Approved baseline and monitoring methodology AM0048

"New cogeneration facilities supplying electricity and/or steam to multiple customers and displacing grid/off-grid steam and electricity generation with more carbon-intensive fuels"

I. SOURCE AND APPLICABILITY

Source

This methodology is based on NM0141-rev "Displacing grid/off-grid steam and electricity generation with less carbon-intensive fuels", whose baseline study and project design document were prepared by Quality Tonnes.

For more information regarding the proposal and its consideration by the Executive Board please refer to case NM0141-rev on http://cdm.unfccc.int/goto/MPappmeth.

This methodology also refers to the latest version of the "Tool for the demonstration and assessment of additionality" agreed by the Executive Board and available at the UNFCCC website.[1]

Selected approach from paragraph 48 of the CDM modalities and procedures

"Actual or historical emissions, as applicable"

Definitions

The following definitions apply for this methodology:

Project facility: fossil-fuel-based new cogeneration facility developed as a project activity to supply electricity and/or steam directly to two or more industrial, commercial and/or residential entities.

Project customer: industrial, commercial and/or residential entity receiving electricity and/or steam from the project facility. This may include the grid operator and other distribution entities that supply to localized grids. Clusters of smaller residential or commercial customers can be considered as a single project customer.

Applicability

This methodology applies to:

- Fossil-fuel-fired cogeneration project activities that supply steam and electricity generation to multiple project customers, including both grid and off-grid applications.

- If a project customer is expected to undertake, or during the crediting period undertakes, replacement and/or have major repair and maintenance of on-site electricity and/or steam equipment during the project lifetime which might result in fuel switch and/or changes in efficiency they shall be excluded from the project activity after the likely or actual date of the replacement or major repair and maintenance as per Table 2.

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[1] Please refer to: http://cdm.unfccc.int/goto/MPappmeth

- To the existing capacity available at project customers previous to the implementation of the project activity.

- Project customers that do not co generate steam and electricity currently and/or in the baseline scenario.

- Only to project customers that ensure that the equipment displaced by the project activity will not be sold or used for other purposes.

II. BASELINE METHODOLOGY

Project boundary

The project boundary includes the site of the project facility(s) and the sites of all project customer(s).

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

	Source	Gas	Included?	Justification / Explanation
Baseline	Combustion of fossil fuels to produce steam and electricity at the project customers and at the grid	CO_2	Yes	Main emission source in the combustion of fossil fuels.
		CH_4	No	Excluded for simplification.
		N_2O	No	Excluded for simplification.
Project Activity	Combustion of fossil fuels to produce steam and electricity at the project facility(s)	CO_2	Yes	Main emission source in the combustion of fossil fuels.
		CH_4	No	Excluded for simplification.
		N_2O	No	Excluded for simplification.

Procedure for estimating the remaining lifetime of the equipment included in the project boundary

As the project activity involves the replacement of existing equipment or facilities, project participants shall take into account, as per guidance provide in EB 22 Annex 2, that the existing equipment could have been replaced in the absence of the project activity during the crediting period. In order to estimate the date when the existing equipment would need to be replaced in the absence of the CDM, the following approaches shall be taken into account:

a) The typical average technical lifetime of the type of equipment may be determined taking into account common practices in the sector and country (e.g. based on industry surveys, statistics, technical literature, etc.);

b) The practices of the responsible company regarding replacement schedules may be evaluated and documented (e.g. based on historical replacement records for similar equipment);

The date when the existing equipment would need to be replaced in the absence of the project activity shall be chosen as the earliest point in time among the alternatives listed above.

The determination of this date shall be made on a case-by-case basis, for each piece of equipment that is being replaced.

After this date, the equipment shall be excluded from the project boundary. Therefore, the emission reductions resulting from the specific equipment replacement shall only be accounted from the actual date of replacement due to the project activity until the date when the existing equipment would have been replaced in the absence of the project activity or the end of crediting period, whatever is earlier.

Procedure for the selection of the most plausible baseline scenario

The project proponents shall select the most plausible baseline scenario through the following two steps:

STEP 1. Identification of alternative scenarios

Project proponents shall identify all reasonable potential alternative scenarios that could provide similar services as the proposed project activity. They shall examine the baseline scenario for each project customer as well as for the developer of the project activity. Scenarios elements to be considered and their consequences are shown in Table 2.

The identification of all reasonable potential alternative scenarios shall be made through interviews and/or surveys with each project customer to assess the project customer's future energy planning (plans for switching to a less carbon-intensive fuel, plans to increase the efficiency of on-site generation, plans that influence energy demand, self-generation capacity, etc.). The objective of the interviews/surveys is to assess for each project customer the potential for changes in the type of fuel used on-site, energy efficiency, on-site generation capacity and demand levels.

Assessing potential for fuel switch: for all project customers, the project proponent should assess the potential of fuel switching under the baseline scenario. The project proponent first determines if fuel changes are technically feasible using existing baseline equipment/processes. Is the existing equipment capable of utilizing more than one fuel, without major capital investment? This can then be verified during project validation. If not, then no additional considerations need to be undertaken in the given project period and it will be assumed the same fuel would have been used as in the past. If a fuel switch is a legitimate technical option given the existing equipment, then the project developer should annually monitor parameters that would indicate a fuel switch is also a logistically feasible option. Does the facility in question have access to other potential fuel sources? (Proximity of a natural gas supply line, fuel supply network developed, etc). If a fuel switch is not a legitimate option, then no additional considerations need to be undertaken in the given project year and it will be assumed the same fuel would have been used as in the past.

Plans, by self-generating project customer(s), to upgrade or replace generating equipment during the crediting period shall be documented. For equipment retrofit or lifetime issues the guidance provided above should be taken into account by the project proponent.

The project proponents shall take into consideration the effects of national and sectoral policies in each alternative baseline scenario. When project customers have to change or shutdown their facilities because of actively enforced laws (for reasons of emissions, safety, etc.), these changes shall be considered as part of the baseline scenario. The project developer will provide to the DOE documentation of the status of the regulatory situation potentially affecting the project in the selected country concerning self-generation units and new power plants.

STEP 2. Barrier analysis

The barriers section of the latest version of the "Tool for the demonstration and assessment of additionality" shall be used to determine the most likely scenario for the project facility and individual project customers. If the application of the tool is inconclusive, the most conservative alternative shall be chosen as the baseline scenario.

Table 2 - Scenario Elements

Alternative		Project developer	Project customer	How does the methodology apply if this is the most likely scenario element?
		Project facilities in the absence of the project activity (CDM)	Electricity and/or heat sources in the absence of the project activity (CDM)	
Historical	1	No project facility.	Project customer maintains historical characteristics in terms of on-site fuel choice, on-site equipment efficiency, mix of on-site generation and grid purchase (on-site generation capped at self-generation capacity) and on-site generation equipment lifetime (must be greater than the crediting period).	As described in the equations.
Fuel choice is likely to change at the project customers in the absence of the project activity	2a	No project facility.	Project customer is likely to switch to less intensive GHG fuel in the absence of the project activity (e.g. a switch from oil to natural gas by the project customer in absence of the project activity).	Such project customers shall be excluded from project boundary after the likely or actual date of implementing the fuel switch.
	2b	No project facility.	Project customer is likely to switch to more intensive GHG fuel in the absence of the project activity (e.g. a switch from oil to coal by the project customer in absence of the project activity).	As described in the equations.

