CLEAN DEVELOPMENT MECHANISM

CDM-MP68-A04

Draft Large-scale Methodology

AM0058: Introduction of a district heating system

Version 04.0

Sectoral scope(s): 01

United Nations
Framework Convention on
Climate Change

COVER NOTE

1. Procedural background

1. The revision of this methodology is carried out in response to the mandate from the Board at EB 82 (EB 82 report, annex 8; MAP project 223) to simplify and streamline methodologies and tools.

2. Purpose

2. The purpose of the draft revision is to simplify the baseline and additionality determination, the baseline emissions calculations and to expand the applicability to improve its usability.

3. Key issues and proposed solutions

3. It is clarified that the methodology is applicable to replacing isolated residential or commercial heating systems with a district heating by interconnecting these Independent Heating Systems (IHSs) and promoting centralized heat generation.

4. Efforts required for baseline and additionality demonstration are reduced as; baseline technology and fuel is now determined for IHSs for a cluster of consumers ; and additionality is now demonstrated for the district heating system at supply side, rather than for end-consumers.

5. Baseline determination is simplified, eliminating the household-level analysis, reducing the monitoring complexity.

6. Definitions are clarified for improved interpretation.

7. Due to the large extent of the revision, revised text is not marked.

4. Impacts

8. The revision, if approved, will expand the applicability of the methodology to allow, to a limited extent, the industrial consumers in addition to residential consumers to consume heat supplied by CDM project; and simplify the baseline emissions calculation and additionality demonstration.

5. Subsequent work and timelines

6. The methodology is recommended by the Meth Panel for consideration by the Board at its eighty-seventh meeting. No further work is envisaged.

7. Recommendations to the Board

9. The Meth Panel recommends that the Board approve this draft revised methodology, to be made effective at the time of the Board’s approval.

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1. Introduction

1. The following table describes the key elements of the methodology.

Table 1. Methodology key elements

Typical projects	Introduction of a district heating system supplying heat from a fossil fuel-fired power plant and/or by new centralised boilers. It replaces decentralised fossil fuel fired heat only boilers
Type of GHG emissions mitigation action	Energy efficiency: Displacement of fossil-fuel-based heat generation by utilization of heat extracted from a power plant and/or by a more efficient centralized fossil fuel fired boiler.

2. Scope, applicability, and entry into force

2.1. Scope

2. The methodology covers project activities which introduce a district heating system that utilises heat extracted from a local power plant and/or heat only boilers.

2.2. Applicability

3. The methodology is applicable to project activities introducing a district heating system to supply heat to residential and commercial consumers, where the heat comes from:

   (a) An existing grid connected thermal power plant with no steam extraction for heating purposes, other than that required for the operation of the power plant auxiliary systems, prior to the project activity; or

   (b) A new centralised heat only boiler(s)[1]; or

   (c) A combination of both (a) and (b).

4. The methodology is applicable under the following conditions:

   (a) Heat supplied to the district heating system is predominantly used for heating and/or hot tap water supply for residential and/or commercial users. At the most 20% of the heat may be supplied to other users, such as for industrial production processes;

   (b) For project activities in which a co-generation plant supplies heat to the district heating system:

      (i) The power plant is fossil fuel fired;

[1] For project activities dealing exclusively with boilers either by means of complete replacement or retrofit or fuel switch in the existing isolated heating system at the site of existing boilers, project proponents may use the approved methodology AM0056.

(ii) Only one type of fuel is used by the project's co-generation plant (a maximum of 1% of auxiliary fuel may be used for start-up.). The same type of fossil fuel is fired in the power plant in the baseline and project scenarios;

(iii) The project activity does not lead to an increase in the technical lifetime of the power plant and does not result in any major integrated production changes at the power plant, other than the modifications required for heat extraction for the district heating.

5. The methodology does not account for potential emission reductions resulting from a decrease in heat losses due to reductions in hot water/steam losses or from demand-side measures (e.g. insulation of buildings, use of thermostatic valves, behavioural changes due to billing practices). However project activities that include any of these components are still eligible to use the methodology.

