PROGRAMME DESIGN DOCUMENT FORM FOR CDM PROGRAMMES OF ACTIVITIES (F-CDM-PoA-DD)
Version 02.0

PROGRAMME OF ACTIVITIES DESIGN DOCUMENT (PoA-DD)

Programme of activities (PoA)

SECTION A. General description of PoA

A.1. Title of the PoA

Petrotrin Oil Fields Associated Gas Recovery and Utilization PoA
Version number 7
26/12/2012

A.2. Purpose and general description of the PoA

This programme of activities aims to avoid greenhouse-gas emissions resulting from venting and flaring of associated gases from producing oil fields. With this PoA, the Petroleum Company of Trinidad and Tobago Limited (Petrotrin) has created a platform that enables petroleum companies to overcome financial barriers to capture and use of associated gases from oil fields, by harnessing the financial support made available through the sale of carbon credits.

This PoA platform will initially be utilized in the Republic of Trinidad and Tobago, at existing oil fields operated by Petrotrin. Petrotrin intends to include additional oil fields in Trinidad operated by other petrochemical companies as future CPAs. The PoA will contribute to avoiding the waste of developing countries' energy resources while helping to mitigate global climate change.

(a) Policy/measure or stated goal that the PoA seeks to promote

There are currently no national policies in place in Trinidad and Tobago requiring capture and/or use of associated gas in oil production.[1] However, the Trinidad and Tobago Ministry of Energy and Energy Affairs (MEEA) is in the process of developing an energy efficiency policy for the petrochemical and power generation sectors, with the goal of improving the efficiency of the use of energy resources.

Further, the national Climate Change Policy calls for the continued development of all relevant sectors – including its industrial sector – as it aspires to achieve sustainable development.[2] The government proposes to accomplish this via a low greenhouse-gas-emission economic development pathway across all sectors of the economy. In addition, the climate change policy calls for maximizing the use of the carbon market, by:

a. Strengthening institutional capacity to participate in the Clean Development Mechanism of the Kyoto Protocol; and

b. Developing incentives for participation in feasible domestic cap-and-trade regimes.

While these efforts are in a nascent stage of development, it is clear that the intent of the government is to encourage efficient use of national energy resources and to harness the potential of carbon

[1] The following potentially-relevant policy documents have been provided to the DOE for validation: 1. the National Climate Change Policy (2011); 2. DRAFT Air Pollution Rules (June 2010); 3. the Occupational Safety and Health Act (2004); 4. the Environmental Management Act (entered into force 2001); 5. the Water Pollution (Amendment) Rules (2006); 6. the Petroleum Act (1969), and; 7. the Petroleum Regulations (1970).
[2] Government of the Republic of Trinidad and Tobago, "National Climate Change Policy," July 2011.

markets to contribute to attaining this goal. This PoA – by eliminating the loss of associated gases from oil production – will support the general aims of the national government with regard to energy policy and – as the first CDM project to be registered in the country – make an important contribution to achieving the aims of the national climate policy.

(b) Framework for the implementation of the proposed PoA

Capture of associated gas from oil wells is neither required nor common in the Republic of Trinidad and Tobago. The CPAs implemented under this PoA will encompass on- and off-shore oil fields. All of the on-shore oil fields in Trinidad are owned by Petrotrin though some are leased out by Petrotrin to small independent operators. Associated gases have historically been, and are currently being, vented from all such oil fields. In addition, most of these fields are comprised of stranded oil wells from which the cost of collecting associated gases is prohibitive. A significant amount of venting also occurs from the off-shore wells in Trinidad. Currently, Petrotrin owns a few off-shore oil wells in the country while most of the others are owned by international conglomerates and a few independent local companies. Petrotrin acreage, include 162,861 acres on shore and 1,539,417 acres offshore. Venting of associated gases is standard practice in all of the offshore oil fields owned by Petrotrin.

Venting and flaring of associated gases from oil wells is commonplace, in Trinidad and internationally. This PoA will improve the economics of collecting associated gases from both onshore and off-shore oil fields in Trinidad.

Contributions to sustainable development:
The recovery and utilization of associated gas from oil fields will contribute significantly to sustainable development in the host country in a number of ways, including:

1. Increasing natural gas resources by utilizing associated-gas resources that would otherwise be vented or flared;
2. Increasing the nation's gross domestic product (GDP) through increased gas sale volumes;
3. Providing employment – both temporary and permanent – during the installation and operation of the recovery system;
4. Expanding technological innovation as this project will be the first gas recovery system ever installed in the company;
5. Building CDM development capacity as this will be the first CDM project to be registered in the small twin-island developing state.

There are no laws or regulations in Trinidad and Tobago prohibiting the venting of waste gas in oil production activities. Recovering and utilizing associated gas is not obligatory.

The proposed PoA is a voluntary action taken by Petrotrin. Individual CPA proponents – including but not limited to Petrotrin – will plan, design, construct and operate their projects as CPAs included in the PoA.

A.3. CMEs and participants of PoA

(a) Coordinating/Managing Entity: TOSL Engineering Limited

(b) Project participants to the PoA: Petroleum Company of Trinidad and Tobago Limited and TOSL Engineering Limited

A.4. Party(ies)

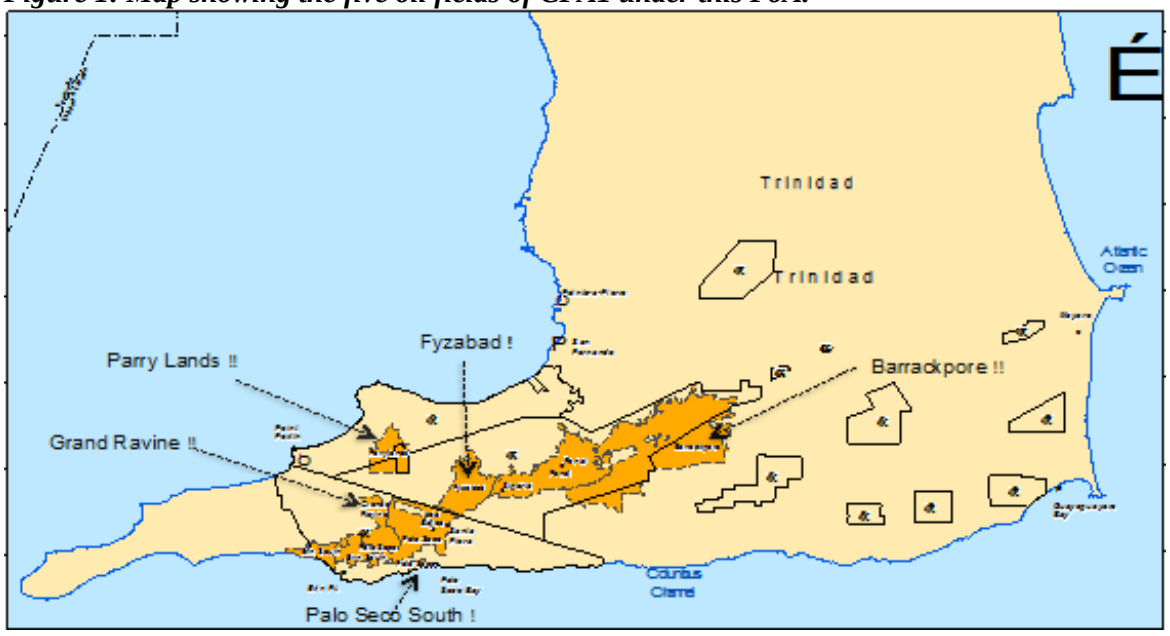
Name of Party involved (host) indicates a host Party	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
The Republic of Trinidad and Tobago (host)	Petroleum Company of Trinidad and Tobago Limited	No
The Republic of Trinidad and Tobago (host)	TOSL Engineering Limited	No

A.5. Physical/ Geographical boundary of the PoA

The geographical boundary of the PoA is defined as the geographical area within which all of the implemented CPAs included in the PoA will be physically implemented. All CPAs under this PoA will be physically located within the national borders of the PoA host Parties.

The first PoA host Party is the Republic of Trinidad and Tobago, located in the southern Caribbean, lying northeast of the South American nation of Venezuela and south of Grenada in the Lesser Antilles roughly between 10°N and 11.5°N (degrees North) latitude and between 60°W and 62°W (degrees West) longitude. It also shares maritime boundaries with Barbados to the northeast and Guyana to the southeast. The country covers an area of 5,128 square kilometers (1,979 square miles) and consists of two main islands, Trinidad and Tobago. All of the oil fields in the Republic of Trinidad and Tobago that will be included in CPAs under this PoA are located on, and off the shore of, the island of Trinidad (see Figure 1).

Figure 1: Map showing the five oil fields of CPA1 under this PoA.



A.6. Technologies/measures

In the baseline, all associated gas in the oil fields included in CPAs under this PoA will be either vented or flared. The technologies in place for venting and flaring may include: for venting, release of the associated gas as casing gas at the oil well and/or venting at a location close to the crude oil

gathering station; for flaring, usually the associated gas is gathered to a flare stack where it is flared. Apart from the flaring and venting configuration described above, the pre-project configuration will include: the production headers; crude oil gathering station; pumping units; crude flow lines; and AG vent lines etc. The key difference between the baseline and CPA technologies are that the baseline technologies for venting and flaring (gas venting lines, gas flares etc) will be replaced with facilities for AG capture as well as compression and/or processing, as described below.

All CPAs in this PoA will contain technology for AG recovery at oil fields. These technologies will include facilities to: pre-clean captured gas; compress the gas; absorb hydrocarbon liquids produced as a result of the compression process; ensure dew point temperature control in the process stream; carry out inter-cooling between compression stages; separate the hydrocarbon into components (C3/C4); etc.

Three basic technologies/measures for compressing and/or processing can be used in CPAs eligible for inclusion in this PoA. Each technology/measure can in turn be implemented in three possible ways, resulting in a total of nine CPA types. The three implementation scenarios for all three technology types differ in the way that energy is supplied to the project facilities. As allowed by AM0009, CPAs may also compress and/or process gas from other (non-project) fields/sources. This is usually to allow such projects to meet volume obligations to buyers, in cases where the AG volume is inadequate to meet contractual demand. Such cases may apply to CPA types 2A-C and 3A-C. As stipulated by AM0009 Version 06.0.0, no emission reductions may be claimed for gas from non-project wells that is treated at the project facilities.

	Project Energy Supply		
Project Technology: How gas is treated	**A. Energy supplied onsite**	**B. Energy supplied from grid**	**C. Energy supplied onsite and from grid**
1. Gas Compression Facilities	CPA Type1A		
		CPA Type 1B	
			CPA Type 1C
2. Gas Processing Facilities	CPA Type 2A		
		CPA Type 2B	
			CPA Type 2C
3. Gas Processing and Compression Facilities	CPA Type 3A		
		CPA Type 3B	
			CPA Type 3C

The basic technologies and scenarios for implemented each CPA type can be described as follows:

<u>Technology 1: Gas Compression Facilities</u>

A Gas Compression Facility (GCF) involves pre-treatment of the captured gas, including cleaning, and compression to pipeline pressures. The three scenarios for supplying energy to a project facility utilizing this technology are:

A. The GCF does *not* access a national or regional grid. Power and other energy requirements of the project activity are supplied from onsite fossil-fuelled energy-generating facilities. A portion of the recovered associated gas, and/or fossil fuel supplied to the project from other sources, is utilized to meet onsite energy requirements in the project facilities (Fig.2).
B. The GCF accesses an existing national or regional grid. All power and other energy requirements of the project activity are supplied from the grid (Fig.3). No onsite energy generation is utilized in the project facilities.

C. The GCF accesses an existing national or regional grid. Part of the power requirements of the project activity are supplied from the grid. A portion of the recovered associated gas, and/or fossil fuel supplied to the project from other sources, is utilized to supply the balance of the power demand of the project facilities, as well as all non-power energy demand (Fig.4).

Figures 2, 3 and 4 are schematic diagrams of these three scenarios for implementing GCF technology. All three diagrams illustrate the cleaning and compression of associated gas that would otherwise have been flared or vented, but that will instead be: collected in gathering pipelines; passed through scrubbers to remove condensates and any entrained liquids, and; sent to a compressor station, to be compressed to pipeline gas pressures. The compressed gas will be further scrubbed to remove any condensates and entrained liquids that have formed as the result of pressure change, before injection into the pipeline to the gas offtaker. The energy supply differs in the three diagrams.

Figure 2. Schematic Diagram of Gas Compression Facility (GCF) CPAs – Scenario A

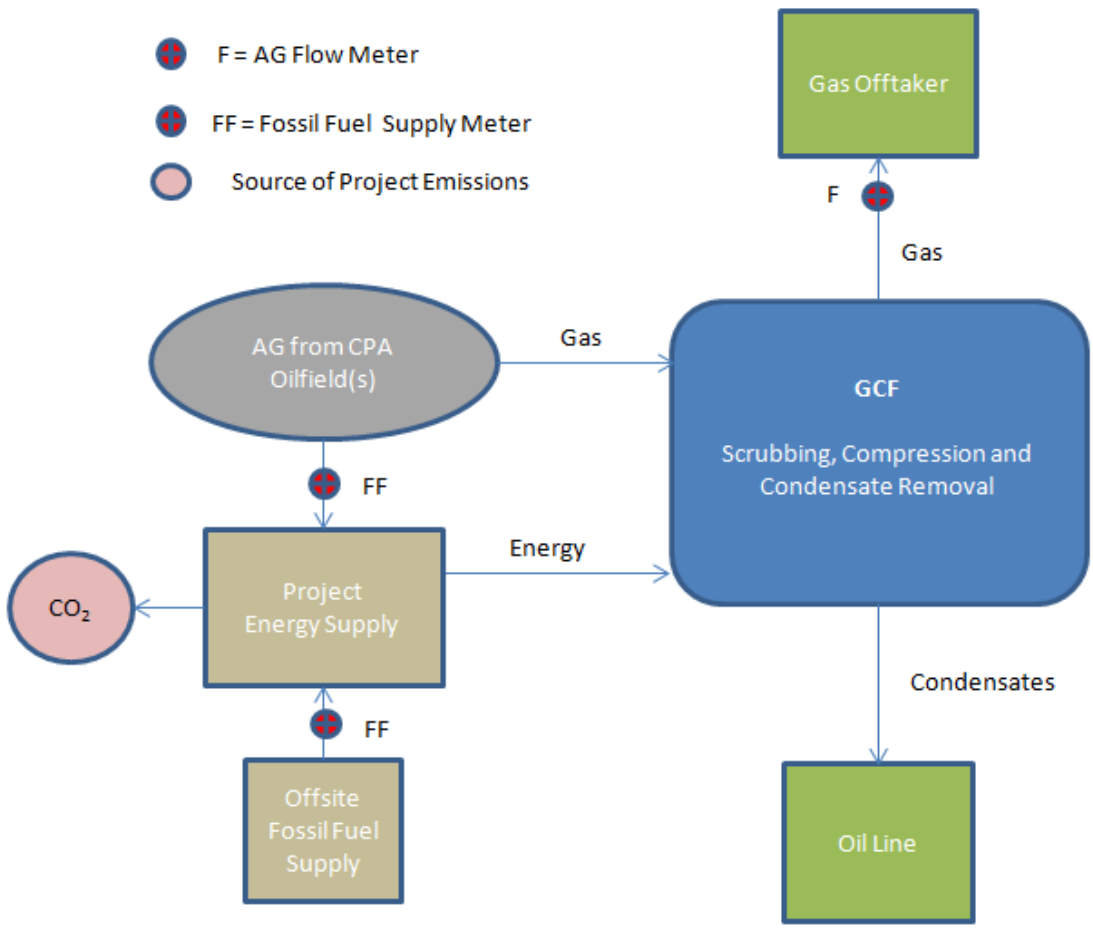


Figure 3. Schematic Diagram of Gas Compression Facility (GCF) CPAs – Scenario B

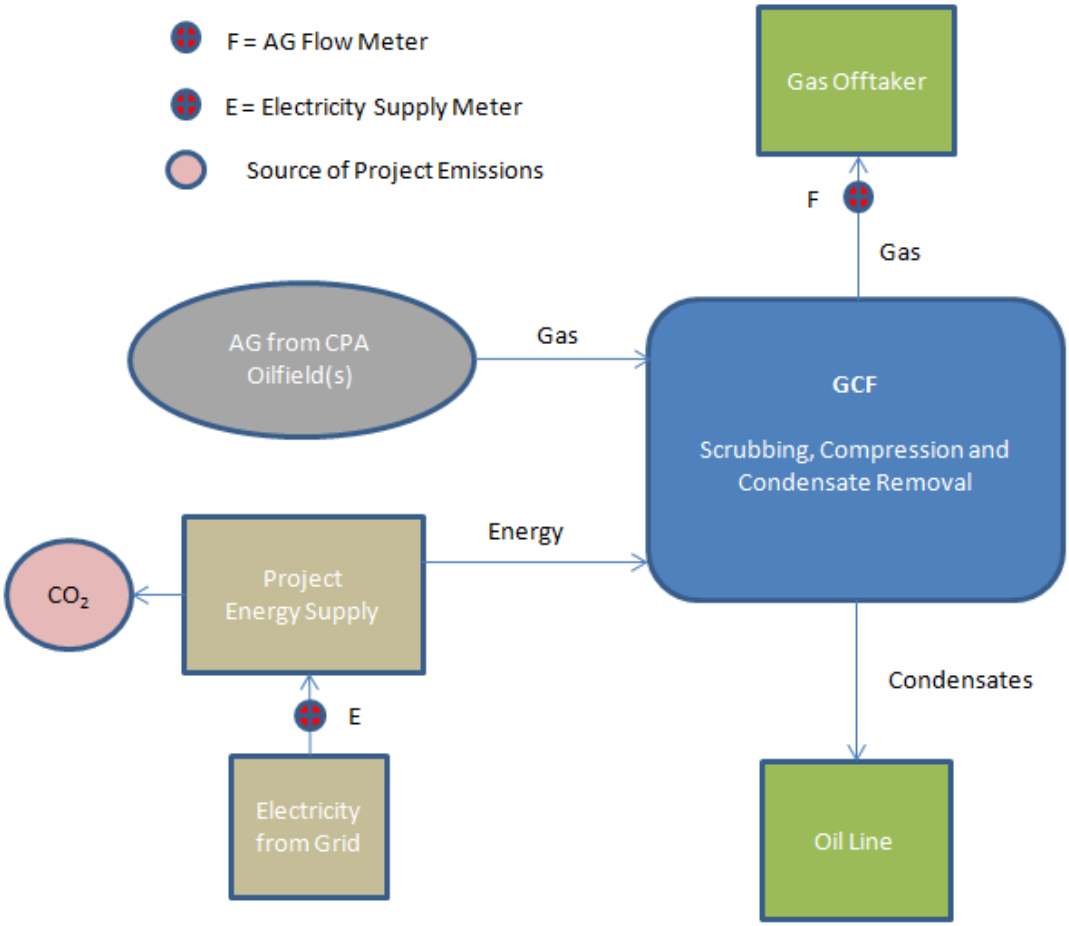
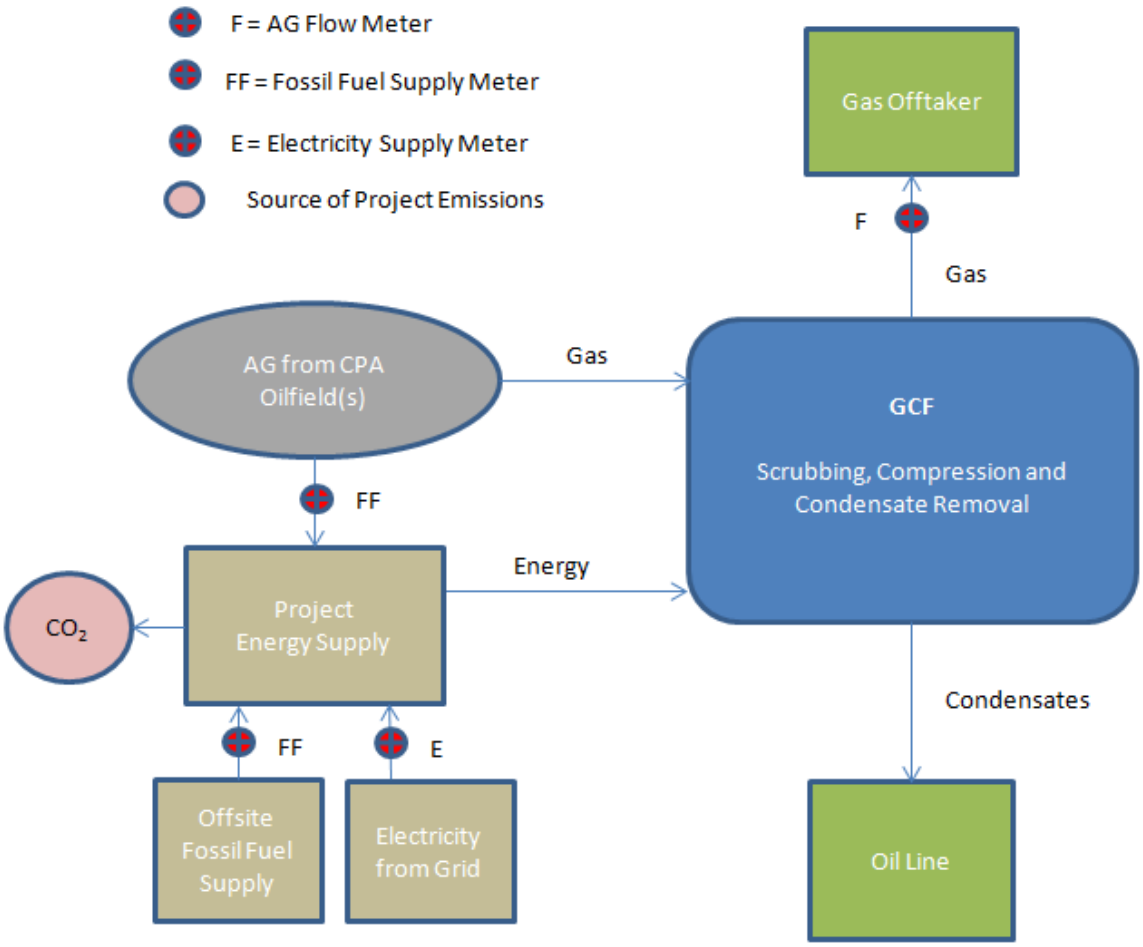


Figure 4. Schematic Diagram of Gas Compression Facility (GCF) CPAs – Scenario C



Technology 2: Gas Processing Facilities

A Gas Processing Facility (GPF) involves pre-treatment of the captured gas – including cleaning, processing and compression of the dry gas to pipeline gas pressure – before injection into the gas pipeline to the offtaker. In this option, after some initial cleaning the recovered associated gas is processed and separated into hydrocarbon products (LPG, Condensates and Dry Gas).

As with Technology 1, the three scenarios for implementing this technology/measure differ in the way energy is supplied to project activities. The three energy supply scenarios are:

A. The GPF does *not* access a national or regional grid. Power and other energy requirements of the project activity are supplied from onsite fossil-fuelled energy-generating facilities. A portion of the recovered associated gas, and/or fossil fuel supplied to the project from other sources, is utilized to meet onsite energy requirements in the project facilities (Fig.5).
B. The GPF accesses an existing national or regional grid. All power and other energy requirements of the project activity are supplied from the grid (Fig.6). No onsite energy generation is utilized in the project facilities.
C. The GPF accesses an existing national or regional grid. Part of the power requirements of the project activity are supplied from the grid. A portion of the recovered associated gas, and/or fossil fuel supplied to the project from other sources, is utilized to supply the balance of the power demand of the project facilities, as well as all non-power energy demand (Fig.7).

As shown in Figs 5, 6 and 7, gas collected in gathering pipelines is sent directly, after very minor cleaning, to a gas-processing facility (GPF). At the GPF, condensates are knocked-out of the gas stream and the C-3 C-4 components are stripped, leaving dry gas (comprised primarily of methane). The methane-rich dry gas is compressed to the pressure required for injection into a gas pipeline. The C-3 and part of the C-4 will usually be blended on site to produce LPG, while the C5+ components are usually blended into crude oil produced at the fields.