Alternative		Project developer	Project customer	How does the methodology apply if this is the most likely scenario element?
		Project facilities in the absence of the project activity (CDM)	Electricity and/or heat sources in the absence of the project activity (CDM)	
Efficiency is likely to change at the project customers in the absence of the project activity.	3a	No project facility.	Project customer is likely to increase efficiency of its off-grid electricity/steam production in the absence of the project activity (e.g. replacement of boilers, installation of cogeneration equipment, in absence of the project activity).	Such project customers shall be excluded from project boundary after the likely or actual date of implementing efficiency improvement component.
	3b	No project facility.	Project customer is likely to decrease efficiency of its off-grid electricity/steam production in the absence of the project activity.	As described in the equations.
Energy consumption of project customer is likely to change in the absence of the project activity	4	No project facility.	Project customer energy (electricity and/or heat) consumption in the baseline scenario is likely to be different from that of the project scenario.	As described in the equations.
Project customer is likely to be supplied by **external sources of electricity/heat** in the absence of the project activity	5	Proposed project activity without the CDM or other external sources of electricity/heat supply the project customers energy demands.	Project customer is likely to be supplied by external sources of electricity/heat in the baseline scenario.	The methodology is not applicable if project customers demand electricity and/or heat from external sources other than the project activity or the grid.

Additionality

Additionality shall be demonstrated using the latest version of the "**Tool for the demonstration and assessment of additionality**". The following details shall be used to supplement the steps of the Additionality Tool.

The additionality shall be demonstrated both for the project facility as well as the project customers. The project participants shall document and prove that a fuel switch in absence of the project activity would not have been undertaken by project consumers.

Step 1. Identification of alternatives to the project activity consistent with current laws and regulations

Implemented as described in the Tool for the demonstration and assessment of additionality.

Project customers that are required to replace self-generation to comply with applicable and enforced laws (e.g. for reasons of emissions, safety, etc.) shall not be included in the project boundary. The DOE shall verify the documentation establishing the compliance with applicable enforced regulation of the project customers included in the project boundary.

Step 2. Investment analysis

Project Developer: If using investment analysis, internal rate of return (IRR) of all the alternatives shall be estimated and compared to assess additionality. If the IRR of the implementing project activity without CDM is less than the other alternatives and less than accepted benchmark for rate of return within the country, then the implementation of project facility is additional. The benchmark, against which the IRR is compared, shall be established as described in the Additionality Tool.

If project facility is additional move to step 4, else, move to Step 3.

Project Customers: If investment analysis is used, the indicator used for comparing the alternatives shall be price of power delivered on project customer site. If the cost of power delivered by the project facility is the highest among all alternatives, then the use of project facility supplied power to the project customer is additional. The project participants shall use data for each project customer to undertake the analysis.

If purchase of power from project facility is the costliest option for the project customer move to step 4, else, move to Step 3.

Step 3. Barrier analysis

The project participants shall follow the sub steps below and the guidance provided in the Tool for the demonstration and assessment of additionality.

If step 3 is used, determine whether the proposed project activity faces barriers that:

(a) Prevent the implementation of this type of proposed project activity; and,

(b) Do not prevent the implementation of at least one of the alternatives.

These barriers might include, but are not be limited to:

For the project facility:

> ➢ Investment Barriers: It shall be demonstrated that:
>
> ▪ The project participants will not be able to finance the project activity; and/or,
>
> ▪ There are barriers to access finances from outside financiers; and/or,
>
> ▪ The available financial resources will be used by the project participants to finance other investment priorities; and/or,
>
> ▪ Risks of the investment in project activity are high and prevent its implementation.
>
> Evidence in support of above barriers shall be submitted to the DOE and could include:
>
> ▪ Analysis of the financial health of the other similar generation company or companies (financial statements, records on subsidized electricity prices, non-

payment rates, and other uncertainties regarding utility revenues – such as inflation causing real tariffs to decline, hurting the utility's revenues, etc.);

- Inability of the companies similar to the project participants to raise funds on the capital markets, inability to attract investors, etc;

- Proposed project activity is not a priority for either the utility or the self-generators, based on records showing lists of priority investments and by comparing against the company's minimum investment criteria.

➢ Fuel Availability:

- Availability of less carbon-intensive fuels, such as natural gas, is a constraint; and/or,

- High up-front investment costs, such as the capital required for building the pipeline, LNG terminal or other infrastructure, is a barrier; and/or,

- Limited availability of less carbon intensive fuel results in competition for the fuel and hence adversely affects the profitability of the project.[2]

Evidence that switching faces barriers could be supported by the rate of switch to less intensive carbon fuel by self-generators based on publicly available documentation or analysis.

➢ Familiarity:

- The proposed project facility to supply two or more off-grid project customers with electricity or steam is not common. Survey of energy supply industry or published information shall be used to support the barrier.

➢ Technological/Training:

- There is a lack of sufficient trained staff to undertake extensive metering and customer services. Retaining highly skilled workers is difficult.

➢ Political:

- The law prohibits Independent power producers to supply to certain category of customers that can improve the revenue profile, as they can only be supplied electricity from state-owned utilities.

Outcome: If fuel is widely available and the upfront costs of switching are not prohibitive, then the project would not be considered additional.

For the project customers: The barriers that inhibit project customers from switching fuels and/or switching to the energy provided by the CDM project facility could include:

➢ Investment Barriers:

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[2] However, in this case, leakage could be considerable, and the PP would need to analyze whether the resulting unavailability of gas would increase emissions at competing sites.

- Investment required switching to natural gas, such as pipe connections and/or re-tooling boilers and other equipment is significant.

- Investment required to access energy from the project facility, to extend power lines and steam lines to the project customer, are significant and the CDM project facility is unable or unwilling to pay.

➢ Fuel availability:

- Lower GHG-emitting fuels are not available to off-grid industrial/commercial facilities and/or difficult to obtain long-term supply contracts resulting in uncertainty in availability of fuel.

The project developer should follow the rest of Step 3 as outlined in the Additionality tool.

Step 4. Common practice analysis

Implemented as described in the "Tool for the demonstration and assessment of additionality".

Baseline emissions

The baseline emissions are sum of emissions from generation of electricity and emissions from generation of steam:

$$BE_y = BE_{IC,y} + BE_{ST,y} + BE_{GR,y}$$ **(1)**

Where:

BE_y Baseline emissions in year 'y' (tCO$_2$). Calculated below.

$BE_{IC,y}$ Emissions for the production of electricity that would be supplied to individual project customers in year 'y' in the baseline scenario (tCO$_2$). Calculated below under (a).

$BE_{ST,y}$ Emissions for the production of steam that would be supplied to individual project customers in year 'y' in the baseline scenario (tCO$_2$). Calculated below under (b).

$BE_{GR,y}$ Emissions for the production of electricity that would be supplied to the grid in year 'y' in the baseline scenario (tCO$_2$). Calculated below (c).