6. In addition, the applicability conditions included in the tools referred to below shall apply.

7. The methodology is applicable only if the baseline scenario is no implementation of district heating system.

2.3. Entry into force

8. The date of entry into force is the date of the publication of the EB 87 meeting report on 27 November 2015.

3. Normative references

9. This baseline and monitoring methodology is based on the following proposed new methodology:

(a) NM0181-rev "Houma District Heating project, Shanxi Province, P.R.C.", prepared by COWI A/S, Energy Department, Denmark.

10. This baseline and monitoring methodology is also based on elements from the following approved baseline and monitoring methodologies:

(a) ACM0011 "Consolidated baseline methodology for fuel switching from coal and/or petroleum fuels to natural gas in existing power plants for electricity generation";

(b) AM0029 "Methodology for Grid Connected Electricity Generation Plants using Natural Gas";

(c) AM0044 "Energy efficiency improvement projects: boiler rehabilitation or replacement in industrial and district heating sector".

11. The methodology also refers to the latest approved version of the following tools:

(a) "Combined tool to identify the baseline scenario and demonstrate additionality";

(b) "Tool to calculate the emission factor for an electricity system";

(c) "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion";

(d) "Tool to determine the remaining lifetime of equipment";

(e) Methodological tool “Determining the baseline efficiency of thermal or electric energy generation systems”;

(f) Methodological tool “Upstream leakage emissions associated with fossil fuel use”.

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

3.1. Selected approach from paragraph 48 of the CDM modalities and procedures

13. “Emissions from a technology that represents an economically attractive course of action, taking into account barriers to investment”

4. Definitions

14. The definitions contained in the Glossary of CDM terms shall apply.

15. Furthermore, for the purpose of this methodology, the following definitions apply:

(a) **District heating** - A system for distributing centrally generated heat to residential and commercial users. A district heating supplies heat to a significant area, i.e. a neighbourhood or a city;

(b) **Isolated heating system (IHS)** - A heat network which provides heat to several users and is not connected to a district heating system (i.e. a boiler house). The IHS existed before the start of the project activity, and its area includes users it provides heat to, as well as users in buildings built after the start of the project activity either next to or in place of a demolished building connected to the heat network;

(c) **Sub-station** - a heat distribution node of the project’s district heating;

(d) **User** - A heat consumer that is either residential or commercial. Existing users are users which received heat from an IHS prior to the implementation of the project activity, or replace such a user (such in the case of house demolition and new construction). New users did not, and would have had, for example, a household level heating, or are in newly established residential areas.

5. Baseline methodology

5.1. Project boundary

16. The physical delineation of the project boundary includes:

(a) For project activities in which a power plant supplies heat to the district heating network, the site of the power plant, including the heat extraction unit(s) and all interrelated production units to account for emissions resulting from changes in power generation and consumption due to the project activity;

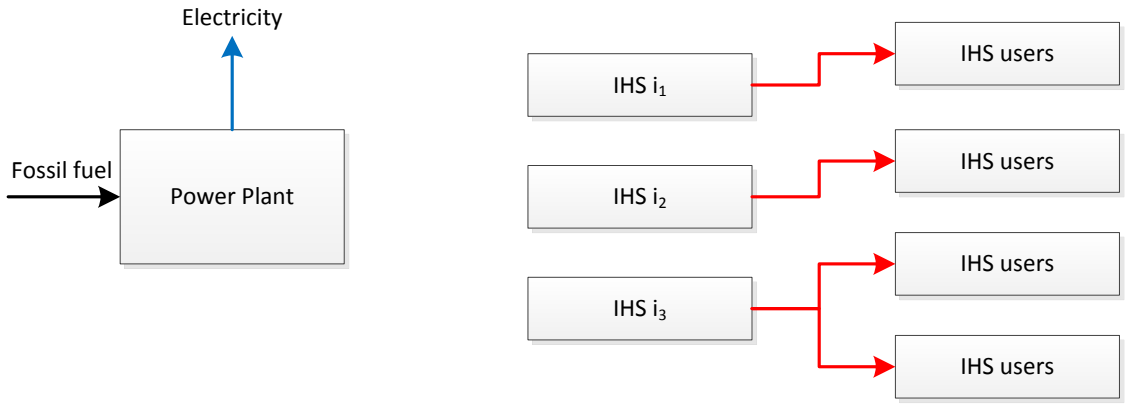
(b) The heat-only boilers that supply heat to the district heating system;