Figure 5. Schematic Diagram of Gas Process Facility (GPF) CPAs – Scenario A

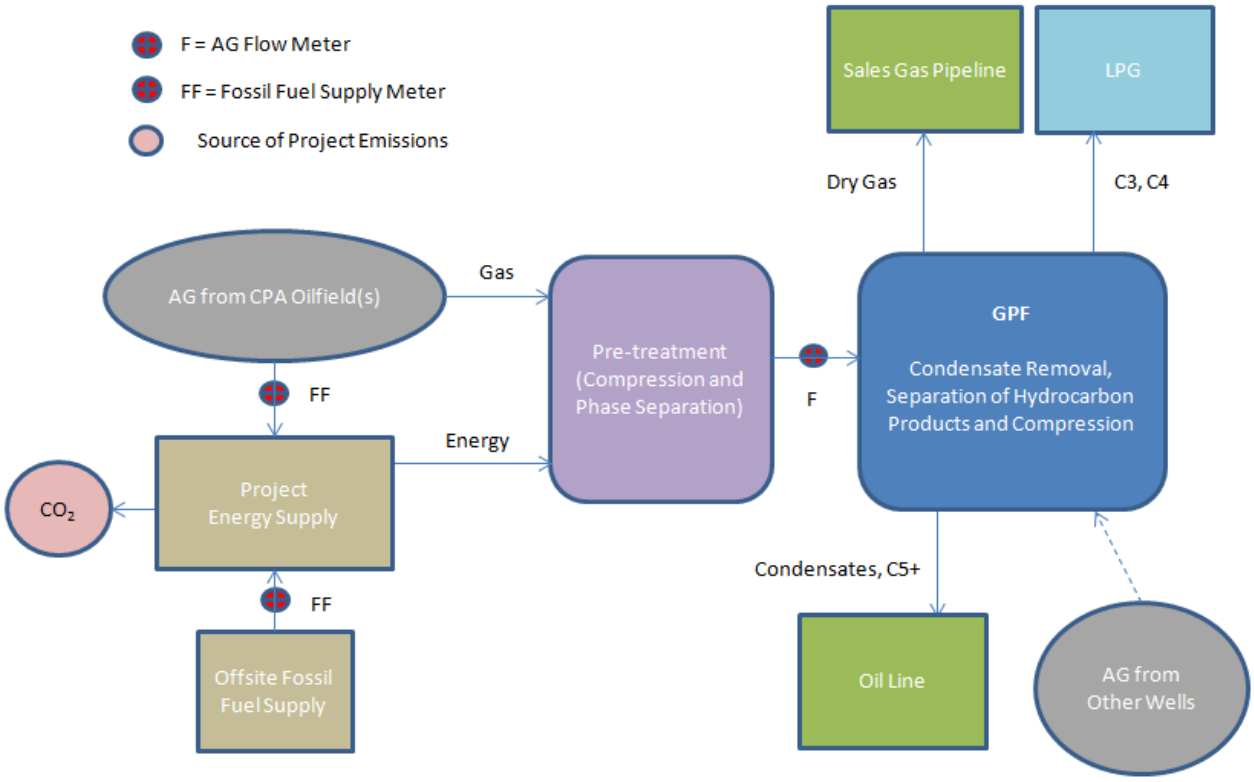


Figure 6. Schematic Diagram of Gas Process Facility (GPF) CPAs – Scenario B

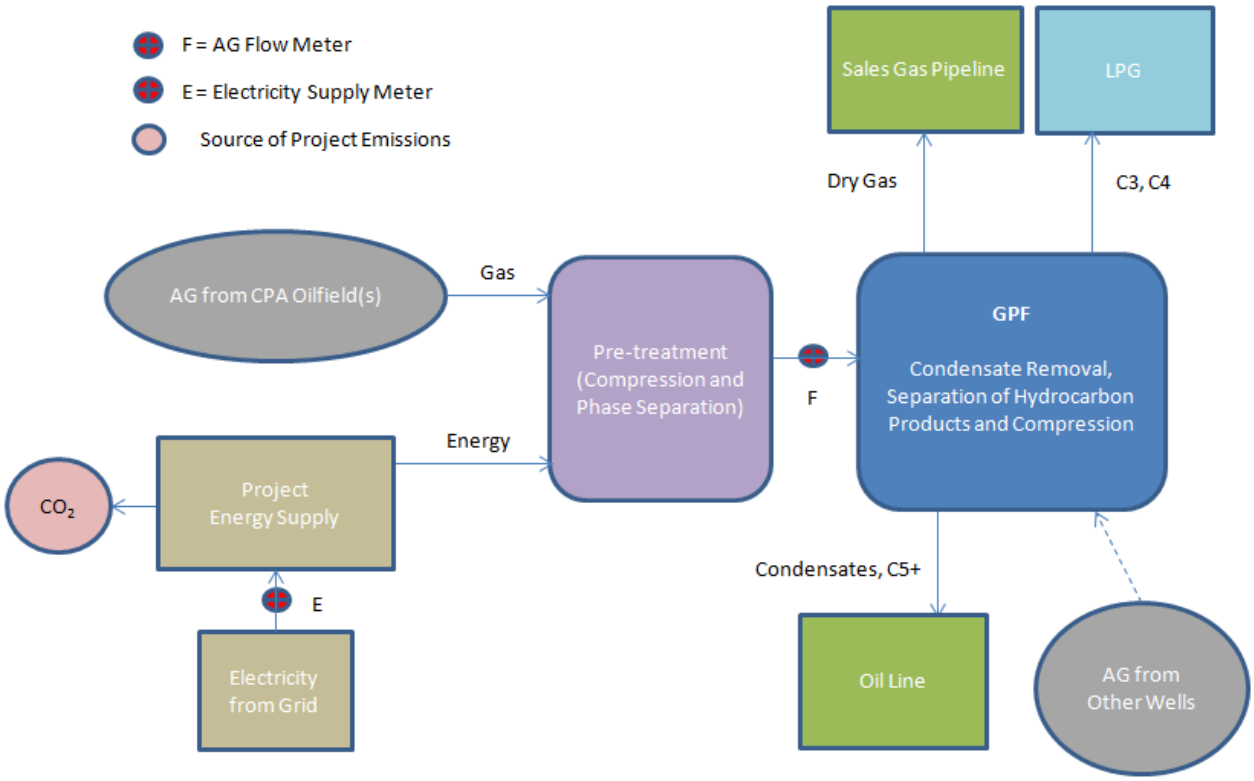
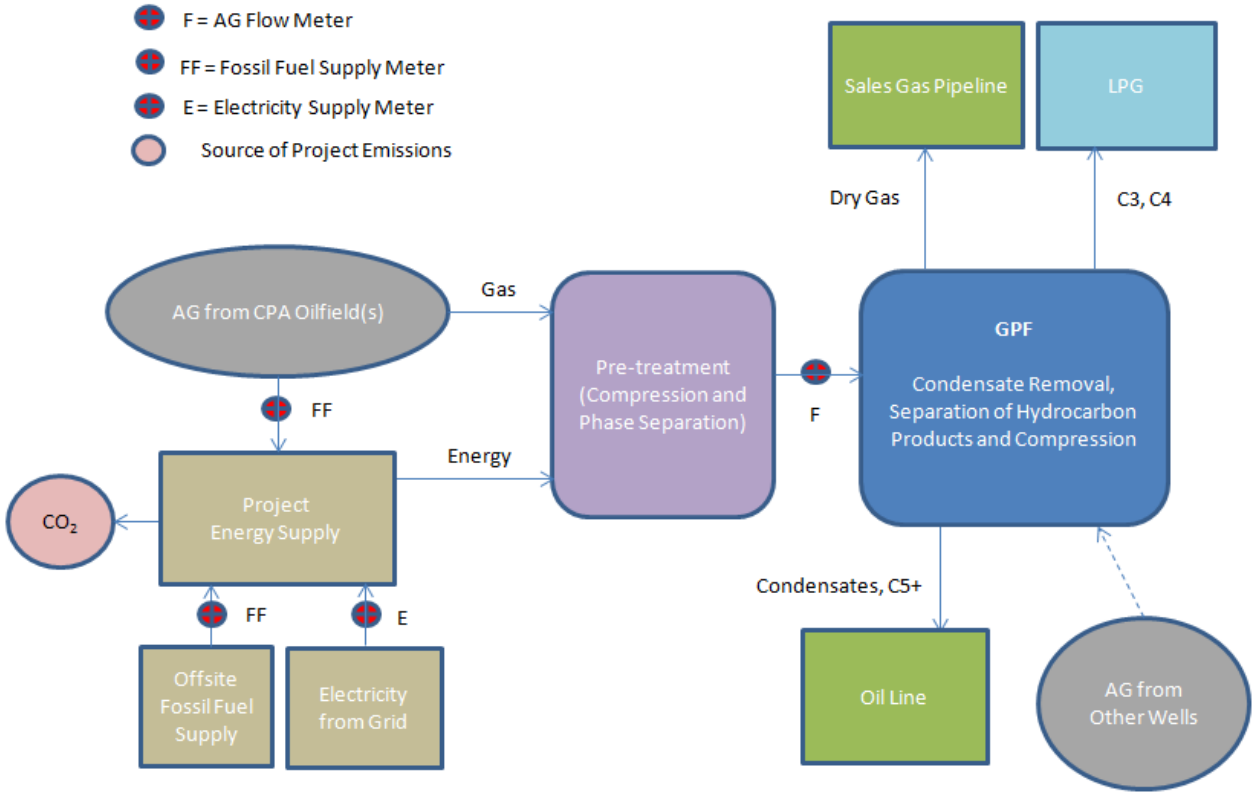


Figure 7. Schematic Diagram of Gas Process Facility (GPF) CPAs – Scenario C



<u>Technology 3: Gas Processing and Compression Facilities</u>

This technology/measure is similar to Technology 2, with the exception that some or all of the dry gas produced by the GPF is compressed to Compressed Natural Gas (CNG), which is then transported by trucks/barges to a compression facility where it is decompressed before injection into a gas pipeline. As in Technology 2, in a combined Gas Processing and Compression Facility (GPCF), captured gas is pre-treated; it is cleaned, compressed and processed to separate it into hydrocarbon products (LPG, condensates and dry gas) before the dry gas is compressed to CNG.

Again, the three scenarios for GPCFs differ in the way that energy is supplied to project activities:

A. The GPCF does *not* access a national or regional grid. Power and other energy requirements of the project activity are supplied from onsite fossil-fuelled energy-generating facilities. A portion of the recovered associated gas, and/or fossil fuel supplied to the project from other sources, is utilized to meet onsite energy requirements in the project facilities (Fig.8).
B. The GPCF accesses an existing national or regional grid. All power and other energy requirements of the project activity are supplied from the grid (Fig.9). No onsite energy generation is utilized in the project facilities.
C. The GPCF accesses an existing national or regional grid. Part of the power requirements of the project activity are supplied from the grid. A portion of the recovered associated gas, and/or fossil fuel supplied to the project from other sources, is utilized to supply the balance of the power demand of the project facilities, as well as all non-power energy demand (Fig.10).

Schematic process diagrams for these three scenarios are presented in Figures 8, 9 and 10.

Figure 8. Schematic Diagram of Gas Processing and Compression Facility (GPCF) CPAs – Scenario A

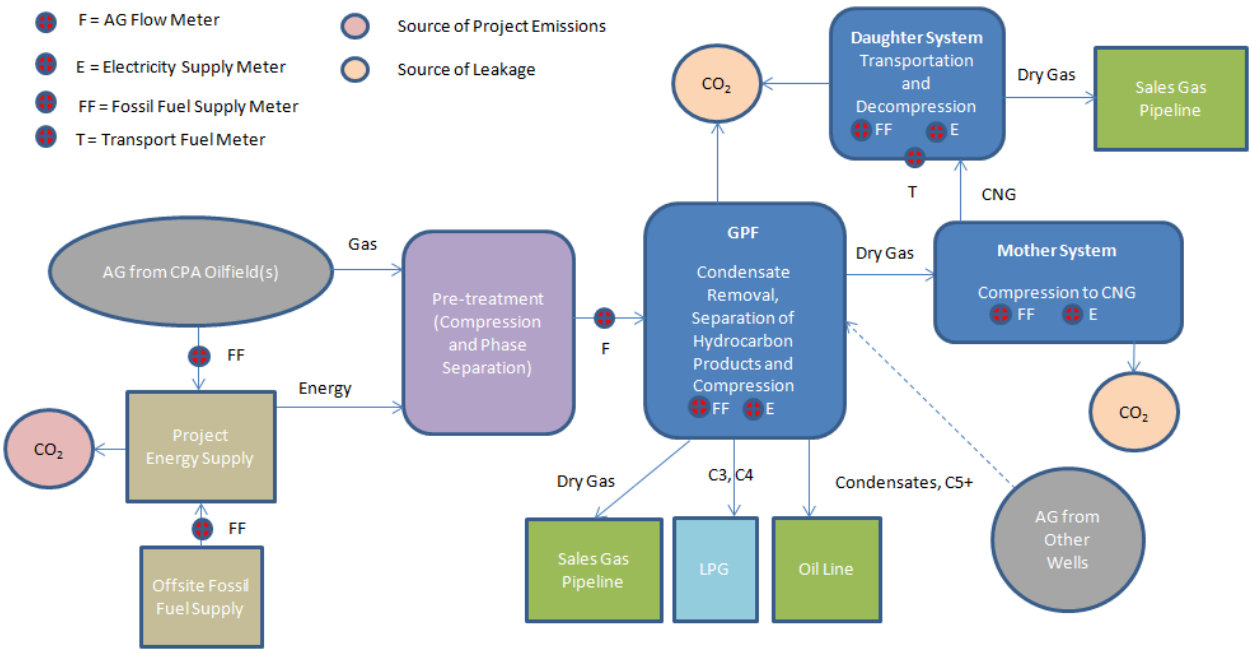


Figure 9. Schematic Diagram of Gas Processing and Compression Facility (GPCF) CPAs – Scenario B

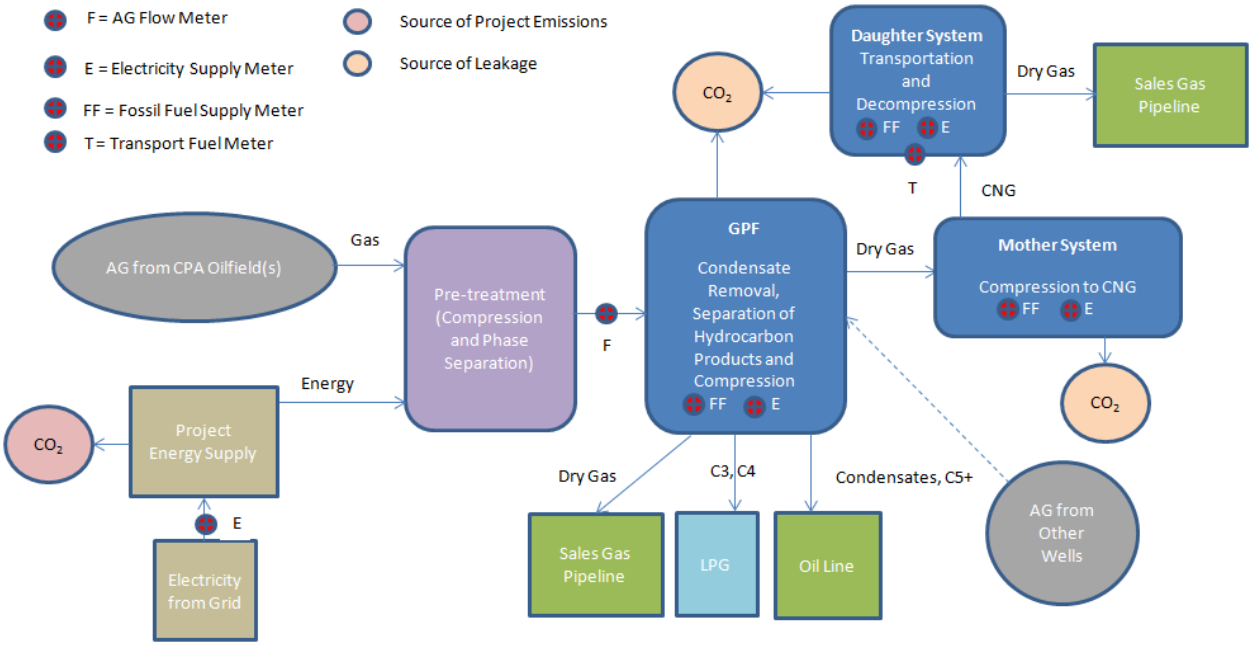
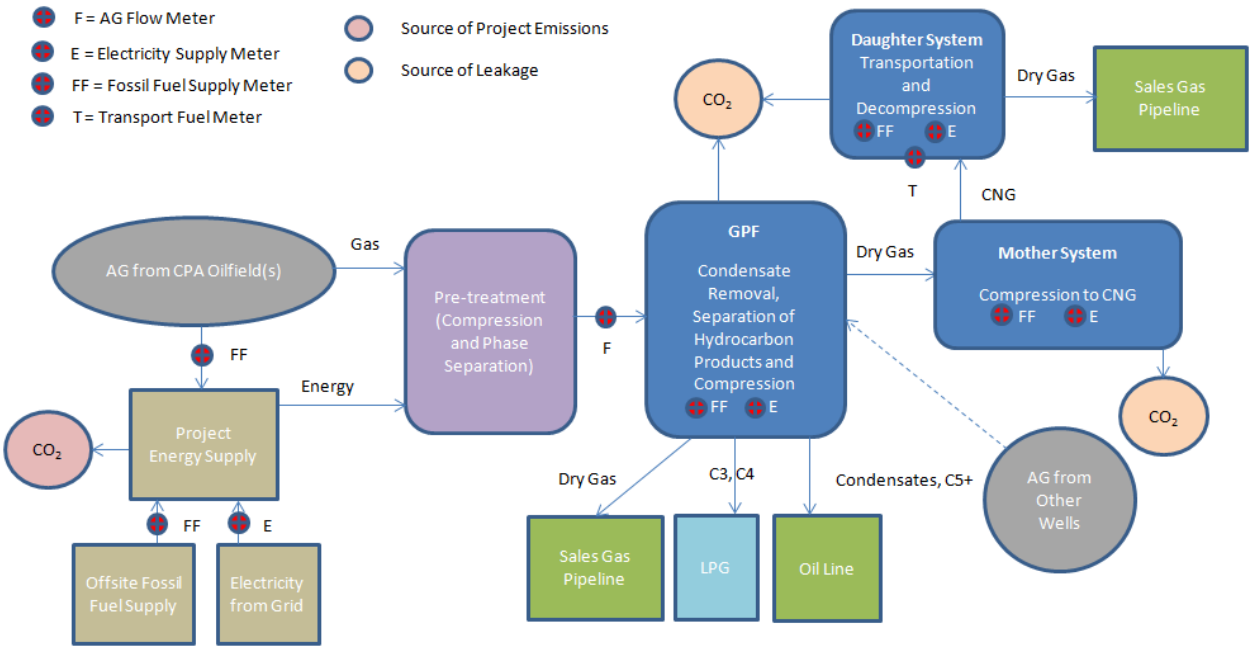


Figure 10. Schematic Diagram of Gas Processing and Compression Facility (GPCF) CPAs – Scenario C



All CPAs will be implemented utilizing new equipment for scrubbing and compression of associated gas and for separation and other processes included in a GPF or a GPCF. Other equipment, including gas-gathering pipelines and own electricity-supply, may utilize existing, new and/or refurbished equipment.

A.7. Public funding of PoA

No public funding will be received for the development of this PoA or the development and implementation of CPAs under the PoA.

SECTION B. Demonstration of additionality and development of eligibility criteria

B.1. Demonstration of additionality for PoA

Which In accordance with the *Standard for Demonstration of Additionality, Development of Eligibility Criteria and Application of Multiple Methodologies for Programme of Activities* (Version 01.0), paragraph 7, "Additionality shall be demonstrated by establishing that in the absence of CDM, none of the implemented CPAs would occur."

For CPAs implemented under this PoA, the additionality of the project activity shall be demonstrated and assessed using investment analysis in accordance with the latest version of the *Tool for the demonstration and assessment of additionality* agreed by the Board, which is available on the UNFCCC CDM website (hereinafter referred to as the Additionality Tool).

All data inputs to the investment analysis must be supported with documentation from reliable sources. To the extent possible, third-party data and information sources should be used, particularly for key financial parameters such as CAPEX and OPEX costs. Sources originating from the CPA proponent (such as feasibility reports) shall be assessed by a third party to ensure the robustness of assumptions. Projections of expected quantities of recoverable associated gas shall be reviewed by a geologist or expert with appropriate expertise.

A benchmark approach must be used, applying the benchmark established at the PoA level. If the project-based internal rate of return (IRR) without carbon credits is below the benchmark, the project shall be considered additional under this PoA.

In carrying out the investment analysis, the following must be clearly elucidated:

(a) The following minimum relevant technical and economic parameters and approaches must be considered in the development of the investment analysis:

- The Investment analysis approach must satisfy the key requirements stipulated in the Annex 5 of UNFCCC EB 62 Report titled "Guidelines on the Assessment of Investment Analysis".
- All data inputs that are not sourced from third parties shall be subjected to a third-party assessment to confirm that they are reasonable.
- Projected production of associated gas:
  - i. Must be developed from a clear and transparent projection of crude oil production in the field where the associated gas will be captured;
  - ii. A scientifically sound gas to oil ratio (GOR) characterization of the oil field must be provided to estimate associated gas production forecast for the field(s);
  - iii. The associated gas projection must be valid within a range of about ±10%;
  - iv. The calorific value of the recovered gas and its molar composition must also be scientifically determined and evidences for this determination e.g. laboratory analysis must be presented to the validating DOE. Also the calorific value of the recovered gas should also be within ±10% of internationally acceptable value for the same quality of gas e.g. IPCC;
- Parameters that will be utilized in the investment analysis should at a minimum include:
  - i. *CAPEX* – This must cover all the necessary equipment for the CPA, with the equipment list backed up by a 3rd Party engineering opinion. The value of this parameter that will be used in the investment analysis must be transparently determined within a validity range of ±10%;
  - ii. *OPEX* – The value of this parameter that will be used in the investment analysis must be supported by a 3rd Party view. The value must also be determined within a validity range of ±10%;
  - iii. *Prices of the products of the CPA* – These products include: the recovered gas; condensate; etc. The prices that will be used must be transparently determined and the values used must be supported with documentary evidences.
  - iv. *Operational Lifetime of the project*
  - v. *The Residual Value of the project*

(b) The Investment Analysis must include a robustly defined sensitivity of key parameters. This should include at the minimum:

- Parameters whose values will affect the estimation of the Additionality decision variables (e.g. Internal return on Investment). The parameters to be included in the sensitivity analysis should include:
  - i. The projected volume of associated gas and/or gas-lift gas projected to be recovered by the project
  - ii. The projected volume of gas to be delivered to point F by the project
  - iii. The CAPEX
  - iv. The OPEX
  - v. Assumed price for the delivery of recovered gas or final product if recovered gas is processed
- The sensitivity analysis should be carried out over a range of not less than ±10% and not more than ±20%;

- The range of the sensitivity analysis must be determined individually for each of the sensitivity-analysis parameters.

This framework for assessing the additionality of CPA – which must be complied with in line with eligibility criterion 10 – shall be updated every 2 years in order to reflect current technical and market circumstances.

For CPAs implemented in the Republic of Trinidad and Tobago, the following criteria for carrying out investment analyses of CPAs are established at the PoA level.

- Benchmark analysis shall be applied, using a pre-tax benchmark of 10%[3]
- Operational lifetime of the project shall be 25 years[4]
- Year for which residual value shall be calculated: 20[5]

Sensitivity analyses shall be carried out for the following parameters and value ranges. Alternative value ranges may be applied to individual parameters if verifiable sources can be provided that justify the alternative.