(a) <u>Emissions for the production of electricity that would be supplied to individual project customers in year 'y' in the baseline scenario</u>

$$BE_{IC,y} = \sum_j \sum_i \left(EL_{BL,j,i,y} \cdot EEF_{BL,i,y} \right)$$ **(2)**

Where:

$EL_{BL,j,i,y}$ Electricity consumed by the project customer 'i' from the proposed project facility 'j' in year 'y' eligible to certified emissions reductions (MWh). Calculated below as per equation (3).

$EEF_{BL,i,y}$ Baseline CO$_2$ emission factor for electricity of the project customer 'i' in year 'y' (tCO$_2$/MWh). Calculated below as per equation (5).

The electricity eligible to certified emissions reductions is limited to the maximum generating capacity of the project customer existing previous to the implementation of the project activity as per equations below:

$$EL_{BL,j,i,y} = \min \left(EL_{PJ,j,i,y}, EL_{MG,i} - EL_{PCSG,i,y} \right)$$ **(3)**

Where:

$EL_{PJ,j,i,y}$ Electricity purchased by the project customer 'i' from the proposed project facility 'j' in year 'y' (MWh). Measured at the project facility and/or at the project customer.

$EL_{MG,i}$ Total historical capacity of electricity generation of equipment existing at project customer 'i' previous to the implementation of the project activity (MWh). Calculated below as per equation (4).

$EL_{PCSG,i,y}$ Total electricity self-generated by project customer 'i' during year 'y' of the crediting period (MWh). Measured at the project customer 'i'.

The maximum generation capacity of the pre-project electricity generating equipment at project customer is calculated as:

$$EL_{MG,i} = \frac{\sum\limits_{n} GC_{EL,i,n} \cdot (8760 - MDH_{EL,i,n})}{J_{EL,i,y}}$$ **(4)**

Where:

$GC_{EL,i,n}$ Nameplate capacity of the electricity generating equipment 'n' existing at the project customer 'i' previous to the implementation of the project activity (MW). Obtained from the project customer 'i'.

$MDH_{EL,i,n}$ Average maintenance and down time hour of the electricity generating equipment 'n' existing at the project customer 'i' previous to the implementation of the project activity (hour). Obtained from the project customer 'i'.

$J_{EL,i,y}$ Number of project facilities 'j' supplying the project customer 'i' with electricity in year 'y' simultaneously (number). Obtained from the project customer 'i'.

The baseline CO_2 emission factor for electricity of the project customer is calculated as:

$$EEF_{BL,i,y} = w_{SG,i} \cdot EF_{PC,SG,i,y} + w_{GR,i} \cdot EF_{PC,GR,i,y}$$ **(5)**

Where:

$w_{SG,i}$ Fraction of electricity consumed on-site by project customer 'i' in the baseline that is self-generated (fraction). Calculated below as per equation (6).

$w_{GR,i}$ Fraction of electricity consumed on-site by project customer 'i' in the baseline that is purchased in the grid (fraction). Calculated below as per equation (7).

$EF_{PC,SG,i,y}$ CO_2 emission factor for self-generated electricity of the project customer 'i' in year 'y' (tCO$_2$/MWh). Calculated below as per equation (8).

$EF_{PC,GR,i,y}$ CO_2 emission factor of the grid connected to the project customer 'i' in year 'y' (tCO$_2$/MWh). The emission factor is estimated using the procedure described in the latest version of approved consolidated methodology ACM0002 making $EF_{PC,GR,i,y} = EF_y$.

The fractions of electricity that is self-generated and that produced on-site are calculated as:

$$w_{SG,i} = \frac{\sum_k EL_{SG,i,k}}{EL_{TC,i}} \tag{6}$$

$$w_{GR,i} = \frac{EL_{GR,i}}{EL_{TC,i}} \tag{7}$$

Where:

$EL_{SG,i,k}$ Electricity self-generated by project customer 'i' with fuel 'k' during the most recent three years previous to the implementation of the project activity (MWh). Obtained from the project customer 'i'.

$EL_{GR,i}$ Total amount of electricity obtained from the grid by project customer 'i' during the most recent three years previous to the implementation of the project activity (MWh). Obtained from the project customer 'i'.

$EL_{TC,i}$ Total electricity consumption for project customer 'i' during the most recent three years previous to the implementation of the project activity (MWh). Obtained from the project customer 'i'.

The CO_2 emission factor for self-generated electricity of each project customer is:

$$EF_{PC,SG,i,y} = \frac{44}{12} \cdot \frac{\sum_k \left(CEF_{i,k} \cdot FC_{SG,i,k}\right)}{\sum_k EL_{SG,i,k}} \tag{8}$$

Where:

$CEF_{i,k}$ Carbon emission factor of fuel 'k' used by project customer 'i' to self-generate electricity in the baseline scenario (tC/TJ). Obtained from the project customer 'i' or technical literature.

$FC_{SG,i,k}$ Consumption of fuel 'k' by project customer 'i' to self-generate electricity in the baseline scenario, calculated as per equation below (TJ). Calculated below as per equation (9).

If data on fuel consumption in the baseline scenario is directly available at project customer 'i', then:

$$FC_{SG,i,k} = F_{SG,i,k} \cdot NCV_{i,k} \tag{9}$$

Where:

$F_{SG,i,k}$ Consumption of fuel 'k' by project customer 'i' to self-generate electricity during the most recent three years previous to the implementation of the project activity (mass or volume

units). Obtained from the project customer 'i'.

$NCV_{i,k}$ Net calorific value of fuel 'k' at project customer 'i' in the baseline scenario (TJ/mass or volume units). Obtained from the project customer 'i' or technical literature.

Otherwise, $FC_{SG,i,k}$ shall be calculated as:

$$FC_{SG,i,k} = \frac{EL_{SG,i,k}}{\eta_{SG,i,k}}$$
        (10)

Where:

$\eta_{SG,i,k}$ Fuel consumption rate of self-generation of electricity at project customer 'i', with fuel 'k', in the baseline scenario (MWh/TJ). This parameter shall be one of the following:

     i) Highest of the measured fuel consumption rate of electricity generating equipment with similar specifications; or,

     ii) Highest of the efficiency values provided by two or more manufacturers for electricity generating equipment with similar specifications; or,

     iii) Maximum efficiency of 100%, based on net calorific values of fuels.

(b) <u>Emissions for the production of steam that would be supplied to individual project customers in year 'y' in the baseline scenario</u>

It is assumed that steam is produced at constant temperature and pressure.

$$BE_{ST,y} = \sum_{j} \sum_{i} \left(SC_{BL,j,i,y} \cdot SEF_{BL,i,y} \right)$$
        (11)

Where:

$SC_{BL,j,i,y}$ Steam consumed by the project customer 'i' from the proposed project facility 'j' in year 'y' eligible to certified emissions reductions, calculated as per equation (12) below (TJ).

$SEF_{BL,i,y}$ Baseline CO_2 emission factor for steam of the project customer 'i' in year 'y' (tCO$_2$/TJ). Calculated below as per equation (15).

