservative assumption, as accounting of methane emissions from flaring would increase the total amount of baseline emissions.

Baseline emissions are calculated as follows:

$$BE_y = (V_{A,y} + V_{D,y} + V_{C,y}) \cdot w_{carbon,A,y} \cdot \frac{44}{12} \cdot \frac{1}{1000} \quad \textbf{(3)}$$

Where:

BE_y	=	Baseline emissions during the period y, (tCO_2e)
$V_{A,y}$	=	Volume of the gas at inlet to gas processing plant at point A in Figure 1during the period y, (m^3)
$V_{D,y}$	=	Volume of the gas used for electricity generation measured at inlet to electricity generation facility (point D in Figure 1 during the period y, (m^3)
$V_{C,y}$	=	Volume of the gas entering the transmission pipeline measured at point C in Figure 1 during the period y, (m^3)
$w_{carbon,A,y}$	=	Average content of carbon in the recovered gas measured at point A Figure 1 during the period y, (kgC/m^3)

The average carbon content in the gas $w_{carbon,A,y}$ is determined from regular measurements of the composition of the gas, taking into account the molecular weight of all fractions of the gas.

b) Baseline emissions from venting of the associated gas

If the identified baseline scenario is venting of the associated gas, the baseline emissions are calculated as follows:

$$BE_y = (V_{A,y} + V_{D,y} + V_{C,y}) \cdot \frac{1}{1000} \cdot \left[w_{carbon,A,y} \cdot 21 \cdot Compliance\ rate_y + w_{CH4,A,y} \cdot \frac{44}{12} \cdot \left(1 - Compliance\ rate_y\right)\right] \quad \textbf{(4)}$$

[3] A minor part of the associated gas could be combusted for on-site power generation. Other fossil fuels (e.g. diesel) may be used in place of the associated gas for on-site power generation after the start of implementation of the project activity. If this is the case, GHG emissions from combustion of such fossil fuels are accounted for as part of the project emissions.

Where:

BE_y	=	Baseline emissions during the period y, (tCO_2e)
$V_{A,y}$	=	Volume of the gas at inlet to gas processing plant at point A in Figure 1 during the period y, (m^3)
$V_{D,y}$	=	Volume of the gas used for electricity generation measured at inlet to electricity generation facility (point D in Figure 1 during the period y, (m^3)
$V_{C,y}$	=	Volume of the gas entering the transmission pipeline measured at point C in Figure 1 during the period y, (m^3)
$w_{CH4,A,y}$	=	Average content of methane in the recovered gas measured at point A in Figure 1 during the period y, ($kgCH_4/m^3$)
$Compliance\ rate_y$	=	Rate of compliance with national/local laws requiring flaring or utilization of the associated gas
GWP_{CH4}	=	Global warming potential of methane (GWP=21 for the first commitment period)

The average methane content in the gas $w_{CH4,A,y}$ is determined from regular measurements of the composition of the gas, taking into account the molecular weight of all fractions of the gas.
---End of Option 1---

Option 2

Baseline emissions

In order to ensure a conservative baseline, it is assumed that all carbon in the gas is flared and converted into carbon dioxide. This is a conservative assumption, as accounting of methane emissions from flaring would increase the total amount of baseline emissions.

Baseline emissions are calculated as follows:

$$BE_y = (V_{A,y} + V_{D,y} + V_{C,y}) \cdot w_{carbon,A,y} \cdot \frac{44}{12} \cdot \frac{1}{1000} \quad \textbf{(3)}$$

Where:

BE_y	=	Baseline emissions during the period y, (tCO_2e)
$V_{A,y}$	=	Volume of the gas at inlet to gas processing plant at point A in Figure 1 during the period y, (m^3)
$V_{D,y}$	=	Volume of the gas used for electricity generation measured at inlet to electricity generation facility (point D in Figure 1 during the period y, (m^3)
$V_{C,y}$	=	Volume of the gas entering the transmission pipeline measured at point C in Figure 1 during the period y, (m^3)
$w_{carbon,A,y}$	=	Average content of carbon in the recovered gas measured at point A Figure 1 during the period y, (kgC/m^3)