Variable	Sensitivity Range
(a) Projected volume of associated gas and/or gas-lift gas projected to be recovered by the project	Appendix 1: ±10%
(b) Projected volume of gas to be delivered to point F by the project	Appendix 2: ±10%
(c) Assumed price for the delivery of recovered gas or final product if recovered gas is processed	Appendix 3: ±10%
(d) CAPEX if based on front-end engineering estimates	Appendix 4: ±20%
(e) CAPEX if based on detailed feasibility study	Appendix 5: ±10%
(f) OPEX	Appendix 6: ±10%

B.2. Eligibility criteria for inclusion of a CPA in the PoA

As described in section A.6, there are nine different types of CPAs that are eligible for inclusion in this PoA. The CPA owner shall provide documentary evidence to the CME to enable an evaluation of the eligibility of the CPA based on the following criteria:

CPA Type 1A: Gas Compression Facilities with onsite energy supply

1. The geographical boundary of the CPA must be within the borders of the relevant PoA Host Party. This shall be demonstrated by comparing the geographical coordinates of the CPA with the geographic coordinates of the boundaries of the relevant Host Party.
2. The project must not be included in another PoA or exist as a stand-alone project submission under the CDM. This shall be demonstrated by comparing the geographic coordinates and CPA owners of the CPA with other CDM project submissions.
3. The CPA start date shall not be before 03/08/2012. This shall be checked in the CPA-DD.
4. The CPA must utilize new equipment for scrubbing and compression of associated gas and for separation and other processes included in a GPF or a GPCF. This shall be demonstrated through

[3] This benchmark was established based on the domestic prime interest rate averaged over the past 5 years. http://www.central-bank.org.tt/content/commercial-banks-annual *Central Bank Prime Interest Rates* provided to the DOE for validation.

[4] Reference CPA1 input used to determine project lifetime.

[5] Reference CPA1 input used to determine lifetime of equipment.

the project design, supported through studies or documentation such as pre-feasibility studies or a business plan.

5. All recovered gas must come from oil wells that are in operation and are producing oil at the time of the recovery of the associated gas and/or gas-lift gas. Further, all associated gas from oil wells included the CPA must be either vented or flared in the baseline. This shall be demonstrated through the project design, supported through studies or documentation such as pre-feasibility studies.
6. The CPA shall not lead to changes in the process of oil production, such as an increase in the quantity or quality of oil extracted, in the oil-wells within the project boundaries. This shall be demonstrated through the project design, supported through studies or documentation such as pre-feasibility studies.
7. The CPA shall be designed such that associated gases may only be injected into the oil reservoir, if at all, for the purpose of the gas-lift process. This shall be demonstrated through the project design, supported through studies or documentation such as pre-feasibility studies.
8. The CPA must meet the requirements of AM0009 version 6.0.0 with regard to applicability conditions (see Part II Section B.2 for each CPA Type), baseline setting and monitoring as well as all Tools associated with this methodology. This shall be demonstrated in the CPA-DD and supported with documentary evidence such as pre-feasibility studies.
9. The CPA start date must be reasonable, based on an investment implementation plan indicating the timing of financial closure and the first commitment of funds for the purchase of gathering pipelines, scrubbers or compressors for the CPA. This shall be demonstrated through the project design, supported through documentation such as a business or investment plan.
10. The CPA must meet the PoA requirements pertaining to the demonstration of additionality. Pre-tax benchmark analysis is required, applying the benchmark set at the PoA level. The minimum relevant technical and economic parameters and approaches provided in the detailed framework in Part I Section B.1 of the PoA-DD must be considered. The investment analysis must include a sensitivity analysis of key parameters, including the volume of gas recovered, volume delivered, CAPEX, OPEX, and gas price. The investment analysis shall be checked through an assessment of the CPA-DD based on the framework for demonstrating additionality established in Part I Section B.1 of the PoA-DD.
11. The CPA must have complied with CDM and local requirements to hold a local stakeholder consultation. This shall be demonstrated through documentary evidence such as: copies of invitations to stakeholder dialogues, newspaper announcements, signed and dated meeting participation lists, photographs, meeting minutes.
12. The CPAs must assess potential environmental impacts of the project activity in accordance with host country requirements and, if required by the host party, perform an EIA (or equivalent as per host-country requirements). This shall be demonstrated through documentary evidence of the host country requirements, as well as approval in cases where an EIA is required, in for example the form of a license or formal confirmation of compliance.
13. The CPA owner must provide the CME with a declaration as to whether or not the CPA will receive donor funding. For CPAs that are funded partially or wholly with donor funding, the CPA owner must provide the CME with written confirmation from the Annex I party that the funding provided does not result in a diversion of official development assistance.
14. The CPA description of the technology/measure to be applied shall include specifications including the level and type of service provided. This shall be documented through preparatory project studies or pre-feasibility studies. In the Republic of Trinidad and Tobago there are no specific testing/certification requirements for the technologies employed in the CPA types eligible for inclusion in this PoA.[6]

[6] Documentation provided to DOE for validation.

15. The technologies to be applied in the CPA must correspond to Technology 1, described in Part I Section A.6. This shall be demonstrated through preparatory project studies or documents such as pre-feasibility studies.
16. The CPA must be designed to recover associated gas that, after compression and phase separation, will be:
    - Partly consumed on-site to meet energy demands; and
    - Transported to a gas pipeline without prior processing.

    This shall be demonstrated through the project design, supported through studies or documentation such as pre-feasibility studies.
17. Energy required for the operation of field activities shall be supplied via onsite fossil fuel consumption and/or off-grid captive power generation in the baseline and for the project. Captive power generation shall not be supplied through combined heat and power production. This shall be demonstrated through the project design, supported through studies or documentation such as pre-feasibility studies.

CPA Type 1B: Gas Compression Facilities with energy supplied from a grid

Eligibility criteria 1 through 15 listed for CPA Type 1A apply. In addition:

18. The CPA must be designed to recover associated gas that, after compression and phase separation, will be:
    - Transported to a gas pipeline without further processing.

    This shall be demonstrated through the project design, supported through studies or documentation such as pre-feasibility studies.
19. Energy required for the operation of field activities shall be supplied from a grid in the baseline and for the project. This shall be demonstrated through the project design, supported through studies or documentation such as pre-feasibility studies.

CPA Type 1C: Gas Compression Facilities with energy supplied onsite and from a grid

Eligibility criteria 1 through 15 listed for CPA Type 1A apply. In addition:

20. The CPA must be designed to recover associated gas that, after compression and phase separation, will be:
    - Partly consumed on-site to meet energy demands; and
    - Transported to a gas pipeline without further processing.

    This shall be demonstrated through the project design, supported through studies or documentation such as pre-feasibility studies.
21. Energy required for the operation of field activities shall be supplied via onsite fossil fuel consumption and from a grid in the baseline and for the project. Captive power production is not allowed. This shall be demonstrated through the project design, supported through studies or documentation such as pre-feasibility studies.

CPA Type 2A: Gas Processing Facilities with onsite energy supply

Eligibility criteria 1 through 14 listed for CPA Type 1A apply. In addition:

22. The technologies to be applied in the CPA must correspond to Technology 2, described in Part I Section A.6. This shall be demonstrated through preparatory project studies or documents such as pre-feasibility studies.
23. The CPA must be designed to recover associated gas that, after compression and phase separation will be:
    - Partly consumed on-site to meet energy demands; and
    - Transported to a processing plant where it is processed into hydrocarbon products (e.g. dry gas, LPG and condensates). The dry gas is then transported to a gas pipeline.

    This shall be demonstrated through the project design, supported through studies or documentation such as pre-feasibility studies.

24. Energy required for the operation of field activities shall be supplied via onsite fossil fuel consumption and/or off-grid captive power generation in the baseline and for the project. Captive power generation shall not be supplied through combined heat and power production. This shall be demonstrated through the project design, supported through studies or documentation such as pre-feasibility studies.

CPA Type 2B: Gas Processing Facilities with energy supplied from a grid

Eligibility criteria 1 through 14 listed for CPA Type 1A apply. In addition:

25. The technologies to be applied in the CPA must correspond to Technology 2, described in Part I Section A.6. This shall be demonstrated through preparatory project studies or documents such as pre-feasibility studies.
26. The CPA must be designed to recover associated gas that, after compression and phase separation, will be:
    - Transported to a processing plant where it is processed into hydrocarbon products (e.g. dry gas, LPG and condensates). The dry gas is then transported to a gas pipeline.

    This shall be demonstrated through the project design, supported through studies or documentation such as pre-feasibility studies.
27. Energy required for the operation of field activities shall be supplied from a grid in the baseline and for the project. This shall be demonstrated through the project design, supported through studies or documentation such as pre-feasibility studies.

CPA Type 2C: Gas Processing Facilities with energy supplied onsite and from a grid

Eligibility criteria 1 through 14 listed for CPA Type 1A apply. In addition:

28. The technologies to be applied in the CPA must correspond to Technology 2, described in Part I Section A.6. This shall be demonstrated through preparatory project studies or documents such as pre-feasibility studies.
29. The CPA must be designed to recover associated gas that, after compression and phase separation, will be:
    - Partly consumed on-site to meet energy demands; and
    - Transported to a processing plant where it is processed into hydrocarbon products (e.g. dry gas, LPG and condensates). The dry gas is then transported to a gas pipeline.

    This shall be demonstrated through the project design, supported through studies or documentation such as pre-feasibility studies.
30. Energy required for the operation of field activities shall be supplied via onsite generation and from a grid in the baseline and for the project. Captive power production is not allowed. This shall be demonstrated through the project design, supported through studies or documentation such as pre-feasibility studies.

CPA Type 3A: Gas Compression and Processing Facilities with onsite energy supply

Eligibility criteria 1 through 14 listed for CPA Type 1A apply. In addition:

31. The technologies to be applied in the CPA must correspond to Technology 3, described in Part I Section A.6. This shall be demonstrated through preparatory project studies or documents such as pre-feasibility studies.
32. The CPA must be designed to recover associated gas that, after compression and phase separation will be:
    - Partly consumed on-site to meet energy demands; and
    - Transported to a processing plant where it is processed into hydrocarbon products (e.g. dry gas, LPG and condensates). The dry gas is then compressed to CNG, transported, and then decompressed before injection into a gas pipeline.

    This shall be demonstrated through the project design, supported through studies or documentation such as pre-feasibility studies.
33. Energy required for the operation of field activities shall be supplied via onsite fossil fuel consumption and/or off-grid captive power generation in the baseline and for the project. Captive

power generation shall not be supplied through combined heat and power production. This shall be demonstrated through the project design, supported through studies or documentation such as pre-feasibility studies.

CPA Type 3B: Gas Compression and Processing Facilities with energy supplied from a grid
Eligibility criteria 1 through 14 listed for CPA Type 1A apply. In addition:

34. The technologies to be applied in the CPA must correspond to Technology 3, described in Part I Section A.6. This shall be demonstrated through preparatory project studies or documents such as pre-feasibility studies.
35. The CPA must be designed to recover associated gas that, after compression and phase separation, will be:
    - Transported to a processing plant where it is processed into hydrocarbon products (e.g. dry gas, LPG and condensates). The dry gas is then compressed to CNG, transported, and then decompressed before injection into a gas pipeline.

    This shall be demonstrated through the project design, supported through studies or documentation such as pre-feasibility studies.
36. Energy required for the operation of field activities shall be supplied from a grid in the baseline and for the project. This shall be demonstrated through the project design, supported through studies or documentation such as pre-feasibility studies.

CPA Type 3C: Gas Compression and Processing Facilities with energy supplied onsite and from a grid
Eligibility criteria 1 through 14 listed for CPA Type 1A apply. In addition:

37. The technologies to be applied in the CPA must correspond to Technology 3, described in Part I Section A.6. This shall be demonstrated through preparatory project studies or documents such as pre-feasibility studies.
38. The CPA must be designed to recover associated gas that, after compression and phase separation, will be:
    - Partly consumed on-site to meet energy demands; and
    - Transported to a processing plant where it is processed into hydrocarbon products (e.g. dry gas, LPG and condensates). The dry gas is then compressed to CNG, transported, and then decompressed before injection into a gas pipeline.

    This shall be demonstrated through the project design, supported through studies or documentation such as pre-feasibility studies.
39. Energy required for the operation of field activities shall be supplied via onsite generation and from a grid in the baseline and for the project. Captive power production is not allowed. This shall be demonstrated through the project design, supported through studies or documentation such as pre-feasibility studies.

At each renewal of the crediting period of the PoA (at the renewal of the first CPA), the CME shall update the eligibility criteria as per the latest revised version of AM0009, and include them in a new version of the PoA-DD validated by a DOE, for submission to the Executive Board for approval. Once changes have been approved by the Board, the inclusion of all new CPAs shall be based on the revised eligibility criteria.

B.3. Application of methodologies

All CPAs under this PoA will apply methodology AM0009 version 06.0.0

SECTION C. Management system
The PoA will be managed and implemented by a Coordinating and Managing Entity (CME). A comprehensive operation and management system has been developed in a separate process and management manual. The role of the CME is as follows:

- The CME will recruit potential CPAs for inclusion in the PoA.

- The CME will screen prospective CPAs under consideration for inclusion in the PoA and assess whether or not each CPA meets the eligibility criteria for inclusion in the PoA, including but not limited to the availability of sufficient information and data to include in the CPA-DD, the adoption of a technology appropriate to one of the PoA CPA types, the additionality of the CPA under consideration, that it is not a duplication of a stand-alone CDM project or a CPA in another PoA submitted for CDM registration.

- The CME will develop the project documentation for prospective CPAs for inclusion in the CPA.

- The CME will obtain letters of approval from each host Party and Annex I Party which wishes to be involved in the PoA.

- Following completion of a CPA-DD for the project and confirmation of the accuracy of its contents by the CPA proponent, the CME will provide a technical review of the prospective CPAs under consideration for inclusion in the PoA and assess whether or the CPA meets each of the eligibility criteria for inclusion in the PoA. As part of this review the CME will determine whether the CPA provides sufficient information and supporting documentation, will review the demonstration of the additionality of the CPA, will determine whether or not it is not a duplication of a stand-alone CDM project or a CPA in another PoA submitted for CDM registration, and will ascertain whether the required supporting national approvals for the underlying project are available. If as a result of this assessment the CME determines that the CPA-DD is eligible for inclusion in the CPA, the CME will approve the documentation for DOE assessment.

- The CME will obtain letters of authorization of its coordination of the PoA from each host Party.

- The CME will forward a completed specific CPA-DD to a DOE, after having ensured that the CPA and the specific CPA-DD meets the requirements determined in the POA.

- The CME will support CPA proponents in the process of DOE assessment for inclusion in the PoA.

- The CME will develop and maintain an electronic data storage and retrieval system that will, inter alia, include the following key data elements for each CPA:

    - Name of the CPA;
    - Site location/ coordinates (GPS coordinates);
    - Owner/ developer name and contact details;
    - Project status and progress through the CDM cycle;
    - Meter measurements;
    - Records documenting meter calibrations; and
    - Verification status.

- The CME will develop and implement a system/procedure to avoid double accounting e.g. to avoid the case of including a new CPA that has been already registered either as CDM project activity or as a CPA of another PoA,

- Before being included in the PoA, the location of each applicant CPA will be cross-checked against the UNFCCC CDM project database to determine that it has not already been officially submitted as a stand-alone project or a CPA in another PoA.

- The CME will implement provisions to ensure that those operating the CPA are aware and have agreed that their activity is being subscribed to the PoA.

- The CME will receive and review monitoring data from each CPA and provide support in ensuring its proper presentation in the form of a monitoring report, prior to submission to a DOE for verification.

- The CME will coordinate the selection and assignment of verification responsibilities to a DOE for verification of all CPAs under the PoA.

- The CME will provide support to CPA proponents during the process of verification, certification and issuance.

- The CME will also archive written documentation of the CPAs (such as maps, diagrams, permits/licenses, and the feasibility study). The CME will be responsible for providing the verifying DOE with all data required from the individual CPAs for successful verification, certification and issuance of CERs.

- The CME will be specified as a project participant in the PoA-DD and the Modalities of Communication (MoC).
- The CME will strive to continuously improve the PoA by addressing problems that may arise as well as updating the process and management manual in accordance with procedures in the manual with the aim of reflecting the knowledge and experienced acquired in the process of implementing the PoA.

The CPAs will be implemented and monitored by the respective CPA proponents (owners). Their roles are as follows:

- The CPA Proponent will be responsible for constructing, operating and maintaining the underlying project as described in the CPA-DD, resulting in the avoidance of greenhouse-gas emissions.

- The Proponent of each proposed CPA will be required to enter into a contract with the CME that includes sections on responsibilities and warranties among the contracted terms of participation.

- The Proponent of each CPA will hold primary responsibility for monitoring of their project activity. Each CPA will establish clearly-defined staff roles and responsibilities and monitoring routines within the CPA O&M structure, for ensuring the completeness and accuracy of all required monitored data, and for providing said data to the CME in the format required and in a timely manner. A CDM Manager for each CPA will be responsible for:
    - Managing the process of training new staff with monitoring duties;
    - Ensuring that staff carry out their monitoring duties;
    - Ensuring that procedures are followed on the site; and
    - Improving processes such that the monitoring system is both efficient and effective.

- To ensure that the data is reliable and transparent, each CPA Proponent will establish Quality Assurance and Quality Control measures for meter maintenance and calibration as well as data reading, recording, archiving and auditing.

- Each CPA Proponent will be responsible for monitoring the following parameters with respect to their project activity:
  - Volume of associated gas captured
  - NCV of the associated gas captured
  - Fraction of the associated gas captured that is used for captive purposes within the project facility
  - Quantity of backup fuel consumed within the project facility, and the carbon content of that fuel

- The monitoring data will be submitted by each CPA proponent to the CME, which will store the data in an electronic database. Primary data will be stored by the implementing entities.

- The CPA Proponent will own, install, operate and maintain and regularly calibrate meters required for monitoring of the CPA.

- Monitoring data will be archived electronically and stored by the CPA Proponent for two years following the end of the CPA crediting period to which it applies. The CPA Proponent will also provide the CME with copies of calibration certificates as required for ensuring the accuracy of metered data.

- The CPA Proponent will own the CERs generated and issued as a result of its CPA.

SECTION D. Duration of PoA
D.1. Start date of PoA

03/08/2012 The PoA start date was selected as the date of publication of the PoA-DD on the UNFCCC website, for global stakeholder consultation.

D.2. Length of the PoA
The PoA is expected to last 28 years from the start date.

SECTION E. Environmental impacts
E.1. Level at which environmental analysis is undertaken
Environmental analysis will be undertaken at the CPA level.

CPAs in the Republic of Trinidad and Tobago will be governed by the *Environmental Management Act No. 3 of 2000. Section 18 of this Act spells out the National Environmental Policy of Trinidad and Tobago. This Policy is aimed at the conservation and sustainable use of the natural resources of Trinidad and Tobago to ensure the growth of economic and social development. Specific objectives of the Policy are to:*

- Prevent, reduce or eliminate various forms of pollution to ensure adequate protection of the environment and consequently the health and well-being of humans.
- Conserve the biological diversity of the country and the stability and resilience of the ecosystems.
- Undertake retrospective analyses or evaluations to correct past development decisions that might be inimical to the continued environmental health of the country.

The Act mandates that new infrastructure projects must obtain a Certificate of Environmental Clearance (CEC) from the Environmental Management Authority (EMA) of the Republic of Trinidad and Tobago before construction activities can start on the project. The requirements for obtaining this CEC is specific the project activity and therefore, performing the environmental analysis at the CPA level is appropriate.

All CPAs under this PoA must comply with the Environmental Authority and or legislation of its host country at the minimum. Although the EMA is silent on what project proponents who already have in place such an environmental clearance should do in case of expansion projects and other activities at such sites, in implementing this associated gas vent-out project in oil fields in the Republic of Trinidad and Tobago, a minimum requirement from the corporate responsibility point of view will be the preparation of Environmental Management Plan (EMP) of the gas capture and utilization activities, as a tool to seek the normal Certificate of Environmental Clearance (CEC) from the Environmental Management Authority.

E.2. Analysis of the environmental impacts
N/A

E.3. Environmental Impact Assessment
N/A

SECTION F. Local Stakeholder comments

F.1. Solicitation of comments from local stakeholders
Local stakeholder consultation will be carried out at the CPA level.

As the locations of the oil fields for which CPAs will be implemented are dispersed and will effect and potentially raise concerns from different local stakeholder groups, performing stakeholder consultations at the CPA level is appropriate.

F.2. Summary of comments received
>>
N/A

F.3. Report on consideration of comments received
>>N/A

SECTION G. Approval and authorization
>>
The LoA for this PoA was issued by the DNA of the Republic of Trinidad and Tobago on 04/09/2012.

Part II: Generic component project activity

For CPA Types 1A and 2A:
SECTION A. General description of a generic CPA
A.1. Purpose and general description of generic CPAs
The purpose of each CPA under this PoA is to avoid venting and/or flaring of associated gas from oil production by capturing and processing it for utilization as an energy resource. CPAs feed captured associated gas into a natural gas pipeline.

SECTION B. Application of a baseline and monitoring methodology

B.1. Reference of the approved baseline and monitoring methodology(ies) selected

AM0009 (version 06.0.0) *"Recovery and utilization of gas from oil wells that would otherwise be flared or vented"*

AM0009 refers to the latest approved versions of the following tools:

- Tool to calculate project or leakage CO2 emissions from fossil fuel combustion (version 2);
- Tool to calculate baseline, project and/or leakage emissions from electricity consumption (version 1);
- Tool for the demonstration and assessment of additionality (version 06.0.0);
- Assessment of the validity of the original/current baseline and to update of the baseline at the renewal of the crediting period (version 3.0.1).

B.2. Application of the methodology

Each CPA shall address the applicability conditions of methodology AM0009 version 06.0.0 as follows:

Applicability Conditions of AM0009 version 06.0.0	Applicability for the proposed CPA
• Under the project activity the recovered gas, after the pre-treatment (compression and phase separation) in movable or stationary equipment, is: o Consumed on-site to meet energy demands; and/or o Transported to a gas pipeline without prior processing; and/or o Transported to a processing plant where it is processed into hydrocarbon products (e.g. dry gas, LPG and condensates). The dry gas is either (i) transported to a gas pipeline, or (ii) compressed to CNG first, transported, and then decompressed before injection into a gas pipeline.	The proposed PoA will be restricted to CPAs that will recover associated gas, which, after pre-treatment (compression and phase separation) will be utilized in one or more of the three ways required by this applicability condition. Confirmation that this condition is met shall be provided in the technology section of the CPA-DD and supported with documentation such as a pre-feasibility study.
• The project activity does not lead to changes in the process of oil production, such as an increase in the quantity or quality of oil extracted, in the oil-wells within the project boundaries;	The proposed PoA will be restricted to CPAs that will have no impact on the process of oil production. Confirmation that this condition is met shall be provided in the technology section of the CPA-DD and supported with documentation such as a pre-feasibility study.
• The injection of any gases into the oil reservoir and its production system is allowed in the project activity only for the purpose of the gas-lift process;	The proposed PoA will be restricted to CPAs for which gases are only injected into the oil reservoir, if at all, for the purpose of the gas-lift process. Confirmation that this condition is met shall be provided in the technology section of the CPA-DD and supported with documentation such as a pre-feasibility study.
• All recovered gas comes from oil wells that are in operation and are producing oil at the time of the recovery of the associated gas and/or gas-lift gas.	The proposed PoA will be restricted to CPAs for which all recovered gas originates from oil wells that are in operation and are producing oil at the time of recovery of the associated gas. Confirmation that this condition is met shall be provided in the project description in the CPA-DD and supported with documentation such as a pre-

	feasibility study.
In addition, the applicability conditions included in the tools referred to above apply, as follows.	
From the *Tool to calculate project or leakage CO2 emissions from fossil fuel combustion*: • "It can be used in cases where CO_2 emissions from fossil fuel combustion are calculated based on the quantity of fuel combusted and its properties."	Emissions from CPAs under this CPA may arise from onsite energy use in the form of combustion of captured associated gas or other fossil fuel sources at the project site. This Tool will be applied in such cases (applies to CPA types 1A, 2A, 3A, 1C, 2C and 3C). In these cases, such energy use can be quantified and the properties of the energy source can be provided.
From the *Tool to calculate baseline, project and/or leakage emissions from electricity consumption*: • "The tool is only applicable if one out of the following three scenarios applies to the sources of electricity consumption: Scenario A: **Electricity consumption from the grid.** The electricity is purchased from the grid only. Either no captive power plant is installed at the site of electricity consumption or, if any on-site captive power plant exits, it is not operating or it can physically not provide electricity to the source of electricity consumption. Scenario B: **Electricity consumption from (an) off-grid fossil fuel fired captive power plant(s).** One or more fossil fuel fired captive power plants are installed at the site of the electricity consumption source and supply the source with electricity. The captive power plant(s) is/are not connected to the electricity grid. Scenario C: **Electricity consumption from the grid and (a) fossil fuel fired captive power plant(s).** One or more fossil fuel fired captive power plants operate at the site of the electricity consumption source. The captive power plant(s) can provide electricity to the electricity consumption source. The captive power plant(s) is/are also connected to the electricity grid. Hence, the electricity consumption source can be provided with electricity from the captive power plant(s) and the grid. This tool is **not** applicable in cases where captive renewable power generation technologies are installed to provide electricity in the project activity, in the baseline scenario or to sources of leakage. The tool only accounts for CO_2 emissions."	The definitions of CPA Types under this PoA allow electricity consumption from the grid or from captive power plants. The CPA Types are not specific with respect to the type of fuel consumed for captive power production. This Tool will be applied in cases where either grid-based, or fossil-fuel-based off-grid captive, power is consumed. Scenario A applies to CPA types 1B, 2B, 3B, 1C, 2C and 3C. Scenario B may apply to CPA types 1A, 2A and 3A. Scenario C does not apply to any of the CPA types eligible under this PoA.
From the *Tool for the demonstration and assessment of additionality*: "The document provides a general framework for demonstrating and assessing additionality and is applicable to a wide range of project types. Some project types may require adjustments to this general framework."	The general framework provided in this Tool is applied in this PoA with the restriction that investment analysis must be applied. No further adjustments are required.
From the Tool *Assessment of the validity of the original/current baseline and to update of the baseline at the renewal of the crediting period*: No specific applicability conditions are included in this Tool.	No specific applicability conditions are included in this Tool.