The steam eligible to certified emissions reductions is limited to the maximum generating capacity of the project customer existing previous to the implementation of the project activity:

$$SC_{BL,j,i,y} = \min \left(SC_{PJ,j,i,y}, SC_{MG,i} - SC_{PCSG,i,y} \right)$$
        (12)

Where:

$SC_{PJ,j,i,y}$ Steam purchased by the project customer 'i' from the proposed project facility 'j' in year 'y' (TJ). Calculated below as per equation (13).

$SC_{MG,i}$ Total historical capacity of steam generation of the equipment existing at project customer 'i' previous to the implementation of the project activity (TJ). Calculated below as per equation (14).

$SC_{PCSG,i,y}$ Total steam self-generated by project customer 'i' during year 'y' of the crediting period (MWh). Measured at the project customer 'i'.

The steam purchased by the project customer 'i' from the proposed project facility 'j' in year 'y' is calculated as:

$$SC_{PJ,j,i,y} = S_{PJ,j,i,y} \cdot EN_{PJ,i} \tag{13}$$

Where:

$S_{PJ,j,i,y}$ Steam purchased by the project customer 'i' from the proposed project facility 'j' in year 'y' (tonnes). Measured at the project facility 'j' and/or at the project customer 'i'.

$EN_{PJ,i}$ Specific enthalpy of the steam purchased by project customer 'i' (TJ/tonnes). This data shall be obtained from steam tables, using temperature and pressure of the steam purchased measured at the project customer 'i'.

The maximum generation capacity of steam of the pre-project generating equipment is calculated as:

$$SC_{MG,i} = \frac{\sum_m GC_{ST,i,m} \cdot (8760 - MDH_{ST,i,m}) \cdot EN_{BL,i,m}}{J_{ST,i,y}} \tag{14}$$

Where:

$GC_{ST,i,m}$ Nameplate capacity of the steam generating equipment 'm' existing at project customer 'i' previous to the implementation of the project activity (tonnes/hour). Obtained from the project customer 'i'.

$MDH_{ST,i,m}$ Normal maintenance and down time hour of the generation equipment 'm' existing at project customer 'i' previous to the implementation of the project activity (hour). Obtained from the project customer 'i'.

$EN_{BL,i,m}$ Specific enthalpy of steam of the pre-project generating equipment 'm' of project customer 'i' (TJ/tonnes). This data shall be obtained from steam tables, using temperature and pressure of the steam measured at the pre-project generating equipment of project customer 'i'.

$J_{ST,i,y}$ Number of project facilities 'j' supplying steam to the project customer 'i', in year 'y', simultaneously (number). Obtained from the project customer 'i'.

The baseline emission factor for self-generated steam $EF_{BL,ST,j,i,y}$ shall be calculated as:

$$SEF_{BL,i,y} = \frac{44}{12} \cdot \frac{\sum_k \left(CEF_{i,k} \cdot FC_{ST,i,k}\right)}{\sum_k HG_{ST,i,k}} \tag{15}$$

Where:

$CEF_{i,k}$ Carbon emission factor of fuel 'k' used by project customer 'i' to self-generate steam in the baseline scenario (tC/TJ). Obtained from the project customer 'i' or technical literature.

$FC_{ST,i,k}$ Consumption of fuel 'k' by project customer 'i' to self-generate steam in the baseline scenario (TJ), calculated as per equation below as per equation (17).

$HG_{ST,i,k}$ Steam self-generated by project customer 'i' with fuel 'k' in the baseline scenario (TJ). Calculated below as per equation (16).

The steam self-generated by project customer 'i' with fuel 'k' in the baseline scenario is:

$$HG_{ST,i,k} = H_{ST,i,k} \cdot EN_{BL,i} \tag{16}$$

Where:

$H_{ST,i,k}$ Steam self-generated by project customer 'i' with fuel 'k' during the most recent three years previous to the implementation of the project activity (tonnes). Obtained from the project customer 'i'.

The consumption of fuel 'k' by project customer 'i' to self-generate steam in the baseline scenario is calculated as:

$$FC_{ST,i,k} = F_{ST,i,k} \cdot NCV_{i.k} \tag{17}$$

Where:

$F_{ST,i,k}$ Amount of fuel 'k' used by project customer 'i' to self-generate steam during the most recent three years previous to the implementation of the project activity (mass or volume units). Obtained from the project customer 'i'.

$NCV_{i,k}$ Net calorific value of fuel 'k' at project customer 'i' in the baseline scenario (TJ/mass or volume units). Obtained from the project customer 'i' or technical literature.

Otherwise, $FC_{ST,i,k}$ shall be calculated as follows:

$$FC_{ST,i,k} = \frac{HG_{ST,i,k}}{\eta_{ST,i,k}} \tag{18}$$

Where:

$\eta_{ST,i,k}$ Fuel consumption rate of self-generation of steam at project customer 'i', with fuel 'k' (TJ/TJ). This parameter shall be one of the following:

    i) Highest of the measured fuel consumption rate of electricity generating equipment with similar specifications; or,

    ii) Highest of the efficiency values provided by two or more manufacturers for electricity generating equipment with similar specifications; or,

    iii) Maximum efficiency of 100%, based on net calorific values of fuels.

(c) Emissions for the production of electricity that would be supplied to the grid in year 'y' in the baseline scenario

$$BE_{GR,y} = \sum_{j} EL_{PF,GR,j,y} \cdot EF_{PF,GR,j,y} \tag{19}$$

Where:

$EL_{PF,GR,j,y}$ Electricity supplied to the grid and/or to distribution entities by the proposed project facility 'j' in year 'y' (MWh). Measured at the project facility 'j'.

$EF_{PF,GR,j,y}$ CO_2 emission factor for the grid electricity connected to the project facility 'j' and/or to the distribution entities in year 'y' (tCO$_2$/MWh). The emission factor is estimated using the procedure described in the latest version of approved consolidated methodology ACM0002 making $EF_{GR,PF,j,y} = EF_y$.

Project Emissions

The project activity emissions are calculated as:

$$PE_y = \frac{44}{12} \cdot \sum_{j} \sum_{k} \left(FC_{PJ,PF,j,k,y} \cdot NCV_{j,k} \cdot CEF_{j,k} \right) \tag{20}$$

Where:

PE_y Project activity emissions (tCO$_2$).

$FC_{PJ,PF,j,k,y}$ Quantity of fuel consumed (mass or volume units) per fuel type 'k' in the year 'y' in the project facilities 'j'. Measured at the project facility 'j'.

$NCV_{j,k}$ Net calorific value of fossil fuel 'k' used at the project facility 'j' during the crediting period (MJ/mass or volume units of fuel). Obtained from the project customer 'i' or technical literature.

$CEF_{j,k}$ Carbon emission factor of fuel 'k' used by project facility 'j' during year 'y' of the crediting period (tC/TJ). Obtained from the project facility 'j' or technical literature.

Leakage

Leakage may result from the extraction, processing, liquefaction, transportation, re-gasification and distribution of fossil fuels outside of the project boundary. This includes mainly fugitive CH_4 emissions and CO_2 emissions from associated fuel combustion and flaring. In this methodology, the following leakage emission sources shall be considered:

• Fugitive CH_4 emissions associated with the extraction, processing, liquefaction, transportation, re-gasification and distribution of fossil fuels used in the project plant and fossil fuels used in the grid in the absence of the project activity.