(c) The district heating system, including pipes, sub-stations and buildings that are or will be connected to the district heating system.

17. Figure 1 below illustrates how the project boundary is defined and where the points to measure heat supplied to buildings (Q_e *and* Q_n) should be located.

Figure 1. Pre-project and project diagram

Pre-project scenario:



Project scenario:

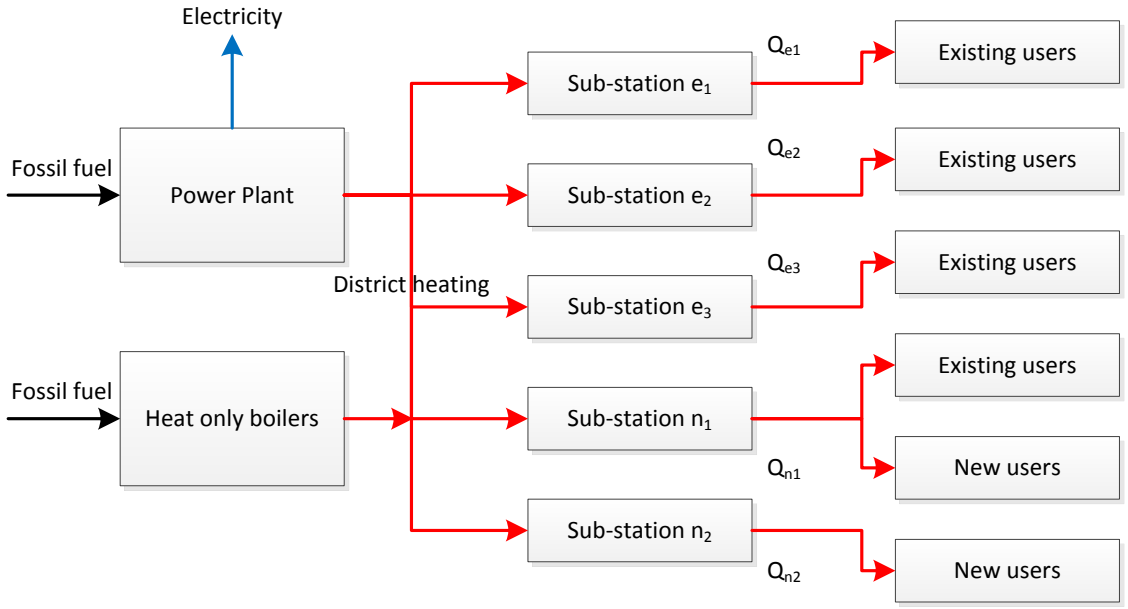


Table 2. Emission sources included in or excluded from the project boundary

Source		Gas	Included	Justification/Explanation
Baseline	Fossil fuel consumption for electricity production	CO_2	Yes	Major emission source
		CH_4	No	Excluded for simplification. This is conservative
		N_2O	No	Excluded for simplification. This is conservative
	Fossil fuel consumption in boiler houses for heat supply	CO_2	Yes	Major emission source
		CH_4	No	Excluded for simplification. This is conservative
		N_2O	No	Excluded for simplification. This is conservative
Project activity	Fossil fuel consumption for generation of heat and electricity	CO_2	Yes	Major emission source
		CH_4	No	Minor emission source. Excluded for simplification
		N_2O	No	Minor emission source. Excluded for simplification
	Fossil fuel consumption in heat-only boilers that supply heat to the district heating system	CO_2	Yes	Major emission source
		CH_4	No	Minor emission source. Excluded for simplification
		N_2O	No	Minor emission source. Excluded for simplification

5.2. Demonstration of additionality

18. Project proponents shall determine the baseline and demonstrate additionality following the procedure for investment comparison analysis in the "Combined tool to identify the baseline scenario and demonstrate additionality". The additionality shall be demonstrated for the investor in the project (the project proponent).