Finally, the methodology is only applicable if the identified baseline scenario is:

- The continuation of the current practice of either venting (scenario G1), flaring (scenario G2) of the associated gas and/or gas-lift gas or on-site use of the partial amount of associated gas and/or gas-lift gas to meet on-site energy demands and rest of the gas are either vented or flared (scenario G3); and
- The continued operation of the existing oil and gas infrastructure without any other significant changes (scenario P4); and
- In the case where gas-lift is used under the project activity: the gas-lift gas under the baseline uses the same source as under the project activity and the same quantity as under the project activity (scenario O1).

B.3. Sources and GHGs

The greenhouse gases included in or excluded from the project boundary under methodology AM0009 (Version 06.0.0) are shown in Table 1. These sources and gases apply to all CPA types under this PoA.

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

	Source	**Gas**	**Included?**	**Justification / Explanation**
Baseline	Combustion of fossil fuels at end-users that are produced from non-associated gas or other fossil sources	CO2	Yes	Main source of emissions in the baseline
		CH4	No	Excluded for simplification. This is conservative.
		N2O	No	Excluded for simplification. This is conservative.
Project Activity	Energy use for the recovery, pre-treatment, transportation, and if applicable, compression/decompression, transportation of the recovered gas	CO2	Yes	Main source of emissions in the project
		CH4	No	Excluded for simplification. This emission source is assumed negligible
		N2O	No	Excluded for simplification. This emission source is assumed negligible

The project boundary encompasses:

- The project oil reservoir and oil wells where the associated gas and/or gas-lift gas is collected;
- The site where the associated gas and/or gas-lift gas was flared or vented in the absence of the project activity;
- The gas recovery, pre-treatment, transportation infrastructure, including where applicable, compressors;
- The source of gas-lift gas.

A schematic representation of a typical baseline within the project boundary in Trinidad is presented in Figure 11.

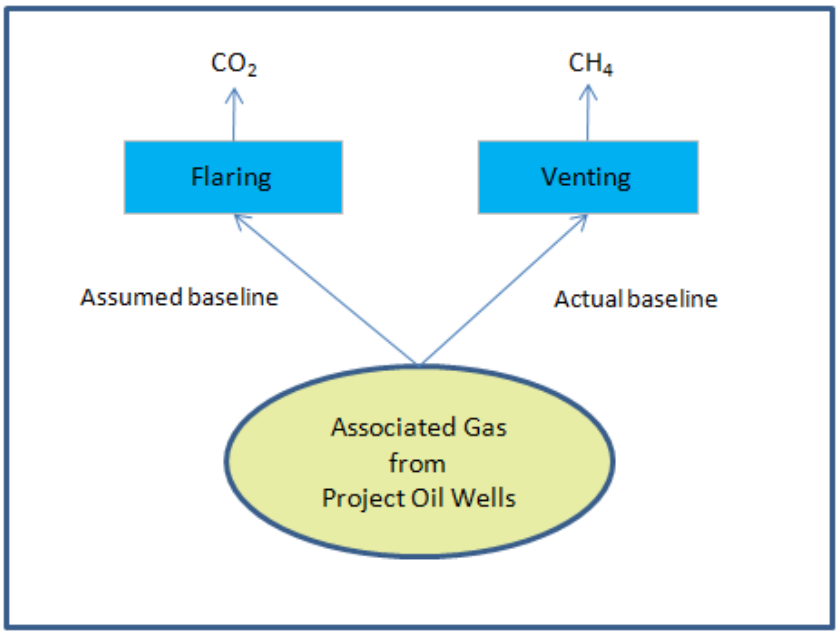


Figure 11: Schematic illustration of a typical baseline activity in Trinidad

Schematic representations of the nine component project activity types are provided in Figures 2 through 10, above. The technologies to be employed in the CPAs that will be included in this PoA are described in detail in Part I Section A.6.

B.4. Description of baseline scenario

Project participants shall apply the following procedure.

Step 1: Identify plausible alternative scenarios

The project activity involves three components. Plausible alternative scenarios should include alternatives for the following components:

Plausible alternative baseline scenarios for the associated gas and/or gas-lift gas from the project oil wells could include, *inter alia*:

G1: Release of the associated gas and/or gas-lift gas into the atmosphere at the oil production site (venting);

G2: Flaring of the associated gas and/or gas-lift gas at the oil production site;

G3: On-site use of the partial amount of associated gas and/or gas-lift gas to meet on-site energy and rest of the gas are either vented (G1) or flared (G2);

G4: Injection of the associated gas and/or gas-lift gas into an oil or gas reservoir;

G5: The proposed project activity without being registered as a CDM project activity;

G6: Recovery, transportation and utilization of the associated gas and/or gas-lift gas as feedstock for manufacturing of useful products.

Plausible alternative baseline scenarios for oil and gas infrastructure should include the proposed project activity and all relevant scenarios for any existing or new gas processing plants, pipelines, compressors, etc. They depend heavily on the context of the proposed project, but could include, *inter alia*:

P1: Construction of a processing plant for the purpose of processing the recovered gas, in the same

way as in the project activity, without being registered as a CDM project activity;

P2: Construction of a processing plant of a lower capacity than under the project activity, which processes only non-associated gas and does not process recovered gas;

P3: Supplying recovered gas to an existing gas processing plant and constructing the necessary infrastructure, without being registered as a CDM project activity;

P4: Continuation of the operation of the existing oil and gas infrastructure without any other significant changes;

P5: Supplying recovered gas to a gas pipeline without prior processing and without being registered as a CDM project activity.

Plausible alternative baseline scenarios for the use of gas-lift could include, *inter alia*:

O1: Gas from the same source as under the project activity and in the same quantity as under the project activity is used for the gas-lift system;

O2: Gas from a different source than under the project activity but using the same quantity of gas-lift gas as under the project activity is used for the gas-lift system;

O3: Gas from the same source as under the project activity, but using a different quantity of gas-lift gas, is used for the gas-lift system;

O4: Gas from a different source than under the project activity and in a different quantity than under the project activity, is used for the gas-lift system;

O5: No gas-lift system is utilized.

Realistic combinations of these three components should be identified and considered as possible alternative scenarios to the proposed project activity. The identified combinations should be transparently described and be illustrated in schematic diagrams in the CPA-DD.

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, following the guidance for the investment analysis in the latest approved version of the "Tool for the demonstration and assessment of additionality". The IRR should be determined using, *inter alia*, the following parameters as applicable to the relevant scenario:

- Overall projected production of associated gas and/or gas-lift gas;

- The projected quantity of gas recovered, gas flared, vented, consumed on-site, processed in a gas processing plant and/or compressed into a pipeline;
- The agreed price for the delivery of recovered gas (e.g. from a Production Sharing Contract) to the gas pipeline or gas processing plant (if operated by a third party);
- The net calorific value of the recovered gas;
- Capital expenditure for all oil and gas infrastructure needed in the relevant scenario, such as gas recovery facilities, pipelines, and gas processing plant (if applicable) etc. (CAPEX);
- All operational expenditure associated with the respective scenario (OPEX);
- All revenues from the operation of the alternative scenario, such as revenues from selling processed gas or other products of the gas processing plant or electricity;
- Any profit sharing agreements and cost recovery, such as cost savings through the substitution of products by the recovered gas, if applicable.

If venting or flaring 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. Proceed to the next step if the IRR of the project activity is lower than 10% and if the most plausible baseline scenario is not the project activity without being registered as a CDM project activity; otherwise, the project activity is not additional.

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.

Step 4: Common practice analysis
Apply the "common practice analysis", following the guidance for the common practice analysis in the latest approved version of the "Tool for the demonstration and assessment of additionality".

The project can be deemed additional if the requirements of the common practice analysis are fulfilled.

B.5. Demonstration of eligibility for a generic CPA

Confirming compliance with the PoA eligibility criteria:
Each CPA owner must provide documentary evidence demonstrating that it meets the eligibility requirements provided in Part I Section B.2. The following documentation, *inter alia*, must be provided to the CME for assessment:

1. A complete CPA-DD supported with an investment analysis carried out as per the specifications in Part II Section B.4 Step 3, and emission reduction calculations carried out as per the specifications in Part II Section B.6.1.
2. A detailed technical description of the project design, supported through studies or documentation such as pre-feasibility studies or a business plan.
3. A detailed financial description of the project, supported through studies or documentation such as pre-feasibility studies, a business plan or an investment plan.
4. A declaration as to whether or not the CPA will receive donor funding, supported if relevant with written confirmation from all contributing Annex I Parties that funding provided does not result in a diversion of official development assistance.
5. Evidence of compliance with host-country requirements regarding the performance of an EIA.

6. Evidence of compliance with CDM Executive Board requirements regarding the performance of local stakeholder consultations.

In addition:

7. Each CPA proponent must enter into a cooperation agreement with the CME to participate in the PoA.
8. Through the submission of a CPA-DD, it must be demonstrated that the CPA meets the requirements of AM0009 version 06.0.0 with regard to applicability conditions, baseline setting and monitoring as well as all Tools associated with this methodology.

B.6. Estimation of emission reductions of a generic CPA

B.6.1. Explanation of methodological choices

Baseline emissions

Project activities under this methodology reduce emissions by recovering associated gas and/or gas-lift gas and utilizing the recovered gas. The utilization of the recovered gas displaces the use of other fossil fuel sources. For example:

- The use of recovered gas in a processing plant can displace the use of non-associated gas in that processing plant;
- In another situation, the recovered gas may be compressed into a natural gas pipeline, thereby displacing the processing of non-associated gas in a gas processing plant at another site.

The exact emission effects are difficult to determine and would require an analysis of the whole fuel supply chain up to the end-users for both the project activity and the baseline scenario. This methodology provides a simplified and conservative calculation of emission reductions, assuming that the use of recovered gas displaces the use of natural gas – the fossil fuel with the lowest direct CO_2 emissions. Emissions from processing and transportation of fuels to end-users are neglected, as it is assumed that these emissions are similar for both the project activity and the baseline scenarios.

Baseline emissions are calculated in the same way for each of the nine types of eligible CPAs in this PoA.

$$BE_y = V_{F,y} \cdot NCV_{RG,F,y} \cdot EF_{CO2,Methane} \quad \textbf{(1)}$$

Where:

BE_y	=	Baseline emissions in year *y*, (tCO_2e)
$V_{F,y}$	=	Volume of total recovered gas measured at point F in year *y* (Nm^3)
$NCV_{RG,F,y}$	=	Average net calorific value of recovered gas at point F in year *y* (TJ/Nm^3)
$EF_{CO2,Methane}$	=	CO_2 emission factor for methane (tCO_2/TJ)

Therefore, for baseline emissions:

Year	Equation
1	BE_y = [insert value for $V_{F,y}$] x [insert value for $NCV_{RG,F,y}$] x 54.834
2	BE_y = [insert value for $V_{F,y}$] x [insert value for $NCV_{RG,F,y}$] x 54.834
3	BE_y = [insert value for $V_{F,y}$] x [insert value for $NCV_{RG,F,y}$] x 54.834
4	BE_y = [insert value for $V_{F,y}$] x [insert value for $NCV_{RG,F,y}$] x 54.834
5	BE_y = [insert value for $V_{F,y}$] x [insert value for $NCV_{RG,F,y}$] x 54.834
6	BE_y = [insert value for $V_{F,y}$] x [insert value for $NCV_{RG,F,y}$] x 54.834
7	BE_y = [insert value for $V_{F,y}$] x [insert value for $NCV_{RG,F,y}$] x 54.834

Project emissions

The following sources[7] of project emissions are accounted in this methodology:

- CO_2 emissions due to consumption of fossil fuels for the recovery, pre-treatment, transportation, and, if applicable, compression of the recovered gas up to point F;
- CO_2 emissions due to the use of electricity for the recovery, pre-treatment, transportation, and, if applicable, compression of the recovered gas up to point F.

Energy is supplied on site using fossil fuels and/or off-grid captive power production:

$$PE_y = PE_{CO2,fossilfuels,y} \quad \textbf{(2)}$$

Where:

PE_y	=	Project emissions in year *y*, (tCO_2e)
$PE_{CO2,fossilfuels,y}$	=	CO_2 emissions due to consumption of fossil fuels for the recovery, pre-treatment, transportation, and, if applicable, compression of the recovered gas up to point F in year *y* (tCO_2e)

Electricity generated through off-grid captive power production is assumed to be consumed exclusively by the project activity. In accordance with Option B3 of the *Tool to calculate baseline, project and/or leakage emissions from electricity consumption* Version 01, project emissions from off-grid captive power plants are determined by calculating the CO_2 emissions from <u>all</u> fuel combustion in the captive power plant. These emissions shall be calculated as project emissions from the consumption of fossil fuels, $PE_{CO2,fossilfuels,y}$, as indicated below.

[7] Other sources of project emissions such as emissions from leaks, venting and flaring during the recovery, transportation and processing of recovered gas are assumed to be of similar magnitude in the baseline scenario.

Project emissions from the consumption of fossil fuels

Project emissions $PE_{CO2,fossilfuels,y}$ due to the consumption of fossil fuels, including the recovered gas, if applicable for the recovery, pre-treatment, transportation and, if applicable, compression of the recovered gas are calculated applying the latest approved version of the "Tool to calculate project or CO_2 emissions from fossil fuel combustion" where $PE_{CO2,fossilfuels,y}$ corresponds to $PE_{FC,j,y}$ in the tool and process j corresponds to all sources of fuel combustion (e.g. a compressor, etc) up to point F. All applicable emission sources should be documented transparently in the CPA-DD and in monitoring reports.

$$PE_{FC,j,y} = \sum_{i} FC_{i,j,y} \times COEF_{i,y} \quad \textbf{(3)}$$

Where:

$PE_{FC,j,y}$	=	Are the CO_2 emissions from fossil fuel combustion in process *j* during the year *y* (tCO_2/yr)
$FC_{i,j,y}$	=	Is the quantity of fuel type *i* combusted in process *j* during the year *y* (mass or volume unit/yr)
$COEF_{i,y}$	=	Is the CO_2 emission coefficient of fuel type *i* in year *y* (tCO_2/mass or volume unit)
i	=	Are the fuel types combusted in process *j* during the year *y*

The CO_2 emission coefficient $COEF_{i,y}$ can be calculated using one of the following two Options, depending on the availability of data on the fossil fuel type *i*, as follows:

Option A: The CO_2 emission coefficient is calculated based on the chemical composition of the fossil fuel type *i*, using the following approach:

If $FC_{i,j,y}$ is measured in a mass unit: $COEF_{i,y} = w_{C,i,y} \times 44/12$

If $FC_{i,j,y}$ is measured in a volume unit: $COEF_{i,y} = w_{C,i,y} \times \rho_{i,y} \times 44/12$

Where:

$COEF_{i,y}$	=	Is the CO_2 emission coefficient of fuel type *i* (tCO_2/mass or volume unit)
$w_{C,i,y}$	=	Is the weighted average mass fraction of carbon in fuel type *i* in year *y* (tC/mass unit of the fuel)
$\rho_{i,y}$	=	Is the weighted average density of fuel type *i* in year *y* (mass unit/volume unit of the fuel)
i	=	Are the fuel types combusted in process *j* during the year *y*

Option B: The CO_2 emission coefficient $COEF_{i,y}$ is calculated based on the net calorific value and CO_2 emission factor of the fuel type *i*, as follows:

$COEF_{i,y} = NCV_{i,y} \times EF_{CO2,i,y}$

Where:

$COEF_{i,y}$	=	Is the CO_2 emission coefficient of fuel type *i* in year *y* (tCO_2/mass or volume unit)
$NCV_{i,y}$	=	Is the weighted average net calorific value of the fuel type *i* in year *y* (GJ/mass or volume unit)
$EF_{CO2,i,y}$	=	Is the weighted average CO_2 emission factor of fuel type *i* in year *y* (tCO_2/GJ)

i = Are the fuel types combusted in process *j* during the year *y*

Option A should be the preferred approach, if necessary data is available.

Therefore, for project emissions:

Year	Equation
1	$PE_y = PE_{CO2,fossilfuels,y} = PE_{FC,j,y}$ = [insert value for $PE_{FC,j,y}$]
2	$PE_y = PE_{CO2,fossilfuels,y} = PE_{FC,j,y}$ = [insert value for $PE_{FC,j,y}$]
3	$PE_y = PE_{CO2,fossilfuels,y} = PE_{FC,j,y}$ = [insert value for $PE_{FC,j,y}$]
4	$PE_y = PE_{CO2,fossilfuels,y} = PE_{FC,j,y}$ = [insert value for $PE_{FC,j,y}$]
5	$PE_y = PE_{CO2,fossilfuels,y} = PE_{FC,j,y}$ = [insert value for $PE_{FC,j,y}$]
6	$PE_y = PE_{CO2,fossilfuels,y} = PE_{FC,j,y}$ = [insert value for $PE_{FC,j,y}$]
7	$PE_y = PE_{CO2,fossilfuels,y} = PE_{FC,j,y}$ = [insert value for $PE_{FC,j,y}$]

Leakage
In accordance with AM0009 version 06.0.0, leakage emissions need not be considered. Therefore $LE_y = 0$.

Emission reductions
Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y \qquad \textbf{(4)}$$

Where:
ER_y = Emission reductions in year *y* (tCO_2e)
BE_y = Baseline emissions in year *y* (tCO_2e)
PE_y = Project emissions in year *y* (tCO_2e)
LE_y = Leakage emissions in year *y* (tCO_2e)

Therefore, for emission reductions:

Year	Equation
1	ER_y = [insert value for ER_y] = [insert value for BE_y] – [insert value for PE_y] – [insert value for LE_y]
2	ER_y = [insert value for ER_y] = [insert value for BE_y] – [insert value for PE_y] – [insert value for LE_y]
3	ER_y = [insert value for ER_y] = [insert value for BE_y] – [insert value for PE_y] – [insert value for LE_y]
4	ER_y = [insert value for ER_y] = [insert value for BE_y] – [insert value for PE_y] – [insert value for LE_y]
5	ER_y = [insert value for ER_y] = [insert value for BE_y] – [insert value for PE_y] – [insert value for LE_y]
6	ER_y = [insert value for ER_y] = [insert value for BE_y] – [insert value for PE_y] – [insert value for LE_y]
7	ER_y = [insert value for ER_y] = [insert value for BE_y] – [insert value for PE_y] – [insert value for LE_y]

B.6.2. Data and parameters that are to be reported ex-ante

Data / parameter:	$EF_{CO2,Methane}$
Data unit:	tCO_2/TJ
Description:	CO_2 emission factor for methane
Source of data:	AM0009 Version 06.0.0
Value to be applied:	54.834 tCO_2/TJ
Choice of data or Measurement methods and procedures	Calculated in line with procedures and data presented in ISO 6976:

Unit	**Value**	**Source**
Carbon Content of Methane	12,011 kg/kmol	ISO 6976: Table 1
CO_2 Emission Factor for Methane	44.01 kg/kmol	ISO 6976: Table 1
NCV of Methane (at 25^0C)	802.60 kJ/kmol	ISO 6976: Table 1

Purpose of data	Calculating baseline emissions
Additional comment	----

B.6.3. Ex-ante calculations of emission reductions

Ex ante calculations of emission reductions shall be provided in each specific CPA-DD.