• In the case liquefied natural gas (LNG) is used in the project plant: CO_2 emissions from fuel combustion / electricity consumption associated with the liquefaction, transportation, re-gasification and compression into a natural gas transmission or distribution system.

Thus, leakage emissions are calculated as follows:

$$LE_y = LE_{CH4,y} + LE_{LNG,CO2,y} \tag{21}$$

Where:

LE_y Leakage emissions (tCO_2).

$LE_{CH4,y}$ Leakage emissions due to fugitive upstream CH_4 emissions in the year 'y' (tCO_2). Calculated below under (a).

$LE_{LNG,CO2,y}$ Leakage emissions due to fossil fuel combustion/electricity consumption associated with the liquefaction, transportation, re-gasification and compression of LNG into natural gas transmission or distribution system during the year 'y' of the crediting period (tCO_2). Calculated below under (b).

Note that to the extent that upstream emissions occur in Annex I countries that have ratified the Kyoto Protocol, from 1 January 2008 onwards, these emissions should be excluded, if technically possible, in the leakage calculations.

(a) Fugitive methane emissions

For the purpose of determining fugitive methane emissions associated with the production – and in case of natural gas, the transportation and distribution of the fuels – project participants should multiply the quantity of fuel consumed in the project facilities 'j' with a methane emission factor for these upstream emissions.

$$LE_{CH4,y} = \frac{44}{12} \cdot GWP_{CH4} \cdot \sum_j \sum_k \left(FC_{PJ,PF,j,k,y} \cdot NCV_{j,k} \cdot EF_{CH4,ups,k} \right) \tag{22}$$

Where:

GWP_{CH4} Global warming potential of CH_4 (tCO_2/tCH_4) valid for the commitment period. Obtained from IPCC.

$EF_{CH4,ups,k}$ Emission factor for upstream fugitive methane emissions from production, transportation and distribution of fuel 'k' (tCH_4/TJ). Obtained from the project facility 'j' or table below.

Where reliable and accurate national data on fugitive CH_4 emissions associated with the production, and in case of natural gas, the transportation and distribution of the fuels is available, project participants should use this data to determine average emission factors by dividing the total quantity of CH_4 emissions by the quantity of fuel produced or supplied respectively[3]. Where such data is not available, project participants may use the default values provided in Table 3 below. In this case, the fuel emission factor for the location of the project should be used, except in cases where it can be shown that the relevant system element (fuel

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[3] GHG inventory data reported to the UNFCCC as part of national communications can be used where country specific approaches (and not IPCC Tier 1 default values) have been used to estimate emissions.

production and/or processing/transmission/distribution) is predominantly of recent vintage and built and operated to international standards, in which case the US/Canada values may be used. Note that the emission factor for fugitive upstream emissions for natural gas should include fugitive emissions from production, processing, transport and distribution of natural gas, as indicated in the table below.

Table 3: Default emission factors for fugitive CH_4 upstream

Activity	Unit	Default emission factor	Reference for the underlying emission factor range in Volume 3 of the *1996 Revised IPCC Guidelines*
Coal			
Underground mining	t CH4 / kt coal	13.4	Equations 1 and 4, p. 1.105 and 1.110
Surface mining	t CH4 / kt coal	0.8	Equations 2 and 4, p.1.108 and 1.110
Oil			
Production	t CH4 / PJ	2.5	Tables 1-60 to 1-64, p. 1.129 - 1.131
Transport, refining and storage	t CH4 / PJ	1.6	Tables 1-60 to 1-64, p. 1.129 - 1.131
Total	t CH4 / PJ	4.1	
Natural gas			
USA and Canada			
Production	t CH4 / PJ	72	Table 1-60, p. 1.129
Processing, transport and distribution	t CH4 / PJ	88	Table 1-60, p. 1.129
Total	t CH4 / PJ	160	
Eastern Europe and former USSR			
Production	t CH4 / PJ	393	Table 1-61, p. 1.129
Processing, transport and distribution	t CH4 / PJ	528	Table 1-61, p. 1.129
Total	t CH4 / PJ	921	
Western Europe			
Production	t CH4 / PJ	21	Table 1-62, p. 1.130
Processing, transport and distribution	t CH4 / PJ	85	Table 1-62, p. 1.130
Total	t CH4 / PJ	105	
Other oil exporting countries / Rest of world			
Production	t CH4 / PJ	68	Table 1-63 and 1-64, p. 1.130 and 1.131
Processing, transport and distribution	t CH4 / PJ	228	Table 1-63 and 1-64, p. 1.130 and 1.131
Total	t CH4 / PJ	296	

Note: The emission factors in this table have been derived from IPCC default Tier 1 emission factors provided in Volume 3 of the 1996 Revised IPCC Guidelines, by calculating the average of the provided default emission factor range.

CO_2 emissions from LNG

Where applicable, CO_2 emissions from fuel combustion / electricity consumption associated with the liquefaction, transportation, re-gasification and compression of LNG into a natural gas transmission or distribution system should be estimated by multiplying the quantity of natural gas combusted in the project with an appropriate emission factor, as follows:

$$LE_{LNG,CO2,y} = \frac{44}{12} \cdot \sum_{j} \left(FC_{LNG,j,y} \cdot NCV_{j,LNG} \cdot EF_{CO2,ups,LNG} \right) \tag{23}$$

Where:

$FC_{LNG,j,y}$ Quantity of LNG consumed (mass or volume units) in the year 'y' in the project facilities 'j'. Measured at the project facility 'j'.

$NCV_{j,LNG}$ Net calorific value of LNG used at the project facility 'j' during the crediting period (MJ/mass or volume units of fuel). Obtained either at the project facility 'j' or from technical literature.

$EF_{CO2,ups,LNG}$ Emission factor for upstream CO_2 emissions due to fossil fuel combustion / electricity consumption associated with the liquefaction, transportation, re-gasification and compression of LNG into a natural gas transmission or distribution system. Where reliable and accurate data on upstream CO_2 emissions due to fossil fuel combustion / electricity consumption associated with the liquefaction, transportation, re-gasification and compression of LNG into a natural gas transmission or distribution system is available, project participants should use this data to determine an average emission factor. Where such data is not available, project participants may assume a default value of 6 tCO_2/TJ as a rough approximation[4] (tCO_2/TJ).

Emissions Reductions

The emissions reductions are calculated as:

$$ER_y = BE_y - PE_y - LE_y \tag{24}$$

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

No changes are required in the second or third crediting periods.

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[4] This value has been derived on data published for North American LNG systems. "Barclay, M. and N. Denton, 2005. Selecting offshore LNG process. http://www.fwc.com/publications/tech_papers/files/LNJ091105p34-36.pdf (10th April 2006)".