19. For the investment analysis, realistic baseline scenarios shall be compared. These could include:

    (a) No implementation of district heating system (continuation of current practice);

    (b) Implementation of district heating system supplied only by new centralised heat-only boilers, considering the various available fuels;

    (c) Implementation of district heating system supplied by heat extraction from a power plant, and additional heat from new centralised heat-only boilers, considering the various available fuels.

20. When conducting investment analysis, project proponents shall explicitly state the following parameters:

    (a) Investment requirements (including break-up into major equipment costs, required construction work, and installation);

    (b) Current price of each relevant fuel. Probable range of future fuel prices for the sensitivity analysis has to be substantiated by a public and official publication

from a governmental body or an intergovernmental institution. If such publications are not available, highlight the key logical assumptions and quantitative factors for determining the value chain of each fuel (e.g. international market price, transport costs, level of taxes/subsidies, local price). State clearly which assumptions and factors have significant uncertainty associated with them, and include these uncertainties in the sensitivity analysis of the "investment analysis";

(c) Decreased revenues from decrease in electricity exported to the grid;

(d) Changes in operating costs (including handling/treatment costs for fuel);

(e) Changes in the operation and maintenance costs, e.g. of slag and ash disposal, environmental pollution fees etc.;

(f) The calculation should be done taking into account the residual value of the new equipment at the end of the lifetime of the project activity, determined by the "Tool to determine the remaining lifetime of equipment";

(g) Revenues from sell of heat to users and industrial consumers. Information used for the selling price of heat in the financial analysis to demonstrate additionality should be consistent with the price used in feasibility studies or other documentation used to obtain project finance.

21. If the sensitivity analysis is not conclusive, identify the alternative with the lowest emissions (i.e. the most conservative) to be the most plausible baseline scenario.

22. The methodology is applicable only if the most plausible baseline scenario is "no implementation of primary district heating system (continuation of current practice)".

5.3. Baseline emissions

23. The baseline emissions include emissions from fossil fuels fired for the production of heat and emissions from the generation of electricity.

$$BE_y = BE_{HG,y} + BE_{EL,y}$$ Equation (1)

Where:

BE_y	=	Baseline emissions during the year y, (tCO2e)
$BE_{HG,y}$	=	Baseline emissions from the generation of heat during the year y, (tCO2e)
$BE_{EL,y}$	=	Baseline emissions from the generation of electricity during the year y, (tCO2e)

24. The baseline emissions from the generation of electricity only need to be determined for projects that involve heat extraction from an existing power plant.

25. For the estimation of baseline emissions from the generation of heat the following stepwise approach should be applied.

5.3.1. Baseline emissions from heat generation

26. The baseline for existing sub-stations shall be calculated based on their weighted average and the baseline for the new sub-stations shall be calculated based on a benchmark approach taking into account similar IHSs in the project boundary.

27. Baseline emissions from heat generation are estimated as follows:

$$BE_{HG,y} = \sum_{e} Q_{e,y} \times EF_{BL,HG,e} + \sum_{n} Q_{n,y} \times EF_{BL,HG,n} \quad \text{Equation (2)}$$

Where:

$BE_{HG,y}$	=	Baseline emissions from the generation of heat during the year y, (tCO2e)
$Q_{e,y}$	=	Quantity of heat supplied by sub-station e in the year y, (GJ)
$Q_{n,y}$	=	Quantity of heat supplied by sub-station n in the year y, (GJ)
$EF_{BL,HG,e}$	=	CO2 emission factor for heat generation in the baseline associated with sub-station e (tCO2/GJ)
$EF_{BL,HG,n}$	=	CO2 emission factor for heat generation in the baseline associated with sub-station n (tCO2/GJ)
e	=	Set of sub-stations supplying heat to existing users
n	=	Set of sub-stations supplying heat to new users