Year	Baseline emissions (tCO_2e)	Project emissions (tCO_2e)	Leakage (tCO_{2e})	Emission reductions (tCO_2e)
1	[number]	[number]	0	[number]
2	[number]	[number]	0	[number]
3	[number]	[number]	0	[number]
4	[number]	[number]	0	[number]
5	[number]	[number]	0	[number]
6	[number]	[number]	0	[number]
7	[number]	[number]	0	[number]
Total				[number]
Total number of crediting years	[number]			
Annual average over the crediting period				[number]

B.7. Application of the monitoring methodology and description of the monitoring plan

B.7.1. Data and parameters to be monitored by each generic CPA

Data / Parameter:	$V_{F,y}$
Unit:	Nm^3
Description:	Volume of the total recovered gas measured at point F in year *y*
Source of data:	Flow meter (e.g., diaphragm gouge)
Value(s) applied	To be provided in specific CPA-DD
Measurement methods and procedures	Data should be measured using calibrated flow meters. Measurements should be taken at the point(s) where recovered gas exits the pre-treatment plant
Monitoring frequency:	Continuously
QA/QC procedures:	Volume of gas should be completely metered with regular calibration of metering equipment. The measured volume should be converted to the volume at normal temperature and pressure using the temperature and pressure at the time to measurement.
Purpose of data	Calculation of baseline emissions
Additional comments	---

Data / Parameter:	$NCV_{RG,F,y}$
Unit:	TJ/Nm^3
Description:	Average net calorific value of recovered gas at point F in year *y*
Source of data:	On site measurement
Value(s) applied	To be provided in specific CPA-DD
Measurement methods and procedures	Measurements should be undertaken in line with national or international fuel standards Gas samples should regularly be taken at point F and the molar composition of each gas sample should be determined through chemical analysis following the procedures for QA/QC. Based on the molar composition, the Net Calorific Value on a volumetric basis should be determined for each sample in line with ISO 6976 or an equivalent standard for a combustion reference temperature of 25^0C and the same metering reference condition used for parameter $V_{F,y}$. The average NCV during the period y is defined as the arithmetic average of NCVs for the samples taken during the same period
Monitoring frequency:	Sampling and compositional analysis and calculation of net calorific value at least monthly
QA/QC procedures:	Sampling in accordance with ISO 10715 or equivalent standard. Compositional analysis in accordance with ISO 6974 or equivalent standard. Routine maintenance and calibration in accordance with ISO 10723 or equivalent standard. GC calibration gases certified to ISO 6141 or equivalent standard. Annual manufacturer servicing and calibration to ISO17025 or equivalent standard. In case third party laboratories are used, these should as a minimum have ISO17025 accreditation or justify that they can comply with similar quality standards
Purpose of data	Calculation of baseline emissions
Additional comments	For the purpose of this methodology, the qualifier “net” is synonymous with “lower” and “inferior”, and the term “calorific value” is synonymous with “heating value”

Data / Parameter	$FC_{i,j,y}$
Unit	Mass or Volume Unit per year (e.g. tonne/yr or m^3/yr)
Description	Quantity of fuel type *i* combusted in process *j* during year *y*
Source of data	On site measurements
Value(s) applied	To be provided in specific CPA-DD
Measurement methods and procedures	• Use either mass or volume meters. In cases where fuel is supplied from small daily tanks, rulers can be used to determine mass or volume of the fuel consumed, with the following conditions: The ruler gauge must be part of the daily tank and calibrated at least once a year and have a book of control for recording the measurements (on a daily basis or per shift); • Accessories such as transducers, sonar and piezoelectronic devices are accepted if they are properly calibrated with the ruler gauge and receiving a reasonable maintenance; • In case of daily tanks with pre-heaters for heavy oil, the calibration will be made with the system at typical operational conditions.
Monitoring frequency	Continuously
QA/QC procedures	The consistency of metered fuel consumption quantities should be cross-checked by an annual energy balance that is based on purchased quantities and stock changes. Where the purchased fuel invoices can be identified specifically for the CDM project, the metered fuel consumption quantities should also be cross-checked with available purchase invoices from the financial records.
Purpose of data	Calculation of project emissions and, where relevant, leakage
Additional comment	Amount of fossil fuel consumed in onsite energy generation plant j in year y

Data / Parameter	$w_{C,i,y}$
Unit	tC/mass unit of the fuel
Description	Weighted average mass fraction of carbon in fuel type *i* in year *y*
Source of data	The following data sources may be used if the relevant conditions apply: **Data source** / **Conditions for using the data source** a) Values provided by the fuel supplier in invoices / This is the preferred source b) Measurements by the project participants / If a) is not available
Value(s) applied	To be provided in specific CPA-DD
Measurement methods and procedures	Measurements should be undertaken in line with national or international fuel standards
Monitoring frequency	The mass fraction of carbon should be obtained for each fuel delivery, from which weighted average annual values should be calculated.
QA/QC procedures	Verify if the values under a) and b) are within the uncertainty range of the IPCC default values as provided in Table 1.2, Vol. 2 of the 2006 IPCC Guidelines. If the values fall below this range collect additional information from the testing laboratory to justify the outcome or conduct additional measurements. The laboratories in b) should have ISO17025 accreditation or justify that they can comply with similar quality standards.
Purpose of data	Calculation of project emissions and, where relevant, leakage
Additional comments	Applicable where Option A is used for calculating the emission coefficient $COEF_{i,y}$

Data / Parameter	$\rho_{i,y}$
Unit	Mass unit/volume unit
Description	Weighted average density of fuel type *i* in year *y*
Source of data	The following data sources may be used if the relevant conditions apply: **Data source** / **Conditions for using the data source** a) Values provided by the fuel supplier in invoices — This is the preferred source b) Measurements by the project participants — If a) is not available c) Regional or national default values — If a) is not available These sources can only be used for liquid fuels and should be based on well-documented, reliable sources (such as national energy balances).
Value(s) applied	To be provided in specific CPA-DD
Measurement methods and procedures	Measurements should be undertaken in line with national or international fuel standards
Monitoring frequency	The density of the fuel should be obtained for each fuel delivery, from which weighted average annual values should be calculated.
QA/QC procedures	None
Purpose of data	Calculating project emissions and, where relevant, leakage
Additional comments	Applicable where Option A is used for calculating the emission coefficient $COEF_{i,y}$ and where $FC_{i,j,y}$ is measured in a volume unit. Preferably the same data source should be used for $w_{C,i,y}$ and $\rho_{i,y}$

Data / Parameter	$NCV_{i,y}$
Unit	GJ per mass or volume unit (e.g. GJ/m^3, GJ/tonne)
Description	Weighted average net calorific value of fuel type *i* in year *y*
Source of data	The following data sources may be used if the relevant conditions apply: **Data source** / **Conditions for using the data source** a) Values provided by the fuel supplier in invoices — This is the preferred source b) Measurements by the project participants — If a) is not available c) Regional or national default values — If a) is not available These sources can only be used for liquid fuels and should be based on well-documented, reliable sources (such as national energy balances). d) IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories — If a) is not available
Value(s) applied	To be provided in specific CPA-DD
Measurement methods and procedures	For a) and b): Measurements should be undertaken in line with national or international fuel standards
Monitoring frequency	For a) and b): the NCV should be obtained for each fuel delivery, from which weighted average annual values should be calculated For c): Review appropriateness of the values annually For d): Any future revision of the IPCC Guidelines should be taken into account
QA/QC procedures	Verify if the values under a), b) and c) are within the uncertainty range of the IPCC default values as provided in Table 1.2, Vol. 2 of the 2006 IPCC Guidelines. If the values fall below this range collect additional information from the testing laboratory to justify the outcome or conduct additional measurements. The laboratories in a), b) or c) should have ISO17025 accreditation or justify that they can comply with similar quality standards.
Purpose of data	Calculating project emissions and, where relevant, leakage
Additional comments	Applicable where Option B is used for calculating the emission coefficient $COEF_{i,y}$

Data / Parameter	$EF_{CO2,i,y}$
Unit	tCO_2/GJ
Description	Weighted average CO_2 emission factor of fuel type *i* in year *y*
Source of data	The following data sources may be used if the relevant conditions apply: **Data source** / **Conditions for using the data source** a) Values provided by the fuel supplier in invoices — This is the preferred source b) Measurements by the project participants — If a) is not available c) Regional or national default values — If a) is not available These sources can only be used for liquid fuels and should be based on well-documented, reliable sources (such as national energy balances). d) IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories — If a) is not available
Value(s) applied	To be provided in specific CPA-DD
Measurement methods and procedures	For a) and b): Measurements should be undertaken in line with national or international fuel standards
Monitoring frequency	For a) and b): the NCV should be obtained for each fuel delivery, from which weighted average annual values should be calculated For c): Review appropriateness of the values annually For d): Any future revision of the IPCC Guidelines should be taken into account
QA/QC procedures	
Purpose of data	Calculating project emissions and, where relevant, leakage
Additional comments	Applicable where Option B is used for calculating the emission coefficient $COEF_{i,y}$ For a) If the fuel supplier does provide the NCV value and the CO_2 emission factor on the invoice and these two values are based on measurements for this specific fuel, this CO_2 factor should be used. If another source for the CO_2 emission factor is used or no CO_2 emission factor is provided, Options b), c) or d) should be used.

B.7.2. Description of the monitoring plan for a generic CPA

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Procedures

All of the data indicated in Part II. A. Section B.7.1 shall be monitored in accordance with the measurement methods and frequency indicated. All data collected should be archived electronically and be kept at least for 2 years after the end of the last crediting period. All measurements should be

conducted with calibrated measurement equipment according to relevant industry standards.

The CPA-DD shall include minimal procedures to ensure that the data collection and retention will be made properly.

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

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 associated gas and gas-lift 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 CPA-DD 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 associated gas and gas-lift 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).

Monitoring Equipment

A typical CPA will consist of multiple oil fields, each comprised of multiple oil wells where captured associated gas is collected and fed into a smaller number of gathering stations feeding in turn to gas compression or gas processing facilities and, from there through a feed line to a gas pipeline. For all CPA types, the volume of recovered associated gas will be monitored with flow meters installed on the feed lines to the gas pipeline, just short of the point of entry into the gas pipeline.

- The volume of recovered associated gas ($V_{F,i,y}$) will be monitored with a flow meter installed on the gas feed line from the gas compression and/or processing facilities just short of the connection point to the gas pipeline. In cases where CNG is transported to a decompression facility, the volume of recovered associated gas will be monitored with a flow meter on the feed line from the decompression facility to the gas pipeline, just short of the gas pipeline.

- Each gas compression or gas processing facility will require energy to run compressors, scrubbers, coolers and auxiliary equipments such as pumps and motors. This energy will be supplied through onsite fossil fuel consumption originating from collected associated gas and/or external sources. On-site fossil fuel consumption for direct combustion and/or captive power production can be supplied to gathering stations by utilizing some of the captured associated gas or from other off-site supply sources. The quantity of on-site fossil fuel consumed ($FC_{i,j,y}$) will be monitored at each gathering station with a flow meter (or meters if more than one supply source is utilized) installed at the supply point of entry to the station.

The placement of metering equipment is represented schematically in Figures 12 and 13, for CPA types 1A and 2A, respectively.

Figure 12. Metering points for CPA type 1A

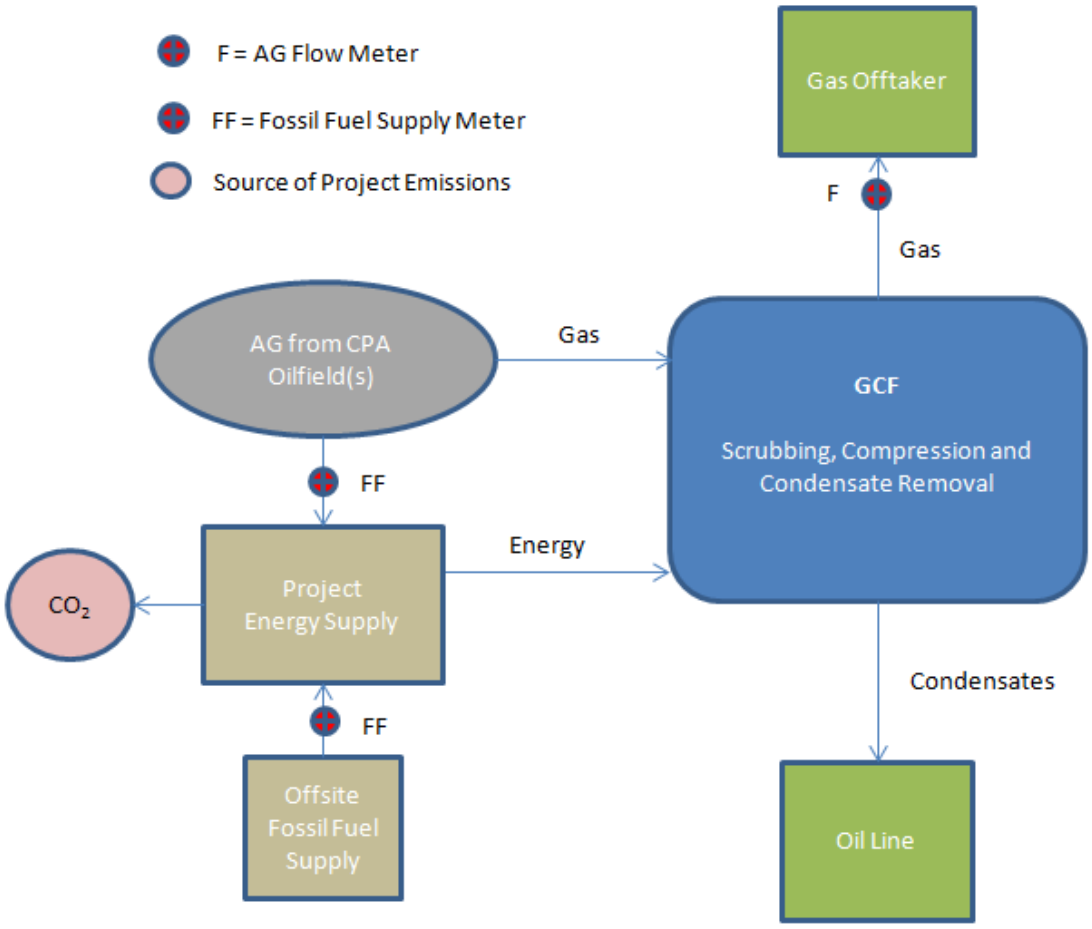
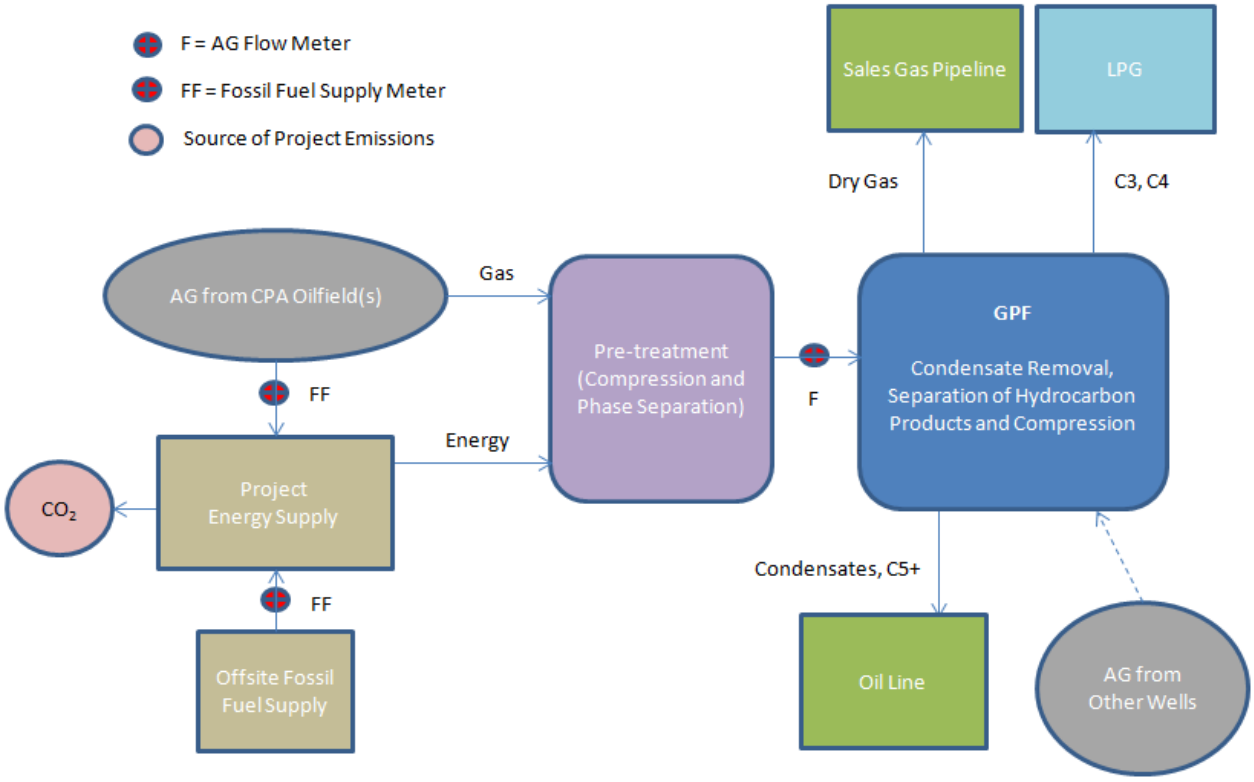


Figure 13. Metering points for CPA type 2A



Part II: Generic component project activity

For CPA Type 3A:

SECTION A. General description of a generic CPA

A.1. Purpose and general description of generic CPAs

Please see Part II for CPA types 1A + 2A Section A.1, which also applies here.

SECTION B. Application of a baseline and monitoring methodology

B.1. Reference of the approved baseline and monitoring methodology(ies) selected

Please see Part II for CPA types 1A + 2A Section B.1, which also applies here.

B.2. Application of the methodology

Please see Part II for CPA types 1A + 2A Section B.2, which also applies here.

B.3. Sources and GHGs

Please see Part II for CPA types 1A + 2A Section B.3, which also applies here.

B.4. Description of baseline scenario

Please see Part II for CPA types 1A + 2A Section B.4, which also applies here.

B.5. Demonstration of eligibility for a generic CPA

Please see Part II for CPA types 1A + 2A Section B.5, which also applies here.

B.6. Estimation of emission reductions of a generic CPA

B.6.1. Explanation of methodological choices

Please see Part II for CPA types 1A + 2A Section B.6.1, which also applies here, with the exception of the calculation of leakage, which shall be performed as follows.

Leakage

Leakage emissions shall be accounted for project activities where the recovered gas is transported to a processing plant where it is processed into hydrocarbon products (e.g. dry gas, LPG and condensates) and the dry gas is compressed to CNG first, then transported by trailers/trucks/carriers and then decompressed again, before it finally enters the gas pipeline.

$$LE_y = LE_{FC,y} + LE_{EC,y} \quad \textbf{(5)}$$

Where:

LE_y	=	Leakage emissions in year *y* (tCO_2e)
$LE_{FC,y}$	=	Leakage emissions due to fossil fuel consumption after point F in year *y* (tCO_2e)
$LE_{EC,y}$	=	Leakage emissions due to electricity consumption after point F in Figure 2 in year *y* (tCO_2e)

Leakage emissions due to fossil fuel consumption

Leakage emissions due to fossil fuel consumption in year y ($LE_{FC,y}$) are calculated applying the latest approved version of the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion," where $LE_{FC,y}$ corresponds to $PE_{FC,j,y}$ in the Tool and process *j* corresponds to all modes of transporting CNG (e.g. trucks or barges) after point F. All emission sources from fuel consumption should be documented transparently in the CPA-DD and in monitoring reports.

As per the Tool, CO_2 emissions from fossil fuel combustion in process *j* are calculated based on the quantity of fuels combusted and the CO_2 emission coefficient of those fuels, as follows:

$$PE_{FC,i,y} = \sum_i FCi,j,y \times COEF_{i,y} \quad \textbf{(6)}$$

Where:

$FC_{i,j,y}$	=	Is the quantity of fuel type i combusted in process j during the year y (mass or volume unit/yr);
$COEF_{i,y}$	=	Is the CO_2 emission coefficient of fuel type i in year y (tCO_2/mass or volume unit)
i	=	Are the fuel types combusted in process j during the year y

$COEF_{i,y}$ shall be determined in accordance with the latest approved version of the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion".

Leakage emissions due to electricity consumption

Leakage emissions due to grid-based electricity consumption in year *y* ($LE_{EC,y}$) is calculated applying the latest approved version of the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" where $LE_{EC,y}$ corresponds to $PE_{EC,y}$ in the tool and the electricity consumption sources *j* in the tool corresponds to all sources of electricity consumption (e.g. compressor, decompressor) after point F. All emission sources of grid-based electricity consumption should be documented transparently in the CDM-PDD and in monitoring reports.

$$PE_{EC,y} = \sum_{j} EC_{PJ,j,y} \times EF_{EL,j,y} \times (1 + TDL_{j,y}) \quad (7)$$

Where:

$EC_{PJ,j,y}$	=	Quantity of electricity consumed by the electricity consumption source *j* in year *y* (MWh/yr)
$EF_{EL,j,y}$	=	Emission factor for the grid (tCO_2/MWh)
$TDL_{j,y}$	=	Average technical transmission and distribution losses for providing electricity to source *j* in year *y*

$EF_{EL,j,y}$ is equal to $EF_{grid,CM,y}$, which has been established at the PoA level for Trinidad.

Therefore, for leakage:

Year	Equation
1	LE_y = [insert value for $LE_{FC,y}$] + [insert value for $LE_{EC,y}$]
2	LE_y = [insert value for $LE_{FC,y}$] + [insert value for $LE_{EC,y}$]
3	LE_y = [insert value for $LE_{FC,y}$] + [insert value for $LE_{EC,y}$]
4	LE_y = [insert value for $LE_{FC,y}$] + [insert value for $LE_{EC,y}$]
5	LE_y = [insert value for $LE_{FC,y}$] + [insert value for $LE_{EC,y}$]
6	LE_y = [insert value for $LE_{FC,y}$] + [insert value for $LE_{EC,y}$]
7	LE_y = [insert value for $LE_{FC,y}$] + [insert value for $LE_{EC,y}$]

B.6.2. Data and parameters that are to be reported ex-ante

Please see Part II for CPA types 1A + 2A Section B.6.2, which also applies here.

B.6.3. Ex-ante calculations of emission reductions

Ex ante calculations of emission reductions shall be provided in each specific CPA-DD.

Year	Baseline emissions (tCO_2e)	Project emissions (tCO_2e)	Leakage (tCO_{2e})	Emission reductions (tCO_2e)
1	[number]	[number]	[number]	[number]
2	[number]	[number]	[number]	[number]
3	[number]	[number]	[number]	[number]
4	[number]	[number]	[number]	[number]
5	[number]	[number]	[number]	[number]
6	[number]	[number]	[number]	[number]
7	[number]	[number]	[number]	[number]
Total				[number]
Total number of crediting years	[number]			
Annual average over the crediting period				[number]

B.7. Application of the monitoring methodology and description of the monitoring plan

B.7.1. Data and parameters to be monitored by each generic CPA

Please see Part II for CPA types 1A + 2A Section B.7.1, which also applies here, with the following addition:

Data / Parameter	$EC_{PJ,j,y}$
Unit	MWh/yr
Description	Quantity of electricity consumed by the project electricity consumption source *j* in year *y*
Source of data	Electricity meters on the incoming lines to each the GPF, Mother System and Daughter System facilities.
Value(s) applied	To be provided in specific CPA-DD
Measurement methods and procedures	Electricity consumption will be measured from electrical energy meters installed at each GPF, Mother System and Daughter System. The readings from each of the meters will then be aggregated to CPA level as $EC_{PJ,j,y}$
Monitoring frequency	Monitored continuously, collected and archived monthly.
QA/QC procedures	The energy metering equipment are calibrated and checked for accuracy by qualified third party in accordance with national standard, The frequency of calibration will be in accordance with the specifications of the national standards, or as per the manufacturers specifications, whichever is most frequent. The monthly electricity imported from the grid will be approved and signed off by the CDM Manager.
Purpose of data	Calculating leakage emissions
Additional comment	Electricity supplied from the grid to GPF, Mother Systems and Daughter Systems, and aggregated to the CPA level.

Data / Parameter	$TDL_{j,y}$
Unit	%
Description	Average technical transmission and distribution losses for providing electricity to source *j* in year *y*
Source of data	Choose one of the following options: • Use recent, accurate and reliable data available within the host country; • Use as default values of 20% for project or leakage electricity consumption sources; • Use as default values of 3% for project and leakage electricity consumption sources if the electricity consumption by all project and leakage electricity consumption sources to which scenario A applies is smaller than the electricity consumption of all baseline electricity consumption sources to which scenario A applies.
Value(s) applied	To be provided in specific CPA-DD
Choice of data or Measurement methods and procedures	$TDL_{j,y}$ should be estimated for the distribution and transmission networks of the electricity grid of the same voltage as the connection where the proposed CDM project activity is connected to. The technical distribution losses should not contain other types of grid losses (e.g. commercial losses/theft). The distribution losses can either be calculated by the project participants or be based on references from utilities, network operators or other official documentation.
Purpose of data	Calculating leakage emissions
Additional comment	Shall be monitored annually. In the absence of data from the relevant year, most recent figures should be used, but not older than 5 years.