The average carbon content in the gas $w_{carbon,A,y}$ is determined from regular measurements of the composition of the gas, taking into account the molecular weight of all fractions of the gas.
---End of Option 2---

Project emissions

The following sources of project emissions are accounted in this methodology:

- CO_2 emissions due to fuel combustion for recovery, transport and processing of the gas;
- CO_2 emission due to consumption of other fuels in place of the recovered gas; and,
- CH_4 and CO_2 emissions from leaks, venting and flaring during the recovery, transport and processing of recovered gas.

If these emission sources are under the control of the project participants, they should be included and considered as project emissions within the project boundary. This is for example the case, if the transportation system and the gas processing plant are operated by the project participants.
If these emission sources are not under control of the project participants, they should be considered and calculated as leakage effects. This is the case if project participants do not operate the transportation system and/or the gas processing plant. However, in both cases the methodological approach described below has to be followed to calculate emissions.
Project emissions are calculated as follows:

$$PE_y = PE_{CH4,gas,y} + PE_{CO2,fossilfuels,y} + PE_{CO2,elec,y} \quad \textbf{(5)}$$

Where:

PE_y	=	Project emissions in the period *y,* (tCO_2e).
$PE_{CH4,gas,y}$	=	CH_4 emissions due to venting, leaks or flaring of the recovered gas during the transportation and processing of the associated gas during the period *y,* (tCO_2e).
$PE_{CO2,fossilfuels,y}$	=	CO_2 emissions due to consumption of fossil fuels, including the associated gas if applicable, for the collection, transportation and processing of the associated gas during the period *y,* (tCO_2e).
$PE_{CO2,elec,y}$	=	CO_2 emissions due to the use of electricity for the collection, transportation and processing of the associated gas during the period *y,* (tCO_2e).

CH_4 project emissions from venting, leak or flaring of the associated gas
CH_4 emissions from the leaks, flaring and venting of the associated gas during its transportation and processing are not calculated from single emission sources, but a carbon mass balance is conducted between points A, B, and X in Figure 1:

$$PE_{CH4,gas,y} = \frac{m_{carbon,A,y} \cdot (m_{carbon,A,y} + m_{carbon,X,y} - m_{carbon,B,y})}{m_{carbon,A,y} + m_{carbon,X,y}} \cdot \frac{44}{12} \cdot \frac{1}{1000} \cdot GWP_{CH4} \quad \textbf{(6)}$$

with

$$m_{carbon,A,y} = V_{A,y} \cdot w_{carbon,A,y} \quad \textbf{(7)}$$

$$m_{carbon,B,y} = V_{dry\ gas,B,y} \cdot w_{carbon,dry\ gas,B,y} + m_{LPG,B,y} \cdot w_{carbon,LPG,B,y} + m_{condensate,B,y} \cdot w_{carbon,condensate,B,y} \quad \textbf{(8)}$$

$$m_{carbon,X,y} = \sum_{i} V_{X,y} \cdot w_{Carbon,X,y} \quad \textbf{(9)}$$

Where:

$PE_{CH4,gas,y}$	=	CH_4 emissions due to leaks, flaring or venting of the recovered gas during the period *y*, (tCO_2e).
$m_{carbon,A,y}$	=	Quantity of carbon in the recovered gas, measured at point A in Figure 1 during the period *y*, (kg).
$m_{carbon,B,y}$	=	Quantity of carbon in the products (dry gas, LPG, condensate) leaving the gas processing plant at point B in Figure 1 during the period *y*, (kg).
$m_{carbon,X,y}$	=	Quantity of carbon in the recovered gas from other oil wells at all points X in Figure 1 during the period *y*, (kg)
$V_{A,y}$	=	Volume of the gas recovered at point A in Figure 1 during the period *y*, (m^3)
$w_{carbon,A,y}$	=	Average content of carbon in the gas recovered at point A in Figure 1 during the period *y*, (kgC/m^3).
$w_{carbon,condensate,B,y}$	=	Average content of carbon in condensate at point B in Figure 1 during the period *y*, (kgC/m^3).
$m_{condensate,B,y}$	=	Quantity of condensate that is produced in the gas processing plant (point B in Figure 1) during the period y in kg.
$w_{carbon,LPG,B,y}$	=	Average content of carbon in LPG at point B in Figure 1 during the period *y*, (kgC/m^3).
$m_{LPG,B,y}$	=	Quantity of LPG produced in the gas processing plant (point B in Figure 1) during the period *y*, (kg).
$w_{carbon,dry\ gas,B,y}$	=	Average content of carbon in dry gas at point B in Figure 1 during the period *y*, (kgC/m^3).
$V_{dry\ gas,B,y}$	=	Volume of dry gas produced in the gas processing plant (point B in Figure 1) during the period *y*, (m^3).
$V_{X,y}$	=	Volume of the gas recovered from oil well *i*, measured at point X in Figure 1 during the period *y*, (m^3).
$w_{carbon,X,y}$	=	Average content of carbon in the gas recovered from oil well *i*, measured at point X in Figure 1 during the period *y*, (kgC/m^3).

The carbon content of the products ($w_{Carbon,dry\ gas,B,y}$, $w_{Carbon,LPG,B,y}$, $w_{Carbon,condensate,B,y}$) may be taken from project specifications, if products are homogeneous in their composition, or should be monitored if the carbon content of the products varies.

<u>Project emissions from the consumption of fossil fuels</u>

Project emissions $PE_{CO2,fossilfuels,y}$ from the use of fossil fuels for the collection, recovery, transportation and processing of the associated gas are calculated applying the latest approved version of the “Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion” where process *j* corresponds to the combustion of fossil fuels.

In case when a part of the associated gas is used as fuel within the project boundary, related project emissions should be included in $PE_{CO2,fossilfuels,y}$.

Project emissions from consumption of electricity
Project emissions $PE_{CO2,elec,y}$ from the use of electricity for the collection, recovery, transportation and processing of the associated gas are calculated applying the latest approved version of the "Tool to calculate project emissions from electricity consumption".

Leakage

Changes in CO_2 emissions due to the substitution of fuels at end-users
Project participants should assess:

- Whether the supply of additional fuels by the project activity to the market will lead to additional fuel consumption; and
- Whether the fuels of the project activity substitute fuels with a lower carbon intensity (e.g. if electricity generation with the recovered gas substitutes renewable electricity generation).

For this purpose the market of the products should be analyzed. If such leakage effects may result from the project activity, emission reductions should be adjusted for these leakage effects respectively in a conservative manner. Where the fuels of the project activity substitute fuels with a higher carbon intensity, emission reductions should as a conservative assumption not be adjusted.

Emission reductions

Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y \quad \textbf{(10)}$$

Where:

ER_y	=	Emission reductions in the period *y,* (t CO_2e)
BE_y	=	Baseline emissions in the period *y,* (t CO_2e)
PE_y	=	Project emissions in the period *y,* (t CO_2e)
LE_y	=	Leakage emissions in the period *y,* (t CO_2e)

Changes required for methodology implementation in 2nd and 3rd crediting periods

a) Consistent with guidance by the Executive Board, project participants shall assess the continued validity of the baseline and update the baseline. In order to assess the continued validity of the baseline, project participants should apply the procedure to determine the most plausible baseline scenario, as outlined above. The crediting period may only be renewed if the application of the procedure shows that the baseline scenario determined in the registered CDM-PDD still applies;
b) It shall be demonstrated that the project activity is not a common practice using the procedure defined in the Common Practice step of the "*Combined tool to identify the baseline scenario and demonstrate additionality*". The Designated Operational Entity shall evaluate the common practice with the information provided regarding the practices applied to handling of the associated gas in the host country;
c) The introduction of laws and regulations requiring flaring or utilization of the associated gas and/or the rate of compliance with the existing relevant laws/regulations shall also be assessed to determine the continued validity of the baseline;

d) Flaring as a baseline can only be established for 2nd or 3rd crediting period if it can be demonstrated that 50% or more of the oil wells in the country do not flare or utilize associated gas.