Data and parameters not monitored

Data/parameter:	$EL_{GR,i}$
Data unit:	MWh
Description:	Total amount of electricity obtained from the grid by project customer 'i' during the most recent three years previous to the implementation of the project activity. Obtained from the project customer 'i'.
Source of data:	Electricity data log available at project customer site.
Measurement procedures (if any):	Store information until 2 years after the end of the crediting period.
Any comment:	-

Data/parameter:	$EL_{SG,i,k}$
Data unit:	MWh
Description:	Electricity self-generated by project customer 'i' with fuel 'k' during the most recent three years previous to the implementation of the project activity. Obtained from the project customer 'i'.
Source of data:	Electricity data log available at project customer site.
Measurement procedures (if any):	Store information until 2 years after the end of the crediting period.
Any comment:	If a project customer has less than or equal to 100 kW of installed capacity of electricity generation previous to the implementation of the project activity and if this project customer do not have accurate metering of the electricity generated on-site (MWh), estimates can be used as long as they are transparent and appropriately calculated. The estimation shall rely on all possible available data such as operating hours, rated capacity, capacity factor, efficiency, etc., using company records and available data.

Data/parameter:	$EN_{BL,i}$ and $EN_{BL,i,m}$
Data unit:	TJ/tonnes
Description:	Specific enthalpy of steam of generating equipment existing at the project customer 'i' previous to the implementation of the project activity. This data shall be obtained from steam tables, using temperature and pressure of the steam measured at the pre-project generating equipment of project customer 'i'.
Source of data:	Steam tables
Measurement procedures (if any):	Use monitored pressure and temperature of the steam to obtain specific enthalpy from steam tables. Store information until 2 years after the end of the crediting period.
Any comment:	-

Data/parameter:	*Steam temperature*
Data unit:	°C
Description:	Temperature of steam purchased by project customer 'i'.
Source of data:	Temperature meters at project customer 'i'.
Measurement procedures (if any):	Read temperature meter daily and calculate monthly average. Store information until 2 years after the end of the crediting period.
Any comment:	-

Data/parameter:	*Steam pressure*
Data unit:	MPa
Description:	Pressure of steam purchased by project customer 'i'.
Source of data:	Pressure meters at project customer 'i'.
Measurement procedures (if any):	Read pressure meter daily and calculate monthly average. Store information until 2 years after the end of the crediting period.
Any comment:	-

Data/parameter:	$F_{SG,i,k}$
Data unit:	Mass or volume units
Description:	Consumption of fuel 'k' by project customer 'i' to self-generate electricity during the most recent three years previous to the implementation of the project activity. Obtained from the project customer 'i'.
Source of data:	Fuel data log/purchase receipts available at project customer site.
Measurement procedures (if any):	Store information until 2 years after the end of the crediting period.
Any comment:	-

Data/parameter:	$F_{ST,i,k}$
Data unit:	Mass or volume units
Description:	Consumption of fuel 'k' by project customer 'i' to self-generate steam during the most recent three years previous to the implementation of the project activity. Obtained from the project customer 'i'.
Source of data:	Fuel data log/purchase receipts available at project customer site.
Measurement procedures (if any):	Store information until 2 years after the end of the crediting period.
Any comment:	-

Data/parameter:	$GC_{EL,i,n}$
Data unit:	MW
Description:	Nameplate capacity of the electricity generating equipment 'n' existing at the project customer 'i' previous to the implementation of the project activity. Obtained from the project customer 'i'.
Source of data:	Equipment at project customer site.
Measurement procedures (if any):	Read nameplate capacity before project implementation. Store the information until 2 years after the end of the crediting period.
Any comment:	-

Data/parameter:	$GC_{ST,i,m}$
Data unit:	Tonnes/hour
Description:	Nameplate capacity of the steam generating equipment 'm' existing at the project customer 'i' previous to the implementation of the project activity. Obtained from the project customer 'i'.
Source of data:	Equipment at project customer site.

Measurement procedures (if any):	Read nameplate capacity before project implementation. Store the information until 2 years after the end of the crediting period.
Any comment:	-

Data/parameter:	$H_{ST,i,k}$
Data unit:	Tonnes
Description:	Steam self-generated by project customer 'i' with fuel 'k' during the most recent three years previous to the implementation of the project activity.
Source of data:	Steam data log available at project customer site.
Measurement procedures (if any):	Store information until 2 years after the end of the crediting period.
Any comment:	If a project customer has less than or equal to 5 MW of installed capacity of steam generation previous to the implementation of the project activity and if this project customer do not have accurate metering of the steam generated on-site (TJ), estimates can be used as long as they are transparent and appropriately calculated. The estimation shall rely on all possible available data such as operating hours, rated capacity, capacity factor, efficiency, etc., using company records and available data.

Data/parameter:	$MDH_{EL,i,n}$
Data unit:	Hour
Description:	Normal maintenance and down time hour of the electricity generating equipment 'n' existing at the project customer 'i' previous to the implementation of the project activity.
Source of data:	Maintenance data log available at project customer site.
Measurement procedures (if any):	Check maintenance data logs. Store information until 2 years after the end of the crediting period.
Any comment:	Check consistency with technical benchmarks and equipment manufacturer data.

Data/parameter:	$MDH_{ST,i,m}$
Data unit:	Hour
Description:	Normal maintenance and down time hour of the steam generating equipment 'm' existing at the project customer 'i' previous to the implementation of the project activity.
Source of data:	Maintenance data log available at project customer site.
Measurement procedures (if any):	Check maintenance data logs. Store information until 2 years after the end of the crediting period.
Any comment:	Check consistency with technical benchmarks and equipment manufacturer data.

Data/parameter:	$EL_{TC,i}$
Data unit:	MWh
Description:	Total electricity consumption for project customer 'i' during the most recent three years previous to the implementation of the project activity.
Source of data:	Electricity data log available at project customer site.
Measurement procedures (if any):	Store information until 2 years after the end of the crediting period.
Any comment:	-

Data/parameter:	$\eta_{SG,i,k}$
Data unit:	MWh/TJ
Description:	Fuel consumption rate of self-generation of electricity at project customer 'i', with fuel 'k', in the baseline scenario. This parameter shall be one of the following: i) Highest of the measured fuel consumption rate of electricity generating equipment with similar specifications; or, ii) Highest of the efficiency values provided by two or more manufacturers for electricity generating equipment with similar specifications; or, iii) Maximum efficiency of 100%, based on net calorific values of fuels.
Source of data:	Fuel and electricity data logs available at project customer site.
Measurement procedures (if any):	Store information until 2 years after the end of the crediting period.
Any comment:	-

Data/parameter:	$\eta_{ST,i,k}$
Data unit:	TJ/TJ
Description:	Fuel consumption rate of self-generation of steam at project customer 'i', with fuel 'k'. This parameter shall be one of the following: i) Highest of the measured fuel consumption rate of electricity generating equipment with similar specifications; or, ii) Highest of the efficiency values provided by two or more manufacturers for electricity generating equipment with similar specifications; or, iii) Maximum efficiency of 100%, based on net calorific values of fuels.
Source of data:	Fuel and steam data logs available at project customer site.
Measurement procedures (if any):	Store information until 2 years after the end of the crediting period.
Any comment:	-

III. MONITORING METHODOLOGY

Monitoring procedures

Data for carbon content of fuel sources may be taken from IPCC. In the event that more recent or accurate scientific studies are produced and approved by the UNFCCC these data shall be used.

Official electricity generation and transmission company statistics is used to determine the grid electricity coefficient. This data is gathered from the utilities, whether on the national, regional or local level, as appropriate.