B.7.2. Description of the monitoring plan for a generic CPA

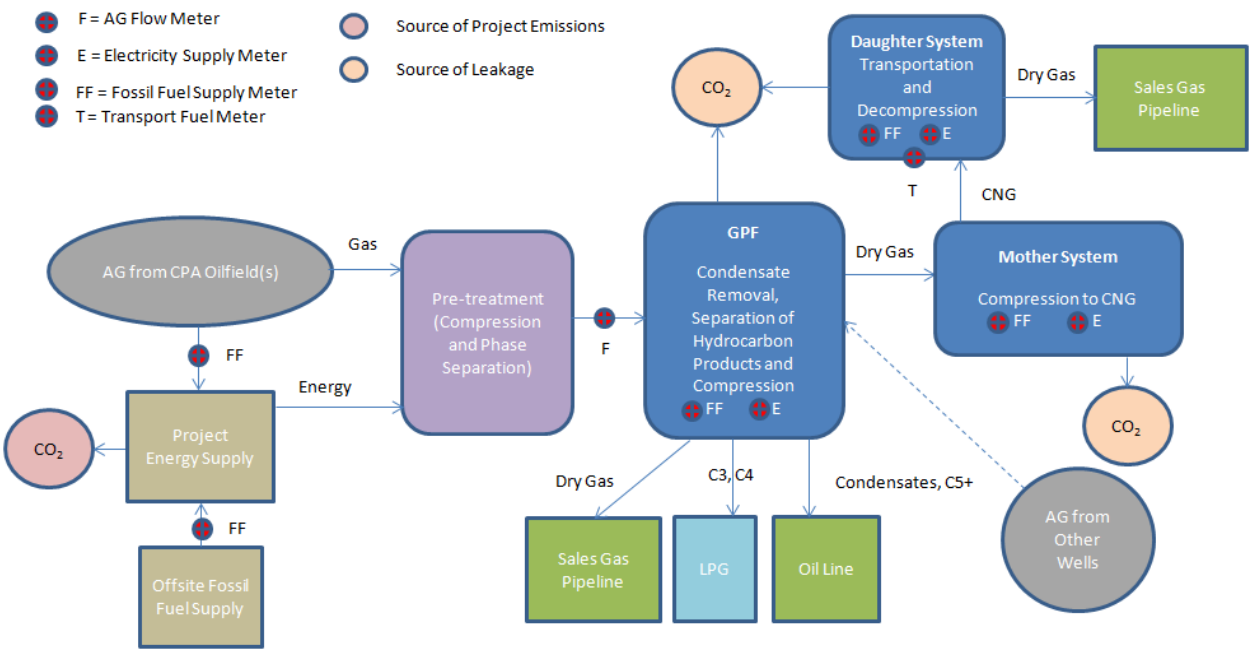
Please see Part II for CPA types 1A + 2A Section B.7.2, which also applies here with the following addition:

Monitoring Equipment

Vehicles (such as trucks or barges) used for transporting CNG must be equipped to monitor the quantity of fossil fuel consumed during the monitoring period over the round-trip distance between the origin and destination of trips used to transport the CNG. Flow meters shall be installed where fossil fuel is consumed, and electricity meters where electricity is consumed, in GPF, Mother System, and Daughter System facilities.

The placement of metering equipment is represented schematically in Figure 14.

Figure 14. Metering points for CPA type 3A



PART II: Generic component project activity

For CPA Types 1B and 2B:

SECTION A. General description of a generic CPA

A.1. Purpose and general description of generic CPAs

Please see Part II for CPA types 1A + 2A Section A.1, which also applies here.

SECTION B. Application of a baseline and monitoring methodology

B.1 Reference of the approved baseline and monitoring methodology(ies) selected

Please see Part II. for CPA types 1A + 2A Section B.1, which also applies here.

B.2. Application of methodology(ies)

Please see Part II for CPA types 1A + 2A. Section B.2, which also applies here.

B.3. Sources and GHGs

Please see Part II for CPA types 1A + 2A. Section B.3, which also applies here.

B.4. Description of baseline scenario

Please see Part II for CPA types 1A + 2A. Section B.4, which also applies here.

B.5. Demonstration of eligibility for a generic CPA

Please see Part II for CPA types 1A + 2A. Section B.5, which also applies here.

B.6. Estimation of emission reductions of a generic CPA

B.6.1. Explanation of methodological choices

Baseline emissions
Please see Baseline Emissions under Part II for CPA types 1A + 2A. Section B.6.1, which also applies here, with the exception of the calculation of project emissions.

Project emissions
The following sources[8] of project emissions are accounted in this methodology:

- CO_2 emissions due to consumption of fossil fuels for the recovery, pre-treatment, transportation, and, if applicable, compression of the recovered gas up to point F;
- CO_2 emissions due to the use of electricity for the recovery, pre-treatment, transportation, and, if applicable, compression of the recovered gas up to point F.

Energy is supplied from a grid:

Project emissions from consumption of electricity from a grid

$$PE_y = PE_{CO2,elec,y} \quad \textbf{(8)}$$

Where:

PE_y	=	Project emissions in year *y*, (tCO_2e)
$PE_{CO2,elec,y}$	=	CO_2 emissions due to electricity consumption from a grid, for the recovery, pre-treatment, transportation, and, if applicable, compression of the recovered gas up to point F in year *y* (tCO_2e)

Project emissions $PE_{CO2,elec,y}$ due to the use of electricity for the recovery, pre-treatment, and transportation of the recovered gas are calculated applying the latest approved version of the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" where $PE_{CO2,elec,y}$ corresponds to $PE_{EC,y}$ in the tool and the electricity consumption sources *j* in the tool corresponds to all sources of electricity consumption (e.g. a compressor, etc) up to point F ($EC_{PJ,j,y}$) in each of fields covered by the CPA. All applicable sources of electricity consumption should be documented transparently in the CPA-DD and in monitoring reports.

Using Equation 1 of the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption", the following equation representing the generic approach in the Tool has been utilized to calculate project emissions:

$$PE_{EC,y} = \sum (EC_{PJ,j,y}) * EF_{EL,j,y} * (1 + TDL_{j,y}) \quad \textbf{(9)}$$

Where:

$PE_{EC,y}$	=	Project emissions from grid-based electricity consumption in year *y* (tCO_2/yr)
$EC_{PJ,j,y}$	=	Quantity of electricity consumed by the project at each field *j* in year y (MWh/yr)
j	=	Sources of electricity consumption in each oil field 1 through *j* included in the CPA
$EF_{EL,j,y}$	=	Emission factor for the relevant grid sourcing oil field *j* in year *y* (tCO_2e /MWh)
$TDL_{j,y}$	=	Average technical transmission and distribution losses for providing electricity from the grid to the oil field(s)

[8] Other sources of project emissions such as emissions from leaks, venting and flaring during the recovery, transportation and processing of recovered gas are assumed to be of similar magnitude in the baseline scenario.

$EF_{EL,j,y}$ shall be established for the relevant grid system following Scenario A Option A1, calculating the combined margin emission factor of the applicable electricity system, using the procedures in the latest approved version of the "Tool to calculate the emission factor for an electricity system". Using this tool,

$$EF_{EL,j,y} = EF_{grid,CM,y} \quad \textbf{(10)}$$

A combined margin grid emission factor (GEF) for CPAs in Trinidad has been established at the PoA level.

Calculation of the Combined Margin Grid Emission Factor ($EF_{grid,CM,y}$)

The combined margin grid emission factor for the relevant isolated, regional or national grid shall be calculated using the *Tool to calculate the emission factor for an electricity system*, Version 02.2.1, as follows:

Project participants shall apply the following six steps:
STEP 1. Identify the relevant electricity systems;
STEP 2. Choose whether to include off-grid power plants in the project electricity system (optional);
STEP 3. Select a method to determine the operating margin (OM);
STEP 4. Calculate the operating margin emission factor according to the selected method;
STEP 5. Calculate the build margin (BM) emission factor;
STEP 6. Calculate the combined margin (CM) emissions factor.

Step 1: Identify the relevant electricity systems

For determining the electricity emission factors, a **project electricity system** is defined by the spatial extent of the power plants that are physically connected through transmission and distribution lines to the project activity and that can be dispatched without significant transmission constraints.

The DNA has not published a delineation of the project electricity system and connected electricity systems. Trinidad is an island nation with two main isolated regional grids; one on Trinidad and one on Tobago. Neither is connected to any other national grid. For this PoA, the project electricity system is the Trinidad regional grid. We have not included an option for CPAs connected to the Tobago grid because there is no oil production on the island, hence there will be no CPAs located there. For project activities connected to the Trinidad regional grid, the project electricity system includes the project site and all power plants supplying power to the grid.

Step 2: Choose whether to include off-grid power plants in the project electricity system (optional)

Project participants may choose between the following two options to calculate the operating margin and build margin emission factor:

Option I: Only grid power plants are included in the calculation.
Option II: Both grid power plants and off-grid power plants are included in the calculation.

For project activities connected to the Trinidad grid, Option I has been chosen: only grid power plants are included in the calculation.

Step 3: Select a method to determine the operating margin (OM)

The calculation of the operating margin emission factor ($EF_{grid,OM,y}$) is based on one of the following methods:

(a) Simple OM; or
(b) Simple adjusted OM; or
(c) Dispatch data analysis OM; or
(d) Average OM.

For project activities connected to the Trinidad grid, low-cost/must-run resources constitute less than 50 percent of total generation. Option (a), Simple OM, has been applied.[9]

For the simple OM, the simple adjusted OM and the average OM, the emissions factor can be calculated using either of the two following data vintages:

- *Ex ante* option: If the *ex ante* option is chosen, the emission factor is determined once at the validation stage, thus no monitoring and recalculation of the emissions factor during the crediting period is required. For grid power plants, use a 3-year generation-weighted average, based on the most recent data available at the time of submission of the CPA-DD to the DOE for validation. For off-grid power plants, use a single calendar year within the 5 most recent calendar years prior to the time of submission of the CPA-DD for validation.
- *Ex post* option: If the *ex post* option is chosen, the emission factor is determined for the year in which the project activity displaces grid electricity, requiring the emissions factor to be updated annually during monitoring. If the data required to calculate the emission factor for year *y* is usually only available later than six months after the end of year *y*, alternatively the emission factor of the previous year *y-1* may be used. If the data is usually only available 18 months after the end of year *y*, the emission factor of the year preceding the previous year *y-2* may be used. The same data vintage (*y*, *y-1* or *y-2*) should be used throughout all crediting periods.

For CPAs connected to the Trinidad grid, the *Ex ante* option has been chosen. The emission factor is determined at the validation stage of the PoA for the entire first crediting period. A 3-year generation-weighted average has been calculated. The calculation is based on data for calendar years 2007 through 2011.

Step 4: Calculate the operating margin emission factor according to the selected method

A simple OM emission factor for the Trinidad grid has been calculated as the generation-weighted average CO_2 emissions per unit net electricity generation (tCO_2/MWh) of all generating power plants serving the system. No power plants have been developed and as registered CDM projects in the Republic of Trinidad and Tobago.

The simple OM may be calculated:
Option A: Based on the net electricity generation and a CO_2 emission factor of each power unit;[10]

or

Option B: Based on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system.

For CPAs connected to the Trinidad grid, Option A has been chosen.

The simple OM emission factor is calculated based on the net electricity supplied to the grid by all power plants serving the system, not including low-cost/must-run power plants/units or power plants/units

[9] For the Trinidad grid, there are no low-cost/must-run sources of power. The calculation of the 5-year average for can be found in an Excel file provided to the DOE for validation.

[10] Power units should be considered if some of the power units at the site of the power plant are low-cost/must-run units and some are not. Power plants can be considered if *all* power units at the site of the power plant belong to the group of low-cost/must-run units or if *all* power units at the site of the power plant do *not* belong to the group of low-cost/must-run units. For Trinidad, power generation data is available at the unit level. However, fuel consumption data is only reported at the plant level. As there are no low-cost/must-run units in the system, power plants have been considered in the OM calculation.

registered as CDM projects, and based on the fuel type(s) and fuel consumption expressed in heat units derived from electricity generation by technology type, as follows:

$$EF_{grid,OMsimple,y} = \frac{\sum_i \left(FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y} \right)}{EG_y} \quad \textbf{(11)}$$

Where:

$EF_{grid,OMsimple,y}$	=	Simple operating margin CO_2 emission factor in year *y* (tCO_2/MWh)
$FC_{i,y}$	=	Amount of fossil fuel type *i* consumed in the project electricity system in year *y* (mass or volume unit)
$NCV_{i,y}$	=	Net calorific value (energy content) of fossil fuel type *i* in year *y* (GJ/mass or volume unit)
$EF_{CO2,i,y}$	=	CO_2 emission factor of fossil fuel type *i* in year *y* (tCO_2/GJ)
EG_y	=	Net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost/must-run power plants/units, in year *y* (MWh)
i	=	All fossil fuel types combusted in power sources in the project electricity system in year *y*
y	=	The relevant year as per the data vintage chosen in Step 3

The Trinidad grid is not connected to any other grid systems. Hence no electricity imports occur. The calculation of the operating margin for the Trinidad grid is presented in an Excel spreadsheet provided to the DOE for validation. Note: Fuel consumption data in Trinidad is reported at the plant level in energy units (MMBtu). Therefore, in calculating $EF_{grid,OMsimple,y}$ for Trinidad $NCV_{i,y,}$ has not been used. The numerator of equation 13 has been calculated as the sum of fuel consumption times the fuel emission factor for the power plants connected to this grid system.

Step 5: Calculate the build margin (BM) emission factor

In terms of vintage of data, project participants can choose between one of the following two options:

Option 1: For the first crediting period, calculate the build margin emission factor *ex ante* based on the most recent information available on units already built for sample group *m* at the time of CPA-DD submission to the DOE for validation. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period.

Option 2: For the first crediting period, the build margin emission factor shall be updated annually, *ex post*, including those units built up to the year of registration of the project activity or, if information up to the year of registration is not yet available, including those units built up to the latest year for which information is available. For the second crediting period, the build margin emissions factor shall be calculated *ex ante*, as described in Option 1 above. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used.

For project activities connected to the Trinidad grid, Option 1 has been chosen. The sample group of power units *m* used to calculate the build margin has been determined as follows:

(a) Identify the set of five power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently ($SET_{5\text{-units}}$) and determine their annual electricity generation ($AEG_{SET\text{-}5\text{-units}}$, in MWh);
(b) Determine the annual electricity generation of the project electricity system, excluding power units registered as CDM project activities (AEG_{total}, in MWh). Identify the set of power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently and that comprise 20% of AEG_{total} (if 20% falls on part of the generation of a unit, the generation of that unit is fully included in the calculation) ($SET_{\geq 20\%}$) and determine their annual electricity generation ($AEG_{SET\text{-}\geq 20\%}$, in MWh);
(c) From $SET_{5\text{-units}}$ and $SET_{\geq 20\%}$ select the set of power units that comprises the larger annual electricity generation (SET_{sample});

Identify the date when the power units in SET_{sample} started to supply electricity to the grid.
If none of the power units in SET_{sample} started to supply electricity to the grid more than 10 years ago, then use SET_{sample} to calculate the build margin. Ignore steps (d), (e) and (f).

The determination of the build margin sample group for the Trinidad grid is presented in Appendix 4. $SET_{\geq 20\%}$ has been selected as SET_{sample}, following the steps above to address the existence of units greater than 10 years old. SET_{sample} has been used to calculate the build margin emissions factor.
The build margin emissions factor has been calculated as the generation-weighted average emission factor (tCO_2/MWh) of all power units *m* during year *y*. Using the most recent available data, year *y* is 2011 for the Trinidad grid. The calculation was performed as follows:

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}} \qquad \textbf{(12)}$$

Where:

$EF_{grid,BM,y}$	=	Build margin CO_2 emission factor in year *y* (tCO_2/MWh)
$EG_{m,y}$	=	Net quantity of electricity generated and delivered to the grid by power unit *m* in year *y* (MWh)
$EF_{EL,m,y}$	=	CO_2 emission factor of power unit *m* in year *y* (tCO_2/MWh)
m	=	Power units included in the build margin
y	=	Most recent historical year for which power generation data is available (2010)

The calculation of the build margin emission factors for the Trinidad grid is presented in an Excel file provided to the DOE for validation.

Step 6: Calculate the combined margin emissions factor
The calculation of the combined margin (CM) emission factor ($EF_{grid,CM,y}$) is based on one of the following methods:

(a) Weighted average CM; or
(b) Simplified CM.

The weighted average CM method (option A) should be used as the preferred option.
The simplified CM method (option b) can only be used if:

- The project activity is located in a Least Developed Country (LDC) or in a country with less than 10 registered projects at the starting date of validation; and
- The data requirements for the application of step 5 above cannot be met.

For CPAs connected to the Trinidad grid, option (a), the weighted average CM, has been chosen.

(a) Weighted average CM

The combined margin emissions factor is calculated *ex ante* as follows:

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM} \quad \textbf{(13)}$$

Where:

$EF_{grid,BM,y}$ = Build margin CO_2 emission factor in year *y* (tCO_2/MWh)

$EF_{grid,OM,y}$ = Operating margin CO_2 emission factor in year *y* (tCO_2/MWh)

w_{OM} = 50%

w_{BM} = 50%

The calculation of the combined margin emissions factor for the Trinidad grid is presented in an Excel file provided to the DOE for validation.

The combined margin grid emission factor $EF_{grid,CM,y}$ to be used for calculating emission reductions of all CPAs connected to the Trinidad grid is:

$EF_{grid,CM,y}$ = 0.775 x 0.5 + 0.558 x 0.5 = 0.666 tCO_2/MWh.

The grid emission factors for the Trinidad grid shall be monitored at the PoA level in accordance with the monitoring methodology published in the "Tool to calculate the emission factor for an electricity system" (Version 02.2.1).

Therefore, for project emissions:

Year	Equation
1	PE_y = [insert value for $\sum EC_{PJ,j,y}$] x 0.666 x (1 + [insert value for $TDL_{j,y}$])
2	PE_y = [insert value for $\sum EC_{PJ,j,y}$] x 0.666 x (1 + [insert value for $TDL_{j,y}$])
3	PE_y = [insert value for $\sum EC_{PJ,j,y}$] x 0.666 x (1 + [insert value for $TDL_{j,y}$])
4	PE_y = [insert value for $\sum EC_{PJ,j,y}$] x 0.666 x (1 + [insert value for $TDL_{j,y}$])
5	PE_y = [insert value for $\sum EC_{PJ,j,y}$] x 0.666 x (1 + [insert value for $TDL_{j,y}$])
6	PE_y = [insert value for $\sum EC_{PJ,j,y}$] x 0.666 x (1 + [insert value for $TDL_{j,y}$])
7	PE_y = [insert value for $\sum EC_{PJ,j,y}$] x 0.666 x (1 + [insert value for $TDL_{j,y}$])

Leakage

Please see Leakage under Part II for CPA types 1A + 2A. Section B.6.1, which also applies here.

Emission reductions
Please see Emission Reductions under Part II for CPA types 1A + 2A. Section B.6.1, which also applies here.

B.6.2. Data and parameters that are to be reported ex-ante
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:	$EF_{CO2,Methane}$
Data unit:	tCO_2/TJ
Description:	CO_2 emission factor for methane
Source of data:	AM0009 Version 06.0.0
Value to be applied:	54.834 tCO_2/TJ
Choice of data or Measurement methods and procedures	Calculated in line with procedures and data presented in ISO 6976:

Unit	**Value**	**Source**
Carbon Content of Methane	12,011 kg/kmol	ISO 6976: Table 1
CO_2 Emission Factor for Methane	44.01 kg/kmol	ISO 6976: Table 1
NCV of Methane (at 25^0C)	802.60 kJ/kmol	ISO 6976: Table 1

Purpose of data	Calculating baseline emissions
Additional comment	----

Fixed parameters:
The following parameters are fixed for all CPAs included during the first 7 years of the PoA crediting period and for the respective first 7-year crediting period of these CPAs. These parameters are to be updated at the PoA level at the start of the second and third crediting periods of the PoA:

For CPAs connected to the Trinidad grid: parameters associated with calculations of the grid emission factor for project emission calculations, sources and values applied here are to be utilized.

Data / Parameter:	**$FC_{i,y}$**
Data unit:	Mass or volume unit
Description:	Amount of fossil fuel type *i* consumed in the project electricity system in year *y*
Source of data:	Utility or government records or official publications
Value(s) applied:	See Excel file
Choice of data or Measurement methods and procedures:	In accordance with the "Tool to calculate the emission factor for an electricity system" (Version 02.2.1)
Purpose of data	Calculation of project emissions
Additional comment:	Note that fuel consumption data for Trinidad is reported in energy units (MMBtu)

Data / Parameter:	**$NCV_{i,y}$**
Data unit:	GJ/mass or volume unit
Description:	Net calorific value (energy content) of fossil fuel type *i* in year *y*
Source of data:	The following data sources may be used if the relevant conditions apply:

Data source	Conditions for using the data source
Values provided by the fuel supplier of the power plants in invoices	If data is collected from power plant operators (e.g. utilities)
Regional or national average default values	If values are reliable and documented in regional or national energy statistics/energy balances
IPCC default values at the lower limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG	

Value(s) applied:	See Excel file
Choice of data or Measurement methods and procedures:	In accordance with the "Tool to calculate the emission factor for an electricity system" (Version 02.2.1)
Purpose of data	Calculation of project emissions
Additional comment:	Note that this parameter is not applied in the calculation of $EF_{grid,OMsimple,y}$ for Trinidad because fuel consumption data for Trinidad is reported in energy units.

Data / Parameter	**$EF_{CO2,i,y}$**
Unit	tCO_2/TJ
Description	Emission factor for fuel *i* in year *y*
Source of data	Default carbon contents, 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Chapter 1, page 1.21, Table 1.3. From http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf Accessed August 11, 2011.
Value(s) applied	See Excel file

Choice of data or Measurement methods and procedures	Reliable data for the Trinidad is not available. The "Tool to calculate the emission factor for an electricity system" (Version 02.2.1) calls for use of IPCC default values at the lower limit of the uncertainty at a 95% confidence interval as provided in table 1.4 of Chapter1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories. The carbon content value that we have applied (in tC/TJ) from the source stated above results in a higher grid emission factor for Trinidad and thus a larger quantity of project emissions, and is therefore conservative.
Purpose of data	Calculation of project emissions
Additional comment	In this case, this parameter is being used to calculate the grid emission factor. Note that the same nomenclature is used for a parameter used for calculating project and leakage emissions from fossil fuel consumption that is *not* related to electricity consumption from the grid. In those cases, the parameter is monitored, not fixed.

Data / Parameter	$\mathbf{EF_{grid,CM,y}}$
Unit	tCO_2/MWh
Description	CO_2 emission factors for electricity displaced from the grid in year *y*.
Source of data	For Trinidad: Calculated, based on electricity generation data supplied by PowerGen and GE Power & Water (original emails and Excel files provided to the DOE for validation).
Value(s) applied	0.666 for the Trinidad grid.
Choice of data or Measurement methods and procedures	This parameter has been calculated *ex ante* for the Trinidad grid as a combined margin (CM), in accordance with the "Tool to calculate the emission factor for an electricity system" (Version 02.2.1).
Purpose of data	Calculation of project emissions
Additional comment	None

Data / Parameter	$\mathbf{EG_{m,y}}$ and $\mathbf{EG_y}$
Unit	MWh
Description	Annual net electricity generation for power units connected the Trinidad grid in year *y*.
Source of data	For Trinidad: PowerGen and GE Power & Water (original emails and Excel files provided to the DOE for validation)
Value(s) applied	See Excel file
Choice of data or Measurement methods and procedures	Power generation data has been supplied by the power plant owners/operators.
Purpose of data	Calculation of project emissions
Additional comment	None

Data / Parameter	$EF_{EL,m,y}$
Unit	tCO_2/MWh
Description	Power unit emission factor
Source of data	Calculated
Value(s) applied	See Excel file
Choice of data or Measurement methods and procedures	This parameter has been calculated *ex ante* for power units connected to the Trinidad grid, in accordance with the "Tool to calculate the emission factor for an electricity system" (Version 02.2.1).
Purpose of data	Calculation of project emissions
Additional comment	None

B.6.3. Ex-ante calculations of emission reductions

Please see Part II for CPA types 1A + 2A Section B.6.3, which also applies here.