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:	GWP_{CH4}
Data unit:	tCO_2e/tCH_4
Description:	Global warming potential for CH_4
Source of data:	IPCC
Measurement procedures (if any):	21 for the first commitment period. Shall be updated according to any future COP/MOP decisions.
Any comment:	---

-- Only required for Option 1 --

Data / parameter:	OF
Data unit:	Number of oil wells in the country that did not flare associated gas and did not utilize low pressure associated gas in the year preceding the start of the project activity
Description:	
Source of data:	Satellite images
Measurement procedures (if any):	1. Define exact location of all oil wells in the country (OT_N) 2. Use adequate satellite images integrated over time to define for each oil well whether any flaring happened during the year prior to the start of the project activity. The satellite pictures provided shall cover at least 90% of the one year period prior to the start of the project activity.
Any comment:	This parameter only needs to be defined if venting is identified as the baseline scenario and national laws/regulations exist that prohibit venting of associate gas. An independent institution with relevant expertise in interpretation of satellite images shall provide a written confirmation in the CDM-PDD stating that the methodology chosen and all the conclusions drawn from satellite images are adequate.

Data / parameter:	OT
Data unit:	Number
Description:	Total number of oil wells in the country in the year preceding the start of the project activity
Source of data:	Official national sources
Measurement procedures (if any):	-
Any comment:	This parameter only needs to be defined if venting is identified as the baseline scenario and national laws/regulations exist that prohibit venting of associate gas.

III. MONITORING METHODOLOGY

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 otherwise in the tables below. All measurements should be conducted with calibrated measurement equipment according to relevant industry standards.

The CDM-PDD will have to include minimal procedures to ensure that the data collection and retention will be made properly.

Uncertainty assessment:

'Permissible uncertainty' shall be expressed as the 95% confidence interval around the measured value, for normally distributed measurements. The uncertainty associated with each parameter should be assessed, for example, by calculating the probable uncertainty as the mean deviation divided by the square root of the number of measurements. If this uncertainty is within the 95% confidence interval, than it is considered permissible uncertainty, and no action must be taken.

If not, then the uncertainty should be assessed as low (<10%), medium (10-60%) or high (>60%). Percent uncertainty may be calculated by dividing the mean of the parameter by the probable uncertainty and multiply by 100% to get percent uncertainty. If percent uncertainty is <10%, the uncertainty is considered low. A detailed explanation of quality assurance and quality control procedures must be described for parameters with medium or high uncertainty in an attempt to decrease uncertainty, and to ensure that emissions reductions calculations are not compromised. In the case of a parameter with medium or high uncertainty, a sensitivity analysis should be performed to determine the potential of the uncertainty of the parameter to affect the emissions reduction calculation. The authenticity of the uncertainty levels should be verified by the DOE at the project verification stage.

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

Data and parameters monitored

Data / parameter:	$w_{A,CH4,y}$
Data unit:	$kgCH_4/m^3$
Description:	Average content of methane in recovered gas
Source of data:	Chemical analysis (e.g., gas chromatography).
Measurement procedures (if any):	Analysis should be performed in conjunction with measurement of the volume of recovered gas. Measurements should be taken at the point(s) where recovered gas enters the gas processing facility.
Monitoring frequency:	Weekly
QA/QC procedures:	Data should be measured using accurate and calibrated equipment.
Any comment:	---