Operational records are used for off grid-generation sources – from individual facilities. Meters and measurements are relatively simple and straightforward for determining total electricity generated and the amount of fuel used to generate the electricity.

It is assumed that the data provided for the electricity grid and from individual facilities are available and transparent, in order to calculate the carbon coefficient of the electricity and steam being displaced from self-generators by the project.

Vintage and spatial level of data: the data is gathered on a national or regional power grid level to determine the combined margin. Local data from the off-grid generator and steam producers is also used in the methodology. As for the vintage of the data, the project developer should try and get three years of data prior to project implementation to determine the baseline emissions factor. If this data is available, the project developer can use the average tCO_2/MWh for each off grid user over that period. If three years of data is not available, then the project developer must uses at least one complete year (two when it exists) and must demonstrate to the DOE that the data does not exist. This will predominately cover cases where the project developer is installing or upgrading meters and/or data collection systems as part of the project.

Non-representative data is included unless there is a major outlying event. Should the project developer wish to exclude non-representative data they must be able to document why this is removed and this should be approved during validation.

Uncertainty Assessment of Key Parameters/Conservative Nature of Values: two key assumptions for this methodology are (1) that the data provided for the electricity grid is available and transparent; and (2) the data will be available, accurate and transparent to calculate the carbon coefficient of the electricity and steam being displaced from self-generators by the project.

The project developer will have to ensure the completeness and accuracy of the data set during the baseline measurement year by installing, repairing, and calibrating meters as appropriate. Completeness/accuracy of data should be relatively easy to verify, and emissions reductions will not be included if the evidence does not demonstrate this point clearly. The project developer should obtain data on metering in the project and try and ascertain that the meter accuracy is 95% or greater – and that quality control procedures are in place to deal with defective meters and/or recalibrate them on a regular basis. The metering covered by this project include:

➢ Metering of steam and electricity generated by each project customer before the implementation of the project activity;

➢ Metering of electricity and steam purchased by each project customer from the proposed project facilities;

➢ Metering of fuel input used to generate steam and electricity at the project facilities;

➢ Metering of fuel input and electricity output of grid connected power plants to calculate the combined margin, as well as data to determine the daily dispatch-operating margin (OM), if this method for the OM is used.

The project customer shall be monitored to cross check the information provided on its future energy planning during the survey to identify the baseline scenario. When project customer continues using some fossil fuel during the crediting period, changes in fuel use by the project customers shall be monitored throughout the crediting period. The information shall be validated by the DOE both at the validation and verification stages. If a fuel switch is a legitimate technical option given the existing equipment, then the project developer should annually monitor parameters that would indicate a fuel switch is also a logistically feasible option.

When IPCC data is available, project proponents shall take into consideration that the Board agreed that the IPCC default values should be used only when country or project specific data are not available or difficult to obtain.

Data and parameters monitored

Data/parameter:	$CEF_{j,k}$
Data unit:	tC/TJ
Description:	Carbon emission factor of fuel 'k' used by project facility 'j' to self-generate electricity in the baseline scenario.
Source of data:	Obtained from the project customer 'i' / project facility 'j' or technical literature.
Measurement procedures (if any):	When IPCC data is available, project proponents shall take into consideration that the Board agreed that the IPCC default values should be used only when country or project specific data are not available or difficult to obtain.
Monitoring frequency:	-
QA/QC procedures:	-
Any comment:	-

Data/parameter:	$EF_{PC,GR,i,y}$
Data unit:	tCO_2/MWh
Description:	CO_2 emission factor of the grid connected to the project customer 'i' in year 'y'. The emission factor is estimated using the procedure described in the latest version of approved consolidated methodology ACM0002 making $EF_{PC,GR,i,y} = EF_y$.
Source of data:	As per ACM0002
Measurement procedures (if any):	As per ACM0002
Monitoring frequency:	As per ACM0002
QA/QC procedures:	As per ACM0002
Any comment:	-

Data/parameter:	$EF_{CH4,ups,k}$
Data unit:	tCH_4/TJ
Description:	Emission factor for upstream fugitive methane emissions from production, transportation and distribution of fuel 'k'.
Source of data:	Obtained from the project facility 'j' or table in the leakage section.
Measurement procedures (if any):	When IPCC data is available, project proponents shall take into consideration that the Board agreed that the IPCC default values should be used only when country or project specific data are not available or difficult to obtain.
Monitoring frequency:	-
QA/QC procedures:	-
Any comment:	-

Data/parameter:	$EF_{CO2,ups,LNG}$
Data unit:	tCO_2/TJ
Description:	Emission factor for upstream CO_2 emissions due to fossil fuel combustion / electricity consumption associated with the liquefaction, transportation, re-gasification and compression of LNG into a natural gas transmission or distribution system.
Source of data:	Where reliable and accurate data on upstream CO_2 emissions due to fossil fuel combustion / electricity consumption associated with the liquefaction, transportation, re-gasification and compression of LNG into a natural gas transmission or distribution system is available, project participants should use this data to determine an average emission factor. Where such data is not available, project participants may assume a default value of 6 tCO_2/TJ as a rough approximation[5].
Measurement procedures (if any):	When IPCC data is available, project proponents shall take into consideration that the Board agreed that the IPCC default values should be used only when country or project specific data are not available or difficult to obtain.
Monitoring frequency:	-
QA/QC procedures:	-
Any comment:	-

Data/parameter:	$EF_{PF,GR,j,y}$
Data unit:	tCO_2/MWh
Description:	CO_2 emission factor for the grid connected to the project facility 'j' in year 'y'.
Source of data:	The emission factor is estimated using the procedure described in the latest version of approved consolidated methodology ACM0002 making $EF_{PJ,GR,j,y} = EF_y$.
Measurement procedures (if any):	As per ACM0002
Monitoring frequency:	As per ACM0002
QA/QC procedures:	As per ACM0002
Any comment:	-

Data/parameter:	$EL_{PCSG,i,y}$
Data unit:	MWh
Description:	Total electricity self-generated by project customer 'i' during year 'y' of the crediting period (MWh). Measured at the project customer 'i'.
Source of data:	Electricity meter at the project customer 'i'.
Measurement procedures (if any):	Read electricity meter and store information until 2 years after the end of the crediting period.
Monitoring frequency:	Monthly

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[5] This value has been derived on data published for North American LNG systems. "Barclay, M. and N. Denton, 2005. Selecting offshore LNG process. http://www.fwc.com/publications/tech_papers/files/LNJ091105p34-36.pdf (10th April 2006)".