B.7. Application of the monitoring methodology and description of the monitoring plan

B.7.1. Data and parameters to be monitored by each generic CPA

Data / Parameter:	$V_{F,y}$
Unit:	Nm^3
Description:	Volume of the total recovered gas measured at point F in year *y*
Source of data:	Flow meter (e.g., diaphragm gouge)
Value(s) applied	To be provided in specific CPA-DD
Measurement methods and procedures	Data should be measured using calibrated flow meters. Measurements should be taken at the point(s) where recovered gas exits the pre-treatment plant
Monitoring frequency:	Continuously
QA/QC procedures:	Volume of gas should be completely metered with regular calibration of metering equipment. The measured volume should be converted to the volume at normal temperature and pressure using the temperature and pressure at the time to measurement.
Purpose of data	Calculating baseline emissions
Additional comments	---

Data / Parameter:	$NCV_{RG,F,y}$
Unit:	TJ/Nm^3
Description:	Average net calorific value of recovered gas at point F in year *y*
Source of data:	On site measurement
Value(s) applied	To be provided in specific CPA-DD

Measurement methods and procedures	Measurements should be undertaken in line with national or international fuel standards Gas samples should regularly be taken at point F and the molar composition of each gas sample should be determined through chemical analysis following the procedures for QA/QC. Based on the molar composition, the Net Calorific Value on a volumetric basis should be determined for each sample in line with ISO 6976 or an equivalent standard for a combustion reference temperature of 25^0C and the same metering reference condition used for parameter $V_{F,y}$. The average NCV during the period y is defined as the arithmetic average of NCVs for the samples taken during the same period
Monitoring frequency:	Sampling and compositional analysis and calculation of net calorific value at least monthly
QA/QC procedures:	Sampling in accordance with ISO 10715 or equivalent standard. Compositional analysis in accordance with ISO 6974 or equivalent standard. Routine maintenance and calibration in accordance with ISO 10723 or equivalent standard. GC calibration gases certified to ISO 6141 or equivalent standard. Annual manufacturer servicing and calibration to ISO17025 or equivalent standard. In case third party laboratories are used, these should as a minimum have ISO17025 accreditation or justify that they can comply with similar quality standards
Purpose of data	Calculating baseline emissions
Additional comments	For the purpose of this methodology, the qualifier “net” is synonymous with “lower” and “inferior”, and the term “calorific value” is synonymous with “heating value”

Data / Parameter	$TDL_{j,y}$
Unit	%
Description	Average technical transmission and distribution losses for providing electricity to source *j* in year *y*
Source of data	Choose one of the following options: • Use recent, accurate and reliable data available within the host country; • Use as default values of 20% for project or leakage electricity consumption sources; • Use as default values of 3% for project and leakage electricity consumption sources if the electricity consumption by all project and leakage electricity consumption sources to which scenario A applies is smaller than the electricity consumption of all baseline electricity consumption sources to which scenario A applies.
Value(s) applied	To be provided in specific CPA-DD
Choice of data or Measurement methods and procedures	$TDL_{j,y}$ should be estimated for the distribution and transmission networks of the electricity grid of the same voltage as the connection where the proposed CDM project activity is connected to. The technical distribution losses should not contain other types of grid losses (e.g. commercial losses/theft). The distribution losses can either be calculated by the project participants or be based on references from utilities, network operators or other official documentation.
Purpose of data	Calculating project emissions
Additional comment	Shall be monitored annually. In the absence of data from the relevant year, most recent figures should be used, but not older than 5 years.

Data / Parameter	$EC_{PJ,j,y}$
Unit	MWh/yr
Description	Quantity of electricity consumed by the project electricity consumption source *j* in year *y*
Source of data	Energy Meters on the incoming lines to each of the compressor stations.
Value(s) applied	To be provided in specific CPA-DD
Measurement methods and procedures	Electricity consumption will be measured from electrical energy meters installed before each of the compressor stations at each CPA field *i*. The readings from each of the meters will then be aggregated to the field level as $EC_{PJ,j,y}$
Monitoring frequency	Monitored continuously, collected and archived monthly.
QA/QC procedures	The energy metering equipment are calibrated and checked for accuracy by qualified third party in accordance with national standard, The frequency of calibration will be in accordance with the specifications of the national standards, or as per the manufacturers specifications, whichever is most frequent. The monthly electricity imported from the grid will be approved and signed off by the CDM Manager.
Purpose of data	Calculating project emissions
Additional comment	Electricity supplied from the grid to the LP and HP Compressor stations in each of the fields covered by the CPA, and aggregated to the CPA level.

B.7.2. Description of the monitoring plan for a generic CPA

Please see Part II for CPA types 1A + 2A. Section B.7.2, which also applies here, with the following difference with respect to energy supply:

Each gas compression or gas processing facility will require energy to run compressors, scrubbers, coolers and auxiliary equipments such as pumps and motors. This energy will be supplied from an electricity grid.

- Grid-based electricity consumption ($EC_{PJ,j,y}$) will be monitored with an electricity meter placed at the incoming box for each field.

The placement of metering equipment is represented schematically in Figures 15 and 16, for CPA types 1B and 2B, respectively.

Figure 15. Monitoring points for CPA type 1B

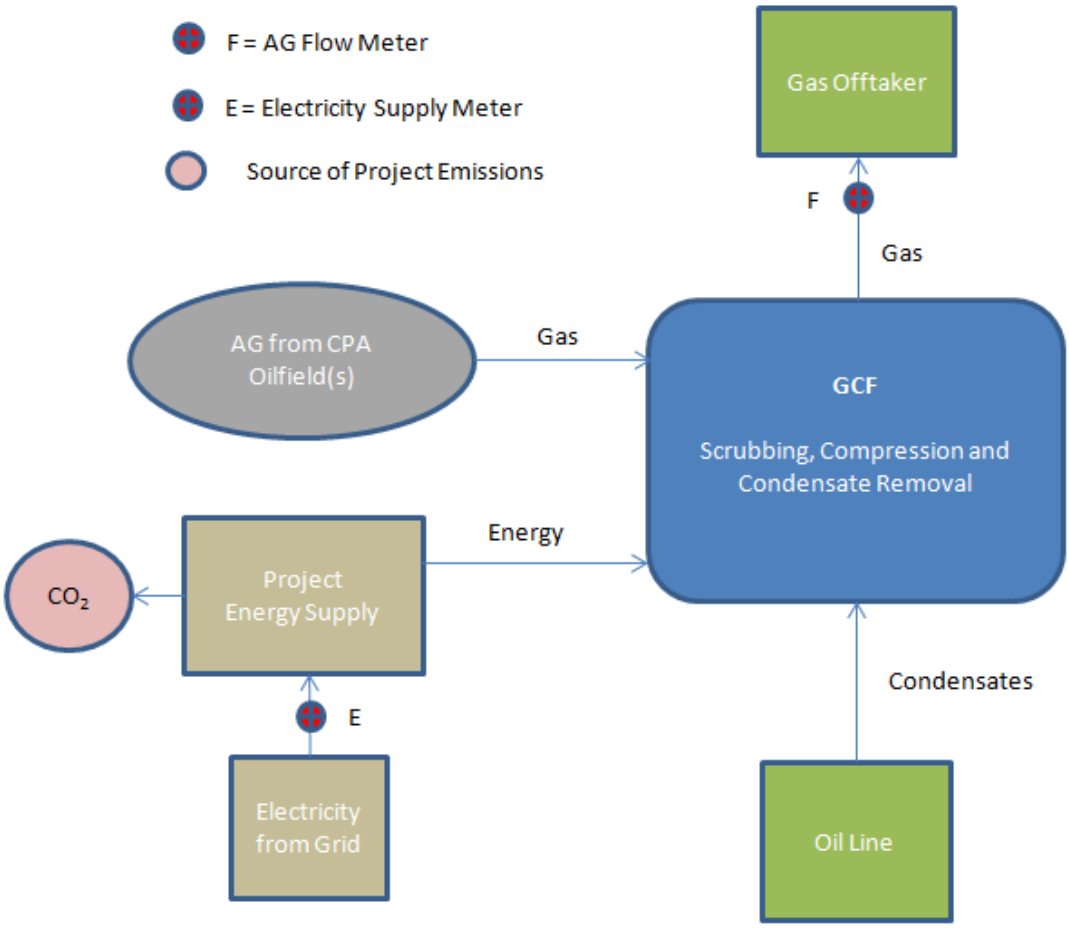
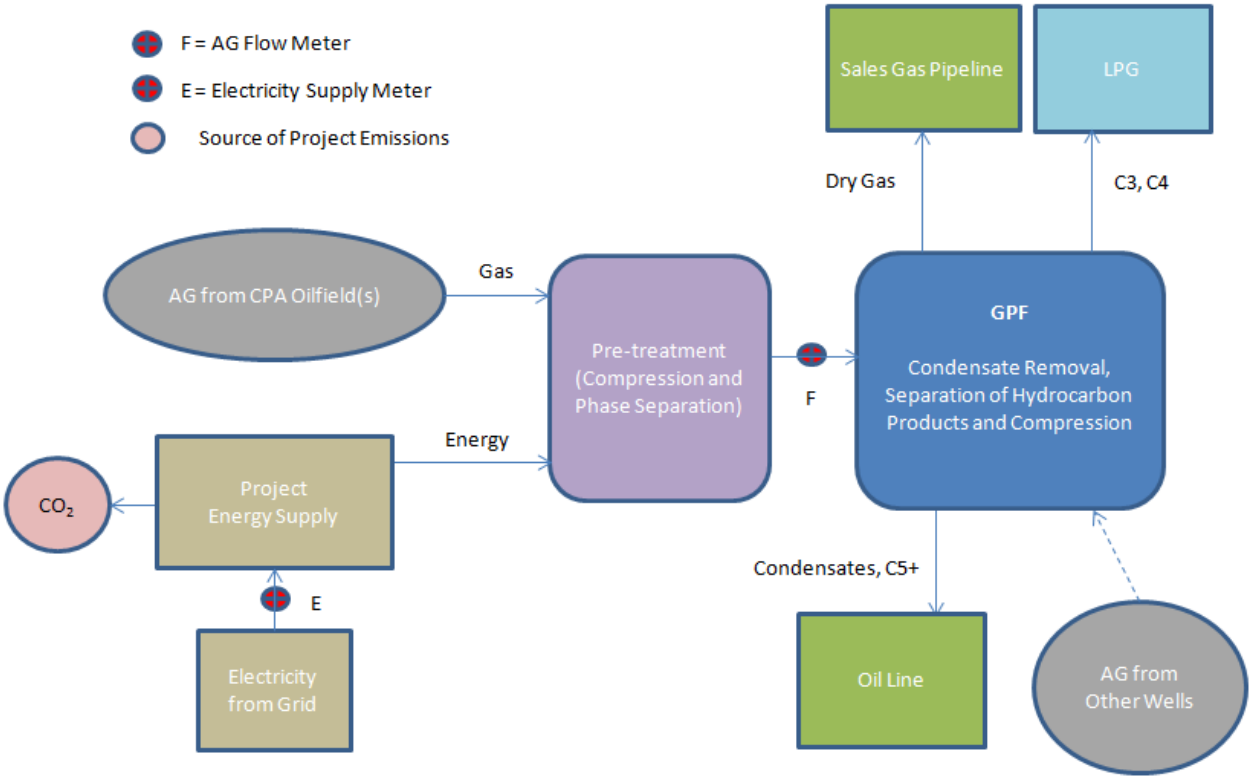


Figure 16. Monitoring points for CPA type 2B



Part II: Generic component project activity

For CPA Type 3B:

SECTION A. General description of a generic CPA

A.1. Purpose and general description of generic CPAs

Please see Part II for CPA types 1A + 2A Section A.1, which also applies here.

SECTION B. Application of a baseline and monitoring methodology

B.1. Reference of the approved baseline and monitoring methodology(ies) selected

Please see Part II for CPA types 1A + 2A Section B.1, which also applies here.

B.2. Application of the methodology

Please see Part II for CPA types 1A + 2A Section B.2, which also applies here.

B.3. Sources and GHGs

Please see Part II for CPA types 1A + 2A Section B.3, which also applies here.

B.4. Description of baseline scenario

Please see Part II for CPA types 1A + 2A Section B.4, which also applies here.

B.5. Demonstration of eligibility for a generic CPA

Please see Part II for CPA types 1A + 2A Section B.5, which also applies here.

B.6. Estimation of emission reductions of a generic CPA

B.6.1. Explanation of methodological choices

Please see Part II for CPA type 3A Section B.6.1, which also applies here, with the exception of the calculation of project emissions, for which Part II for CPA types 1B + 2B Section B.6.1 applies.

B.6.2. Data and parameters that are to be reported ex-ante

Please see Part II for CPA types 1B + 2B Section B.6.2, which also applies here.

B.6.3. Ex-ante calculations of emission reductions

Please see Part II for CPA type 3A Section B.6.3, which also applies here.

B.7. Application of the monitoring methodology and description of the monitoring plan

B.7.1. Data and parameters to be monitored by each generic CPA

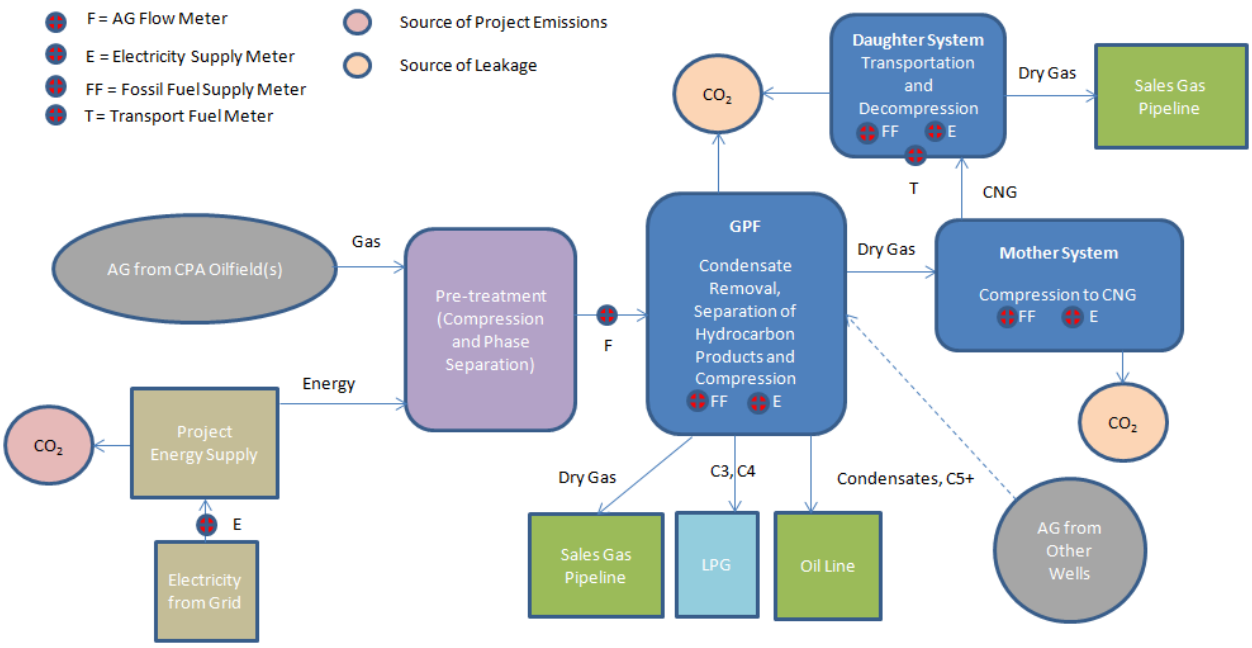
Please see Part II for CPA types 1B + 2B Section B.7.1, as well as monitoring related to leakage from Part II for CPA type 3A, which also apply here.

B.7.2. Description of the monitoring plan for a generic CPA

Please see Part II for CPA type 3A Section B.7.2, which also applies here with the exception of the placement of metering equipment:

The placement of metering equipment is represented schematically in Figure 17.

Figure 17. Monitoring points for CPA type 3B



PART II: Generic component project activity)

For CPA Types 1C and 2C:

SECTION A. General description of a generic CPA

A.1. Purpose and general description of generic CPAs

Please see Part II for CPA types 1A + 2A. Section A.1, which also applies here.

SECTION B. Application of a baseline and monitoring methodology

B.1 Reference of the approved baseline and monitoring methodology(ies) selected

Please see Part II for CPA types 1A + 2A. Section B.1, which also applies here.

B.2. Application of methodology(ies)

Please see Part II for CPA types 1A + 2A. Section B.2, which also applies here.

B.3. Sources and GHGs

Please see Part II for CPA types 1A + 2A. Section B.3, which also applies here.

B.4. Description of baseline scenario

Please see Part II for CPA types 1A + 2A. Section B.4, which also applies here.

B.5. Demonstration of eligibility for a generic CPA

Please see Part II for CPA types 1A + 2A. Section B.5, which also applies here.

B.6. Estimation of emission reductions of a generic CPA

B.6.1. Explanation of methodological choices

Baseline emissions

Please see Baseline Emissions under Part II for CPA types 1A + 2A. Section B.6.1, which also applies here.

Project emissions

The following sources[11] of project emissions are accounted in this methodology:

- CO_2 emissions due to consumption of fossil fuels for the recovery, pre-treatment, transportation, and, if applicable, compression of the recovered gas up to point F;
- CO_2 emissions due to the use of electricity for the recovery, pre-treatment, transportation, and, if applicable, compression of the recovered gas up to point F.

Energy is supplied on site using fossil fuels and from a grid:

$$PE_y = PE_{CO2,fossilfuels,y} + PE_{CO2,elec,y} \quad \textbf{(14)}$$

[11] Other sources of project emissions such as emissions from leaks, venting and flaring during the recovery, transportation and processing of recovered gas are assumed to be of similar magnitude in the baseline scenario.

Where:

PE_y	=	Project emissions in year *y*, (tCO_2e)
$PE_{CO2,fossilfuels,y}$	=	CO_2 emissions due to consumption of fossil fuels for the recovery, pre-treatment, transportation, and, if applicable, compression of the recovered gas up to point F in year *y* (tCO_2e)
$PE_{CO2,elec,y}$	=	CO_2 emissions due to electricity consumption from a grid, for the recovery, pre-treatment, transportation, and, if applicable, compression of the recovered gas up to point F in year *y* (tCO_2e)

Project emissions from the consumption of fossil fuels

Please see the calculation of $PE_{CO2,fossilfuels,y}$ in Part II for CPA types 1A + 2A Section B.6.1, which also applies here.

Project emissions from consumption of electricity from a grid

Please see the calculation of PE_y in Part II for CPA types 1B + 2B Section B.6.1, which also applies here. Therefore, for project emissions:

Year	Equation
1	PE_y = ([insert value for $PE_{FC,j,y}$] + ([insert value for $\sum EC_{PJ,j,y}$] x 0.666 x (1 + [insert value for $TDL_{j,y}$]))
2	PE_y = ([insert value for $PE_{FC,j,y}$] + ([insert value for $\sum EC_{PJ,j,y}$] x 0.666 x (1 + [insert value for $TDL_{j,y}$]))
3	PE_y = ([insert value for $PE_{FC,j,y}$] + ([insert value for $\sum EC_{PJ,j,y}$] x 0.666 x (1 + [insert value for $TDL_{j,y}$]))
4	PE_y = ([insert value for $PE_{FC,j,y}$] + ([insert value for $\sum EC_{PJ,j,y}$] x 0.666 x (1 + [insert value for $TDL_{j,y}$]))
5	PE_y = ([insert value for $PE_{FC,j,y}$] + ([insert value for $\sum EC_{PJ,j,y}$] x 0.666 x (1 + [insert value for $TDL_{j,y}$]))
6	PE_y = ([insert value for $PE_{FC,j,y}$] + ([insert value for $\sum EC_{PJ,j,y}$] x 0.666 x (1 + [insert value for $TDL_{j,y}$]))
7	PE_y = ([insert value for $PE_{FC,j,y}$] + ([insert value for $\sum EC_{PJ,j,y}$] x 0.666 x (1 + [insert value for $TDL_{j,y}$]))

Leakage

Please see Leakage under Part II for CPA types 1A + 2A Section B.6.1, which also applies here.

Emission reductions

Please see Emission Reductions under Part II for CPA types 1A + 2A Section B.6.1, which also applies here.

B.6.2. Data and parameters that are to be reported ex-ante

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:	$EF_{CO2,Methane}$
Data unit:	tCO_2/TJ
Description:	CO_2 emission factor for methane
Source of data:	AM0009 Version 06.0.0
Value to be	54.834 tCO_2/TJ

applied:	
Choice of data or Measurement methods and procedures	Calculated in line with procedures and data presented in ISO 6976:

Unit	Value	Source
Carbon Content of Methane	12,011 kg/kmol	ISO 6976: Table 1
CO2 Emission Factor for Methane	44.01 kg/kmol	ISO 6976: Table 1
NCV of Methane (at 25^0C)	802.60 kJ/kmol	ISO 6976: Table 1

Purpose of data	Calculating baseline emissions
Additional comment	----

Fixed parameters:
The following parameters are fixed for all CPAs included during the first 7 years of the PoA crediting period and for the respective first 7-year crediting period of these CPAs. These parameters are to be updated at the PoA level at the start of the second and third crediting periods of the PoA:

For CPAs connected to the Trinidad grid: See the fixed parameters for the grid emission calculation in Part II for CPA types 1B + 2B Section B.6.2, which also apply here.

B.6.3. Ex-ante calculations of emission reductions
Please refer to Part II for CPA types 1A + 2A Section B.6.3, which also applies here.

B.7. Application of the monitoring methodology and description of the monitoring plan
B.7.1. Data and parameters to be monitored by each generic CPA

Data / Parameter:	$V_{F,y}$
Unit:	Nm^3
Description:	Volume of the total recovered gas measured at point F in year *y*
Source of data:	Flow meter (e.g., diaphragm gouge)
Value(s) applied	To be provided in specific CPA-DD
Measurement methods and procedures	Data should be measured using calibrated flow meters. Measurements should be taken at the point(s) where recovered gas exits the pre-treatment plant
Monitoring frequency:	Continuously
QA/QC procedures:	Volume of gas should be completely metered with regular calibration of metering equipment. The measured volume should be converted to the volume at normal temperature and pressure using the temperature and pressure at the time to measurement.
Purpose of data	Calculation of baseline emissions
Additional comments	---

Data / Parameter:	$NCV_{RG,F,y}$
Unit:	TJ/Nm^3
Description:	Average net calorific value of recovered gas at point F in year *y*
Source of data:	On site measurement
Value(s) applied	To be provided in specific CPA-DD
Measurement methods and procedures	Measurements should be undertaken in line with national or international fuel standards Gas samples should regularly be taken at point F and the molar composition of each gas sample should be determined through chemical analysis following the procedures for QA/QC. Based on the molar composition, the Net Calorific Value on a volumetric basis should be determined for each sample in line with ISO 6976 or an equivalent standard for a combustion reference temperature of 25^0C and the same metering reference condition used for parameter $V_{F,y}$. The average NCV during the period y is defined as the arithmetic average of NCVs for the samples taken during the same period
Monitoring frequency:	Sampling and compositional analysis and calculation of net calorific value at least monthly
QA/QC procedures:	Sampling in accordance with ISO 10715 or equivalent standard. Compositional analysis in accordance with ISO 6974 or equivalent standard. Routine maintenance and calibration in accordance with ISO 10723 or equivalent standard. GC calibration gases certified to ISO 6141 or equivalent standard. Annual manufacturer servicing and calibration to ISO17025 or equivalent standard. In case third party laboratories are used, these should as a minimum have ISO17025 accreditation or justify that they can comply with similar quality standards
Purpose of data	Calculation of baseline emissions
Additional comments	For the purpose of this methodology, the qualifier “net” is synonymous with “lower” and “inferior”, and the term “calorific value” is synonymous with “heating value”

Data / Parameter	$FC_{i,j,y}$
Unit	Mass or Volume Unit per year (e.g. ton/yr or m^3/yr)
Description	Quantity of fuel type *i* combusted in process *j* during year *y*
Source of data	On site measurements
Value(s) applied	To be provided in specific CPA-DD
Measurement methods and procedures	• Use either mass or volume meters. In cases where fuel is supplied from small daily tanks, rulers can be used to determine mass or volume of the fuel consumed, with the following conditions: The ruler gauge must be part of the daily tank and calibrated at least once a year and have a book of control for recording the measurements (on a daily basis or per shift); • Accessories such as transducers, sonar and piezoelectronic devices are accepted if they are properly calibrated with the ruler gauge and receiving a reasonable maintenance; • In case of daily tanks with pre-heaters for heavy oil, the calibration will be made with the system at typical operational conditions.
Monitoring frequency	Continuously
QA/QC procedures	The consistency of metered fuel consumption quantities should be cross-checked by an annual energy balance that is based on purchased quantities and stock changes. Where the purchased fuel invoices can be identified specifically for the CDM project, the metered fuel consumption quantities should also be cross-checked with available purchase invoices from the financial records.
Purpose of data	Calculation of the project emissions and, where relevant, leakage
Additional comment	Amount of fossil fuel consumed in onsite energy generation plant j in year y