Data / Parameter:	$V_{A,y}$
Data unit:	m^3
Description:	Volume of the recovered gas at inlet to the gas processing plant at point A in Figure 1 during the period *y*
Source of data:	Flow meter (e.g., diaphragm gouge)
Measurement procedures (if any):	Data should be measured using accurate and calibrated flow meters.
Monitoring frequency:	Continuously
QA/QC procedures:	Volume of gas should be completely metered with regular calibration of metering equipment
Any comment:	---

Data / Parameter:	$V_{C,y}$
Data unit:	m^3
Description:	Volume of the recovered gas entering the transmission pipeline measured at point C in Figure 1 during the period *y*
Source of data:	Flow meter (e.g., diaphragm gouge)
Measurement procedures (if any):	Data should be measured using accurate and calibrated flow meters. Measurements should be taken at the point(s) where recovered gas exits the pipeline built under the project activity and enters the pre-existing pipeline for further transportation and use.
Monitoring frequency:	Continuously
QA/QC procedures:	Volume of gas should be completely metered with regular calibration of metering equipment
Any comment:	---

Data / Parameter:	$V_{D,y}$
Data unit:	m^3
Description:	Volume of the recovered gas used for electricity generation measured at inlet to electricity generation facility (point D in Figure 1 during the period *y*
Source of data:	Flow meter (e.g., diaphragm gouge)
Measurement procedures (if any):	Data should be measured using accurate and calibrated flow meters. Measurements should be taken at the point(s) where recovered gas exits the pipeline built under the project activity and enters the pre-existing pipeline for further transportation and use.
Monitoring frequency:	Continuously
QA/QC procedures:	Volume of gas should be completely metered with regular calibration of metering equipment
Any comment:	---

Data / Parameter:	$w_{carbon,A,y}$
Data unit:	kgC/m^3
Description:	Average content of carbon in the recovered gas measured at point A in Figure 1 during the period *y*
Source of data:	Chemical analysis (e.g., gas chromatography).
Measurement procedures (if any):	Analysis should be performed in conjunction with measurement of the volume of recovered gas. Measurements should be taken at the point(s) where recovered gas enters the gas processing facility.
Monitoring frequency:	Weekly
QA/QC procedures:	Data should be measured using accurate and calibrated equipment.
Any comment:	---

Data / Parameter:	$V_{dry\ gas,B,y}$
Data unit:	m^3
Description:	Volume of dry gas produced in the gas processing plant (point B in Figure 1)
Source of data:	---
Measurement procedures (if any):	Measurement with e.g. orifice meters
Monitoring frequency:	Continuously
QA/QC procedures:	---
Any comment:	---

Data / Parameter:	$w_{carbon,dry\ gas,B,y}$
Data unit:	kgC/m³
Description:	Average content of carbon in dry gas at point B in Figure 1
Source of data:	---
Measurement procedures (if any):	Measurement with gas chromatography
Monitoring frequency:	Weekly
QA/QC procedures:	---
Any comment:	---

Data / Parameter:	$m_{LPG,B,y}$
Data unit:	t
Description:	Quantity of LPG produced in the gas processing plant (point B in Figure 1)
Source of data:	---
Measurement procedures (if any):	Measurement with e.g. coriolis meters
Monitoring frequency:	Continuously
QA/QC procedures:	---
Any comment:	---

Data / Parameter:	$w_{carbon,LPG,B,y}$
Data unit:	kgC/m³
Description:	Average content of carbon in LPG at point B in Figure 1
Source of data:	---
Measurement procedures (if any):	Measurement with gas chromatography
Monitoring frequency:	Weekly
QA/QC procedures:	---
Any comment:	---

Data / Parameter:	$m_{condensate,B,y}$
Data unit:	t
Description:	Quantity of condensate produced in the gas processing plant (point B in Figure 1)
Source of data:	---
Measurement procedures (if any):	Measurement with e.g. coriolis meters
Monitoring frequency:	Continuously
QA/QC procedures:	---
Any comment:	---