5.3.2. CO_2 emission factor for heat supply in the baseline

28. Two values for CO_2 emission factor for the heat generation in the baseline shall be determined:

    (a) For sub-stations which supply heat only to existing users, $EF_{BL,HG,e}$ shall be used. It may also be applied to new users that replace existing users, such in the case of building demolition and reconstruction, or a new building adjacent to an existing user, so that it could have received heat from a same IHS;

    (b) For all other sub-stations, $EF_{BL,HG,n}$ shall be used.

29. To determine the CO_2 emission factors, a census or survey of the IHSs shall be conducted. The following factors may influence the CO_2 emission factor:

    (a) The efficiency of the identified baseline boiler technology ($\varepsilon_{HG,BL,i}$);

    (b) The fuel type identified as baseline fuel type and respectively the CO_2 emission factor of this fuel ($COEF_{BL,HG,i}$).

5.3.2.1. Emission factor for existing users

30. $EF_{BL,HG,e}$ shall be determined as follows:

$$EF_{BL,HG,e} = Average_i \left(\frac{COEF_{BL,HG,i}}{\varepsilon_{BL,HG,i}} \right) \quad \text{Equation (3)}$$

Where:

$EF_{BL,HG,e}$	=	CO_2 emission factor for heat generation in the baseline associated with sub-station e (tCO_2/GJ)
$COEF_{BL,HG,i}$	=	CO_2 emission factor of the fossil fuel used in IHS i, (tCO_2/GJ)
$\varepsilon_{BL,HG,i}$	=	Energy efficiency of the heat generation in IHS i
i	=	All IHSs existing prior to the implementation of the project activity

5.3.2.2. Emission factor of fuel(s) used

31. Project participants shall determine $COEF_{BL,HG,i}$ for the fuel type used by IHS *i*.

5.3.2.3. Efficiency of heat generation in IHSs

32. The efficiency of the heat generation in IHS *i* shall be determined using a procedure or a default value from "Tool to determine the baseline efficiency of thermal or electric energy generation systems".

5.3.2.4. Emission factor for new users

33. $EF_{BL,HG,n}$ shall be determined according to one of the following options:

(a) Instead of all IHSs *i*, the subset (denoted *j)* of IHSs constructed or refurbished in the project boundary in the 5 years prior to the start of the project activity shall be used, provided that:

(i) Their performance is in the top 20 per-cent in terms of specific CO_2 emissions ($COEF_{BL,HG}/\varepsilon_{BL,HG}$);

(ii) At least five such IHSs are identified;

$$EF_{BL,HG,n} = Average_j \left(\frac{COEF_{BL,HG,j}}{\varepsilon_{BL,HG,j}} \right) \quad \text{Equation (4)}$$

Where:

$EF_{BL,HG,n}$	=	CO_2 emission factor for heat generation in the baseline associated with sub-station n (tCO_2/GJ)
$COEF_{BL,HG,j}$	=	CO_2 emission factor of the fossil fuel used in IHS j constructed or refurbished in the 5 years prior to the start of the project activity, (tCO_2/GJ)
$\varepsilon_{BL,HG,j}$	=	Energy efficiency of the heat generation in IHS j constructed or refurbished in the 5 years prior to the start of the project activity

j = IHSs constructed or refurbished in the 5 years prior to the start of the project activity

(b) A conservative default emission factor shall be calculated, taking the available fuel with lowest emission factor and conservative default efficiency from the methodological tool "Determining the baseline efficiency of thermal or electric energy generation systems".