Data / Parameter	$w_{C,i,y}$
Unit	tC/mass unit of the fuel
Description	Weighted average mass fraction of carbon in fuel type *i* in year *y*
Source of data	The following data sources may be used if the relevant conditions apply: **Data source** / **Conditions for using the data source** a) Values provided by the fuel supplier in invoices / This is the preferred source b) Measurements by the project participants / If a) is not available
Value(s) applied	To be provided in specific CPA-DD
Measurement methods and procedures	Measurements should be undertaken in line with national or international fuel standards
Monitoring frequency	The mass fraction of carbon should be obtained for each fuel delivery, from which weighted average annual values should be calculated.
QA/QC procedures	Verify if the values under a) and b) are within the uncertainty range of the IPCC default values as provided in Table 1.2, Vol. 2 of the 2006 IPCC Guidelines. If the values fall below this range collect additional information from the testing laboratory to justify the outcome or conduct additional measurements. The laboratories in b) should have ISO17025 accreditation or justify that they can comply with similar quality standards.
Purpose of data	Calculation of project emissions and, where relevant, leakage
Additional comments	Applicable where Option A is used for calculating the emission coefficient $COEF_{i,y}$

Data / Parameter	$\rho_{i,y}$
Unit	Mass unit/volume unit
Description	Weighted average density of fuel type *i* in year *y*
Source of data	The following data sources may be used if the relevant conditions apply: **Data source** / **Conditions for using the data source** a) Values provided by the fuel supplier in invoices — This is the preferred source b) Measurements by the project participants — If a) is not available c) Regional or national default values — If a) is not available These sources can only be used for liquid fuels and should be based on well-documented, reliable sources (such as national energy balances).
Value(s) applied	To be provided in specific CPA-DD
Measurement methods and procedures	Measurements should be undertaken in line with national or international fuel standards
Monitoring frequency	The density of the fuel should be obtained for each fuel delivery, from which weighted average annual values should be calculated.
QA/QC procedures	None
Purpose of data	Calculating project emissions and, where relevant, leakage
Additional comments	Applicable where Option A is used for calculating the emission coefficient $COEF_{i,y}$ and where $FC_{i,j,y}$ is measured in a volume unit. Preferably the same data source should be used for $w_{C,i,y}$ and $\rho_{i,y}$

Data / Parameter	$NCV_{i,y}$
Unit	GJ per mass or volume unit (e.g. GJ/m^3, GJ/tonne)
Description	Weighted average net calorific value of fuel type *i* in year *y*
Source of data	The following data sources may be used if the relevant conditions apply: **Data source** / **Conditions for using the data source** a) Values provided by the fuel supplier in invoices — This is the preferred source b) Measurements by the project participants — If a) is not available c) Regional or national default values — If a) is not available These sources can only be used for liquid fuels and should be based on well-documented, reliable sources (such as national energy balances). d) IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories — If a) is not available
Value(s) applied	To be provided in specific CPA-DD
Measurement methods and procedures	For a) and b): Measurements should be undertaken in line with national or international fuel standards
Monitoring frequency	For a) and b): the NCV should be obtained for each fuel delivery, from which weighted average annual values should be calculated For c): Review appropriateness of the values annually For d): Any future revision of the IPCC Guidelines should be taken into account
QA/QC procedures	Verify if the values under a), b) and c) are within the uncertainty range of the IPCC default values as provided in Table 1.2, Vol. 2 of the 2006 IPCC Guidelines. If the values fall below this range collect additional information from the testing laboratory to justify the outcome or conduct additional measurements. The laboratories in a), b) or c) should have ISO17025 accreditation or justify that they can comply with similar quality standards.
Purpose of data	Calculating project emissions and, where relevant, leakage
Additional comments	Applicable where Option B is used for calculating the emission coefficient $COEF_{i,y}$

Data / Parameter	$EF_{CO2,i,y}$
Unit	tCO_2/GJ
Description	Weighted average CO_2 emission factor of fuel type *i* in year *y*
Source of data	The following data sources may be used if the relevant conditions apply: **Data source** / **Conditions for using the data source** a) Values provided by the fuel supplier in invoices / This is the preferred source b) Measurements by the project participants / If a) is not available c) Regional or national default values / If a) is not available These sources can only be used for liquid fuels and should be based on well-documented, reliable sources (such as national energy balances). d) IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories / If a) is not available
Value(s) applied	To be provided in specific CPA-DD
Measurement methods and procedures	For a) and b): Measurements should be undertaken in line with national or international fuel standards
Monitoring frequency	For a) and b): the NCV should be obtained for each fuel delivery, from which weighted average annual values should be calculated For c): Review appropriateness of the values annually For d): Any future revision of the IPCC Guidelines should be taken into account
QA/QC procedures	
Purpose of data	Calculating project emissions and, where relevant, leakage
Additional comments	Applicable where Option B is used for calculating the emission coefficient $COEF_{i,y}$ For a) If the fuel supplier does provide the NCV value and the CO_2 emission factor on the invoice and these two values are based on measurements for this specific fuel, this CO_2 factor should be used. If another source for the CO_2 emission factor is used or no CO_2 emission factor is provided, Options b), c) or d) should be used.

Data / Parameter	$TDL_{j,y}$
Unit	%
Description	Average technical transmission and distribution losses for providing electricity to source *j* in year *y*
Source of data	Choose one of the following options: • Use recent, accurate and reliable data available within the host country; • Use as default values of 20% for project or leakage electricity consumption sources; • Use as default values of 3% for project and leakage electricity consumption sources if the electricity consumption by all project and leakage electricity consumption sources to which scenario A applies is smaller than the electricity consumption of all baseline electricity consumption sources to which scenario A applies.
Value(s) applied	To be provided in specific CPA-DD
Choice of data or Measurement methods and procedures	$TDL_{j,y}$ should be estimated for the distribution and transmission networks of the electricity grid of the same voltage as the connection where the proposed CDM project activity is connected to. The technical distribution losses should not contain other types of grid losses (e.g. commercial losses/theft). The distribution losses can either be calculated by the project participants or be based on references from utilities, network operators or other official documentation.
Purpose of data	Calculating project emissions
Additional comment	Shall be monitored annually. In the absence of data from the relevant year, most recent figures should be used, but not older than 5 years.

Data / Parameter	$EC_{PJ,j,y}$
Unit	MWh/yr
Description	Quantity of electricity consumed by the project electricity consumption source *j* in year *y*
Source of data	Energy Meters on the incoming lines to each of the compressor stations.
Value(s) applied	To be provided in specific CPA-DD
Measurement methods and procedures	Electricity consumption will be measured from electrical energy meters installed before each of the compressor stations at each CPA field *i*. The readings from each of the meters will then be aggregated to the field level as $EC_{PJ,j,y}$
Monitoring frequency	Monitored continuously, collected and archived monthly.
QA/QC procedures	The energy metering equipment are calibrated and checked for accuracy by qualified third party in accordance with national standard, The frequency of calibration will be in accordance with the specifications of the national standards, or as per the manufacturers specifications, whichever is most frequent. The monthly electricity imported from the grid will be approved and signed off by the CDM Manager.
Purpose of data	Calculating project emissions
Additional comment	Electricity supplied from the grid to the LP and HP Compressor stations in each of the fields covered by the CPA, and aggregated to the CPA level.

B.7.2. Description of the monitoring plan for a generic CPA

Please see Part II for CPA types 1A + 2A Section B.7.2, which also applies here, with the following difference with respect to energy supply:

Each gas compression or gas processing facility will require energy to run compressors, scrubbers, coolers and auxiliary equipments such as pumps and motors. This energy will be supplied through onsite fossil fuel consumption originating from collected associated gas and/or external sources and from an electricity grid.

- On-site fossil fuel consumption for direct combustion and/or captive power production can be supplied to gathering stations by utilizing some of the captured associated gas or from other off-site supply sources. The quantity of on-site fossil fuel consumed ($FC_{i,j,y}$) will be monitored at each gathering station with a flow meter (or meters if more than one supply source is utilized) installed at the supply point of entry to the station.

- Grid-based electricity consumption ($EC_{PJ,j,y}$) will be monitored with an electricity meter placed at the incoming box for each field.

The placement of metering equipment is represented schematically in Figures 18 and 19, for CPA types 1C and 2C, respectively.

Figure 18. Monitoring points for CPA type 1C

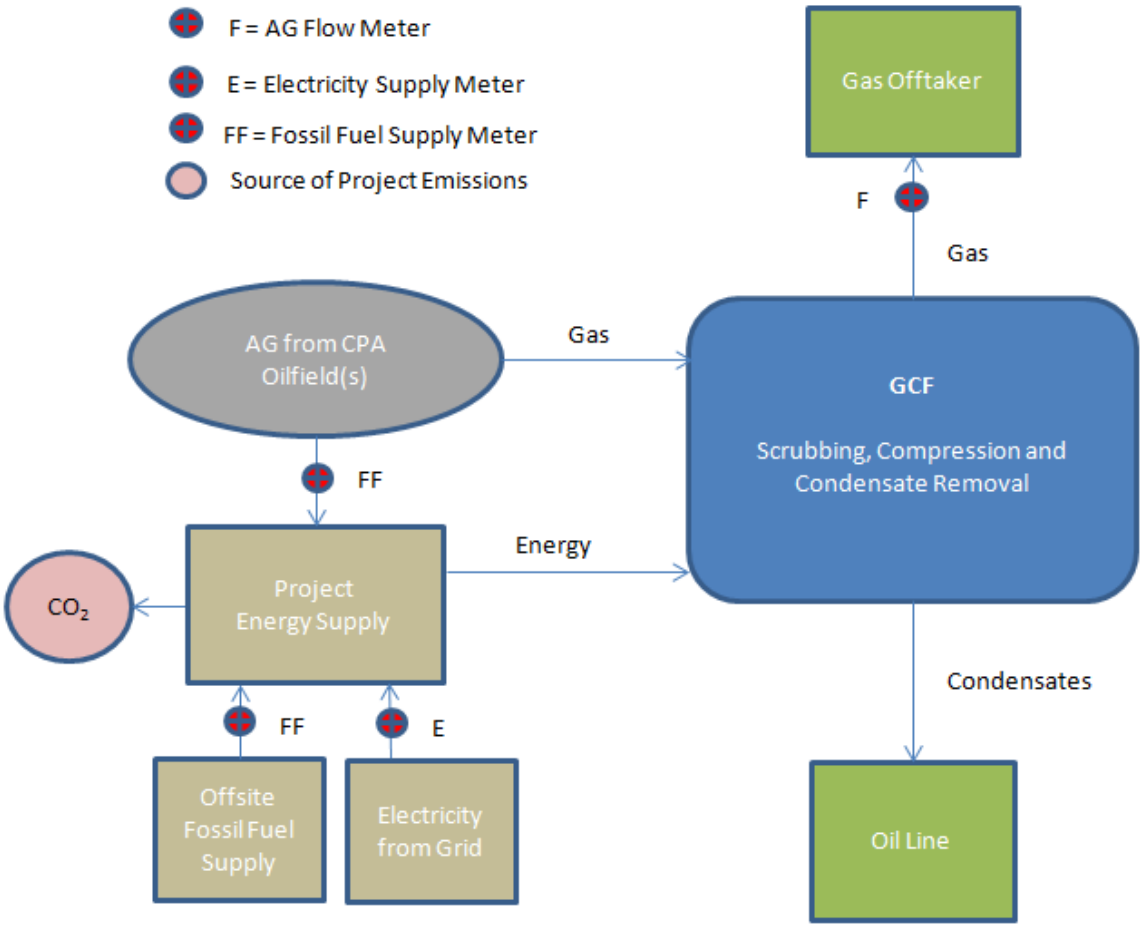
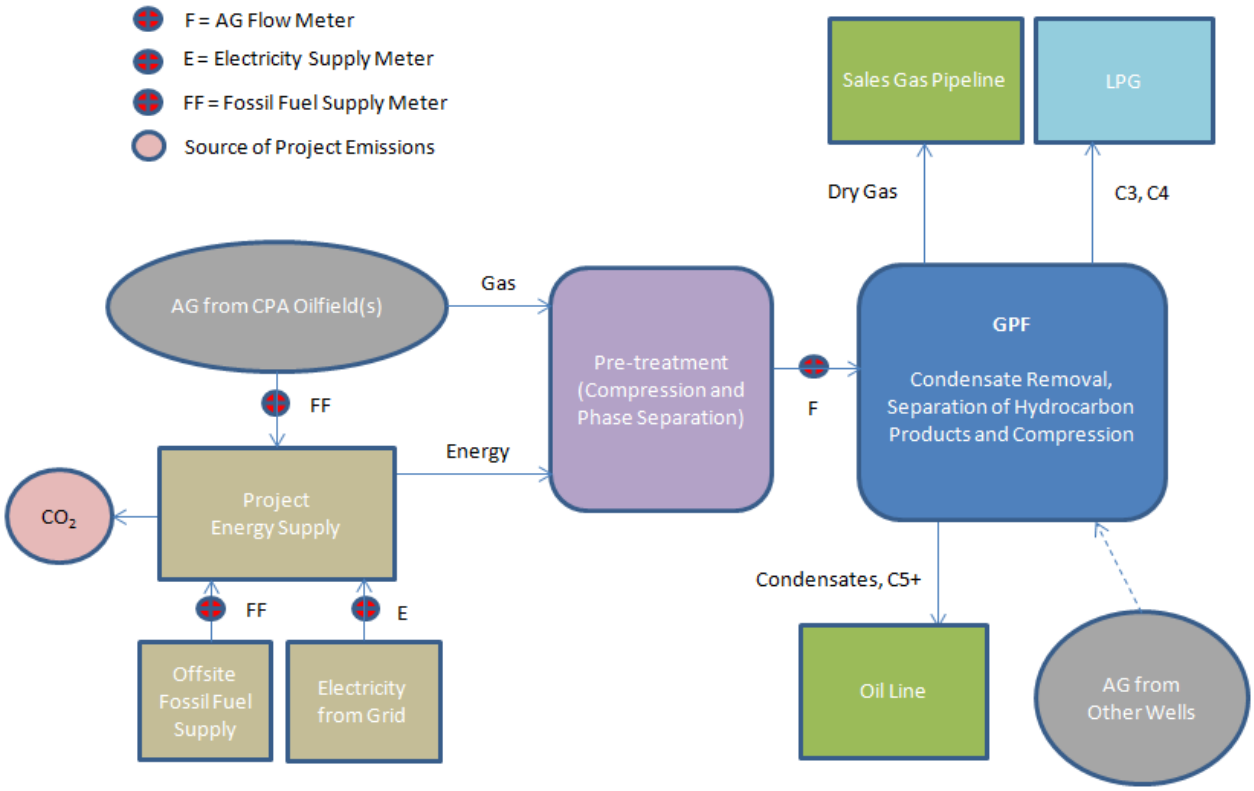


Figure 19. Monitoring points for CPA type 2C



Part II: Generic component project activity

For CPA Type 3C:

SECTION A. General description of a generic CPA

A.1. Purpose and general description of generic CPAs

Please see Part II for CPA types 1A + 2A Section A.1, which also applies here.

SECTION B. Application of a baseline and monitoring methodology

B.1. Reference of the approved baseline and monitoring methodology(ies) selected

Please see Part II for CPA types 1A + 2A Section B.1, which also applies here.

B.2. Application of the methodology

Please see Part II for CPA types 1A + 2A Section B.2, which also applies here.

B.3. Sources and GHGs

Please see Part II for CPA types 1A + 2A Section B.3, which also applies here.

B.4. Description of baseline scenario

Please see Part II for CPA types 1A + 2A Section B.4, which also applies here.

B.5. Demonstration of eligibility for a generic CPA

Please see Part II for CPA types 1A + 2A Section B.5, which also applies here.

B.6. Estimation of emission reductions of a generic CPA

B.6.1. Explanation of methodological choices

Please see Part II for CPA type 3A Section B.6.1, which also applies here, with the exception of the calculation of project emissions, for which Part II for CPA types 1C + 2C Section B.6.1 applies.

B.6.2. Data and parameters that are to be reported ex-ante

Please see Part II for CPA types 1C + 2C Section B.6.2, which also applies here.

B.6.3. Ex-ante calculations of emission reductions

Please see Part II for CPA type 3B Section B.6.3, which also applies here.

B.7. Application of the monitoring methodology and description of the monitoring plan

B.7.1. Data and parameters to be monitored by each generic CPA

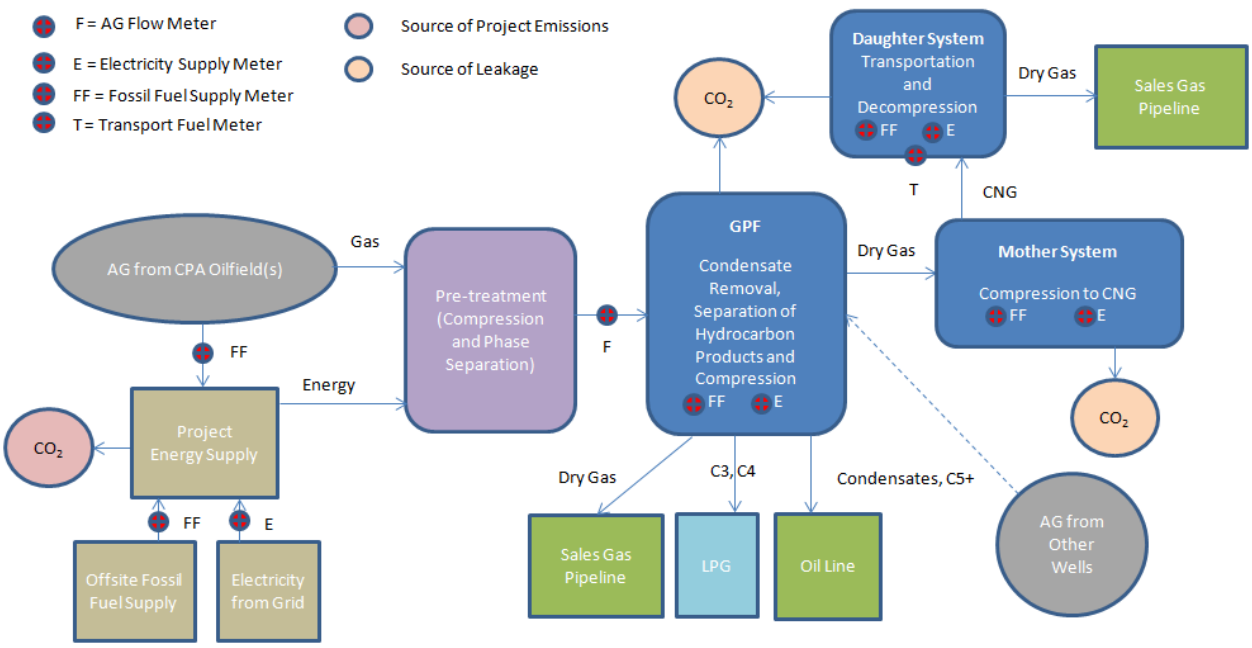
Please see Part II for CPA types 1C + 2C Section B.7.1, as well as monitoring related to leakage from Part II for CPA type 3A, which also applies here.

B.7.2. Description of the monitoring plan for a generic CPA

Please see Part II for CPA type 3B Section B.7.2, which also applies here with the exception of the placement of metering equipment:

The placement of metering equipment is represented schematically in Figure 20.

Figure 20. Monitoring points for CPA type 3C



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Appendix 1: Contact information on entity/individual responsible for the PoA

Organization	Petroleum Company of Trinidad and Tobago Limited
Street/P.O. Box	Southern Main Road
Building	Corporate Headquarters
City	Point-a-Pierre
State/Region	N/A
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Country	Republic of Trinidad and Tobago
Telephone	+1 868 658 4200
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E-mail	khalid.hassanali@petrotrin.com
Website	www.petrotrin.com
Contact person	Mr. Khalid Hassanali
Title	President
Salutation	Mr.
Last name	Hassanali
Middle name	N/A
First name	Khalid
Department	Executive Office
Mobile	+1 868 688 2294
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Direct tel.	+1 868 658-1902
Personal e-mail	khalid.hassanali@petrotrin.com

Organization	TOSL Engineering Limited
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State/Region	N/A
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Country	Republic of Trinidad and Tobago
Telephone	+1 868 299 0360 ext. 1-282
Fax	+1 868 653 5404
E-mail	shazan.ali@tosl.com
Website	www.tosl.com
Contact person	Mr. Shazan Ali
Title	CEO
Salutation	Mr.
Last name	Ali
Middle name	N/A
First name	Shazan
Department	N/A
Mobile	+1 868 290 9176
Direct fax	See above
Direct tel.	N/A
Personal e-mail	shazan.ali@tosl.com

Appendix 2: Affirmation regarding public funding

No public funding will be utilized for the financing of this PoA.

Appendix 3: Application of methodology(ies)

Appendix 4: Further background information on ex ante calculation of emission reductions

For full details of the grid emission factor calculation for Trinidad see the Excel file.

Appendix 5: Further background information on the monitoring plan

The elements of the monitoring plan and associated data management system and tools for the PoA as a whole and for individual CPAs in particular include the following processes:

- CPA inclusion;
- Monitoring and issuance;
- CME functions;
- Data management;
- File storage;
- Process management; and
- Marketing.

The roles and responsibilities assigned to the different participants in the PoA are indicated in the table below.

Task summary name	Specific Task	Responsibility of	Personnel
Monitoring	Monitoring gas supply to offtaker (via gas pipeline)	CPA owner	Data manager
Monitoring	QC/compare monitoring reports	CPA owner	Data manager
Reporting	Monthly reports to CME	CPA owner	Data manager
Reporting	QC year's data	CPA owner	Data management & auditor
Reporting	Prepare yearly summary	CPA owner	Data manager
Reporting	Submit yearly summary to CME	CPA owner	Management
Reporting	QC data from CPA owner	CME	Data manager
Reporting	Prepare report for DOE	CME	Data manager
Reporting	Recruit DOE and submit report	CME	Management
Monitoring	Calibrate meter	CPA owner	Technical officer
Reporting	Feedback on process	CPA owner and CME staff	Data manager
Data Management	Archive files and data	CPA owner and CME staff	Data manager
Data Management	Backup data	CPA owner and CME staff	Data manager

The data required to be monitored at the CPA level includes:

- Volume of the total recovered gas measured at point F in year *y*
- Average net calorific value of recovered gas at point F in year *y*
- Electricity Supplied to LP and HP Compressors and other Electricity Consuming Appurtenances of the Project in year y

Each CPA proponent shall install and maintain its own meters for measuring the quantity of associated gas gathered and the quantity of gas fed into the gas pipeline. The meters will run continuously and meter readings will be recorded on a daily basis. The CPA proponent shall record the values in its own 'Record of Meter Reading' and shall prepare and present a signed Record of Meter Reading to the CME on the first Business Day of every month.

Each CPA proponent will appoint a CDM Manager, possibly supported by a data manager, who will be responsible for the above-mentioned monitoring process. The CDM Manager will: generate primary data through its own monitoring; collate and store the primary data in hard copy and electronic form; cross-check their data against invoices for electricity sales; aggregate primary data into electronic data sets and reports; control the quality of data entered into electronic storage media; transmit the data to the CME; and secure the records through backups and mirror sites. The CDM Manager will also store hard and soft copies of the data, sales receipts and meter calibration reports.

The CME has developed an electronic template using Microsoft Excel to manage the incoming monitoring data. This template will be provided to the CDM Manager of all CPAs to ensure consistency in the format of reporting. The CME will collect and store other information from and about the CPAs namely: basic information on the CPA; meter data; key reference documents; a process checklist; a permits checklist; and the DNA requirements checklist.

The CME has developed a set of data and management tools in order to: ensure accuracy, quality and reliability of data monitoring; and ensure transparency of the processes; avoid duplication of submissions for registration and claims for CERs; organize and store data for ease-of-recall; and manage the numerous processes of the PoA. The data in the system will be regularly updated to reflect a project's status as it progresses through the stages of development and implementation. In addition, the templates will be adjusted over time to better monitor data and activities.

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History of the document

Version	Date	Nature of revision(s)
02.0	EB 66 13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the programme design document form for CDM programmes of activities" (EB 66, Annex 12).
01	EB33, Annex 41 27 July 2007	Initial adoption.
Decision Class: Regulatory **Document Type:** Form **Business Function:** Registration		