QA/QC procedures:	Meters shall be calibrated as per their data book. Measuring conditions shall be as per meters data book. Check consistency with historical monitored data. Crosscheck with purchase receipts and electricity supply data at project site.
Any comment:	-

Data/parameter:	$SC_{PCSG,i,y}$
Data unit:	TJ
Description:	Total steam self-generated by project customer 'i' during year 'y' of the crediting period (TJ). Measured at the project customer 'i'.
Source of data:	Steam meter at the project customer 'i'.
Measurement procedures (if any):	Read steam meter and store information until 2 years after the end of the crediting period.
Monitoring frequency:	Monthly
QA/QC procedures:	Meters shall be calibrated as per their data book. Measuring conditions shall be as per meters data book. Check consistency with historical monitored data. Crosscheck with purchase receipts and electricity supply data at project site.
Any comment:	-

Data/parameter:	$EL_{PF,GR,j,y}$
Data unit:	MWh
Description:	Electricity supplied to the grid by the proposed project facility 'j' in year 'y' (MWh/yr). Measured at the project facility 'j'.
Source of data:	Electricity meter at the project facility 'j'.
Measurement procedures (if any):	Read electricity meter and store information until 2 years after the end of the crediting period.
Monitoring frequency:	Monthly
QA/QC procedures:	Meters shall be calibrated as per their data book. Measuring conditions shall be as per meters data book. Check consistency with historical monitored data. Crosscheck with purchase receipts and electricity supply data at project site.
Any comment:	-

Data/parameter:	$EL_{PJ,j,i,y}$
Data unit:	MWh
Description:	Electricity purchased by the project customer 'i' from the proposed project facility 'j' in year 'y'.
Source of data:	Electricity meter at the project facility 'j' or the project customer.
Measurement procedures (if any):	Read electricity meter and store information until 2 years after the end of the crediting period.
Monitoring frequency:	Monthly
QA/QC procedures:	Meters shall be calibrated as per their data book.

	Measuring conditions shall be as per meters data book. Check consistency with historical monitored data. Crosscheck with purchase receipts and electricity supply data at project site.
Any comment:	-

Data/parameter:	$EN_{PJ,i}$
Data unit:	TJ/tonne
Description:	Specific enthalpy of the steam purchased by project customer 'i' (TJ/tonne). This data shall be obtained from steam tables, using temperature and pressure of the steam purchased measured at the project customer 'i'.
Source of data:	Steam tables
Measurement procedures (if any):	Use monitored pressure and temperature of the steam to obtain specific enthalpy from steam tables.
Monitoring frequency:	Monthly
QA/QC procedures:	Meters shall be calibrated as per their data book. Measuring conditions shall be as per meters data book. Check consistency with historical monitored data.
Any comment:	-

Data/parameter:	*Steam temperature*
Data unit:	°C
Description:	Temperature of steam purchased by project customer 'i'.
Source of data:	Temperature meters at project customer 'i'
Measurement procedures (if any):	Read temperature meter daily and calculate monthly average. Store information until 2 years after the end of the crediting period.
Monitoring frequency:	Daily measurements and monthly average.
QA/QC procedures:	Meters shall be calibrated as per their data book. Measuring conditions shall be as per meters data book. Check consistency with historical monitored data.
Any comment:	-

Data/parameter:	*Steam pressure*
Data unit:	MPa
Description:	Pressure of steam purchased by project customer 'i'.
Source of data:	Pressure meters at project customer 'i'
Measurement procedures (if any):	Read pressure meter daily and calculate monthly average. Store information until 2 years after the end of the crediting period.
Monitoring frequency:	Daily measurements and monthly average.
QA/QC procedures:	Meters shall be calibrated as per their data book. Measuring conditions shall be as per meters data book. Check consistency with historical monitored data.
Any comment:	-

Data/parameter:	$FC_{LNG,j,y}$
Data unit:	Tonnes or m^3
Description:	Quantity of LNG consumed in the year 'y' in the project facilities 'j'. Measured at the project facility 'j'.
Source of data:	Purchase records and fuel data logs.
Measurement procedures (if any):	Store information until 2 years after the end of the crediting period.
Monitoring frequency:	-
QA/QC procedures:	Meters shall be calibrated as per their data book. Measuring conditions shall be as per meters data book. Check consistency with historical monitored data.
Any comment:	-

Data/parameter:	$FC_{PJ,PF,j,k,y}$
Data unit:	Mass or volume units
Description:	Quantity of fuel consumed per fuel type 'k' in the year 'y' in the project facilities 'j'.
Source of data:	Measured at the project facility 'j' from purchase records and fuel data logs.
Measurement procedures (if any):	Store information until 2 years after the end of the crediting period.
Monitoring frequency:	-
QA/QC procedures:	Meters shall be calibrated as per their data book. Measuring conditions shall be as per meters data book. Check consistency with historical monitored data.
Any comment:	-

Data/parameter:	GWP_{CH4}
Data unit:	tCO_2/tCH_4
Description:	Global warming potential of CH_4 valid for the commitment period. Obtained from IPCC.
Source of data:	-
Measurement procedures (if any):	-

Monitoring frequency:	-
QA/QC procedures:	-
Any comment:	-

Data/parameter:	$J_{EL,i,y}$
Data unit:	Number
Description:	Number of project facilities supplying the project customer 'i' with electricity in year 'y' simultaneously. Obtained from the project customer 'i'.
Source of data:	Project customer 'i'.
Measurement procedures (if any):	Store information until 2 years after the end of the crediting period.
Monitoring frequency:	-
QA/QC procedures:	-
Any comment:	-

Data/parameter:	$J_{ST,i,y}$
Data unit:	Number
Description:	Number of project facilities supplying steam to the project customer 'i', in year 'y', simultaneously. Obtained from the project customer 'i'.
Source of data:	Project customer 'i'.
Measurement procedures (if any):	Store information until 2 years after the end of the crediting period.
Monitoring frequency:	-
QA/QC procedures:	-
Any comment:	-

Data/parameter:	$NCV_{j,k}$
Data unit:	TJ/mass or volume units
Description:	Net calorific value of fuel 'k' at project facility 'j'. Obtained from the project customer 'i' or technical literature.
Source of data:	When IPCC data is available, project proponents shall take into consideration that the Board agreed that the IPCC default values should be used only when country or project specific data are not available or difficult to obtain.
Measurement procedures (if any):	-
Monitoring frequency:	-
QA/QC procedures:	-
Any comment:	-

Data/parameter:	$NCV_{j,LNG}$
Data unit:	TJ/mass or volume units
Description:	Net calorific value of LNG used at the project facility 'j'. Obtained from the project facility 'j' or technical literature.
Source of data:	When IPCC data is available, project proponents shall take into consideration that the Board agreed that the IPCC default values should be used only when country or project specific data are not available or difficult to obtain.
Measurement procedures (if any):	-
Monitoring frequency:	-
QA/QC procedures:	-
Any comment:	-

Data/parameter:	$STT_{PU,j,i,y}$
Data unit:	Tonne
Description:	Steam purchased by the project customer 'i' from the proposed project facility 'j' in year 'y'.
Source of data:	Measured at the project facility 'j' and/or at the project customer 'i'.
Measurement procedures (if any):	Read steam meter and store information until 2 years after the end of the crediting period.
Monitoring frequency:	Monthly
QA/QC procedures:	Meters shall be calibrated as per their data book. Measuring conditions shall be as per meters data book. Check consistency with historical monitored data. Crosscheck with purchase receipts and steam supply data at project site.
Any comment:	-

Data monitored because of Baseline Scenario Selection/Additionality

Data/parameter:	*Future energy plans and investment plans*
Data unit:	
Description:	Modernization or investment plans outlining planned upgrades or replacement to any generating unit within the project boundaries.
Source of data:	
Measurement procedures (if any):	
Monitoring frequency:	
QA/QC procedures:	
Any comment:	