Data / Parameter:	$w_{carbon,condensate,B,y}$
Data unit:	kgC/m³
Description:	Average content of carbon in condensate at point B in Figure 1
Source of data:	---
Measurement procedures (if any):	Measurement with gas chromatography
Monitoring frequency:	Weekly
QA/QC procedures:	---
Any comment:	---

Data / Parameter:	$V_{X,y}$
Data unit:	m³
Description:	Volume of the gas recovered from oil well *i*, measured at inlet to the gas processing plant at point X in Figure 1 during the period *y*
Source of data:	---
Measurement procedures (if any):	Data should be measured using accurate and calibrated flow meters (e.g., diaphragm gouge)
Monitoring frequency:	Continuously
QA/QC procedures:	Volume of gas should be completely metered with regular calibration of metering equipment
Any comment:	---

Data / Parameter:	$w_{carbon,X,y}$
Data unit:	kgC/m^3
Description:	Average content of carbon in the gas recovered from oil well *i*, measured at point X in Figure 1 during the period *y*
Source of data:	---
Measurement procedures (if any):	Measurement with gas chromatography
Monitoring frequency:	Weekly
QA/QC procedures:	---
Any comment:	---

-- Only required for Option 1 --

Data / parameter:	$ONF_{N,y}$
Data unit:	Number of oil wells in the country that did not flare associated gas and did not utilize low pressure associated gas in year *y*
Description:	Global warming potential for CH_4
Source of data:	Satellite images
Measurement procedures (if any):	1. Define exact location of all oil wells included in total number of oil wells in the country (OT_N); 2. Use adequate satellite images integrated over time to define for each oil well whether any flaring happened during the year prior to the start of the project activity. The satellite pictures provided shall cover at least 90% of the 1 year period prior to the start of the project activity; 3. Provide an explicit list with name of all oil wells and indicate whether they vented 100% of the gas, used 100% of the associate gas or had another scheme.
Any comment:	This parameter only needs to be defined if venting is identified as the baseline scenario and national laws/regulations exist that prohibit venting of associate gas. This parameter also includes all relevant CDM project activities. An independent institution with relevant expertise in interpretation of satellite images shall provide a written confirmation in the PDD stating that the methodology chosen and all the conclusions drawn from satellite images are adequate.

Data / parameter:	$OT_{N,y}$
Data unit:	Number
Description:	Total number of oil wells in the country in year *y*
Source of data:	Official national sources
Measurement procedures (if any):	-
Any comment:	This parameter only needs to be defined if venting is identified as the baseline scenario. This parameter also includes all relevant CDM projects activities.

Data / parameter:	$ONF_{L,y}$
Data unit:	Number of oil wells in the local area that did not flare associated gas and did not utilize low pressure associated gas in year *y*
Description:	Global warming potential for CH_4
Source of data:	Satellite images
Measurement procedures (if any):	1. Define exact location of all oil wells included in total number of oil wells in the local area during year y ($OT_{N,y}$); 2. Use adequate satellite images integrated over time to define for each oil well whether any flaring happened during the year y. The satellite pictures provided shall cover at least 90% of the 1 year period; 3. Provide an explicit list with name of all oil wells and indicate whether they vented 100% of the low pressure associated gas, used 100% of the associate gas or had another scheme.
Any comment:	This parameter only needs to be defined if venting as the baseline is claimed and local laws/regulations exist that prohibit venting of associate gas. Local area is defined as the area in which the local law/regulation that prohibits venting is applicable. This parameter also includes all relevant CDM project activities. An independent institution with relevant expertise in interpretation of satellite images shall provide a written confirmation in the CDM-PDD stating that the methodology chosen and all the conclusions drawn from satellite images are adequate.

Data / parameter:	$OT_{L,y}$
Data unit:	Number
Description:	Total number of oil wells in the local area in year *y*
Source of data:	Official sources
Measurement procedures (if any):	-
Any comment:	This parameter only needs to be defined if venting as the baseline is claimed. This parameter also includes all relevant CDM project activities.

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