5.3.2.5. Guidance for survey plan

34. Project participants wishing to calculate the CO_2 emission factor for heat supply in the baseline using a survey of the IHSs *j* shall follow the guidance in the "Standard for sampling and surveys for CDM project activities and programme of activities" ensuring that:

(a) The sampling of IHSs is random;

(b) If appropriate to the project circumstances, the survey is stratified according to:

(i) Residential/commercial users; and

(ii) Construction type;

(c) Project proponents may introduce a bias in the sampling process in order to include more IHSs constructed or refurbished in the 5 years prior to the start of the project activity, and consequently to comply with the requirements in paragraph 33. If this is done, the bias must be documented and negated during the calculations of $EF_{BL,HG,e}$.

5.3.3. Baseline emissions from the power generation

35. The *ex post* calculation of baseline emissions from the power generation is based on the actual monitored electricity generated and supplied to the grid in the project activity and limited by the maximum historic annual amount of electricity generated over the three most recent years prior to the start of implementation of project activity:

$$BE_{EL,y} = min\{EG_{max,hist}; EG_{PA,y}\} \times EF_{BL,EL} \quad \text{Equation (5)}$$

Where:

$BE_{EL,y}$ = Baseline emissions from the generation of electricity during the year y, (tCO2e)

$EF_{BL,EL}$ = Baseline emission factor for the electricity generation, (tCO2/MWh)

$EG_{PA,y}$ = Monitored actual quantity of electricity supplied to the grid in the year y, (MWh)

$EG_{max,hist}$ = Maximum historic annual amount of electricity supplied to the grid over the three most recent years prior to the start of the project activity, (MWh)

$$EF_{BL,EL} = \frac{3.6}{1000} \times \frac{EF_{FF,BL,EL}}{NCV_{FF,BL,EL} \times \eta_{BL,EL}}$$ Equation (6)

Where:

$EF_{FF,BL,EL}$ = CO2 emission factor for the fossil fuel fired in the power plant, (tCO2/mass or volume unit)

$NCV_{FF,BL,EL}$ = Net calorific value of fossil fuel fired in the power plant (TJ/mass or volume unit)

$\eta_{BL,EL}$ = Efficiency of the power plant

36. Energy efficiency of the power plant (without heat extraction) prior to the start of the project activity ($\eta_{BL,EL}$) can be either measured according to the manufacturers' procedures to measure efficiency at the commissioning of the plant; or taken from the manufacturer's specification of efficiency at optimum load.

37. The values determined for $\eta_{BL,EL}$ should be documented in the CDM-PDD and shall in general remain fixed throughout the crediting period. However, if during the crediting period a technical measure is taken to improve efficiency of the project power plant and the efficiency increases by x percentage point, then the efficiency of the baseline power plant $\eta_{BL,EL}$ should also be increased by the same x percentage point.

5.4. Project emissions

38. Project emissions PE_y comprise:

(a) CO_2 emissions from fossil fuel combustion associated with the production of heat and electricity in the co-generation plant;

(b) CO_2 emissions from fossil fuel combustion in heat-only boilers.

39. These project emissions are calculated using the latest approved version of the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion", where the process *j* corresponds to (a) combustion of fossil fuel at the co-generation plant and (b) combustion of fossil fuel at the heat-only boilers respectively. PE_y will be estimated as $\Sigma_j PE_{FC,j,y}$ where $PE_{FC,j,y}$ is calculated as per the tool.

5.5. Leakage

40. Leakage emissions are calculated as follows:

$$LE_y = LE_{EL,y} + LE_{FS,y}$$ Equation (7)

Where:

LE_y = Leakage emissions in the year y, (tCO_2e)

$LE_{EL,y}$ = Leakage emissions from the decrease in the electricity supply to the grid during the year y, (tCO_2e)

$LE_{FS,y}$ = Leakage emissions from fuel switch during the year y, (tCO_2e)

5.5.1. Leakage due to decrease in electricity supply to the grid from the power plant

41. The decrease in the electricity supply to the grid, as a consequence of the project activity may result in an increase in the electricity supply from other power plants connected to the grid and their related emissions. In this case, leakage emissions are to be accounted for as per the equation below:

$$LE_{EL,y} = max\left(\left(EG_{min,hist} - EG_{PA,y}\right), 0\right) \times max\left(\left(EF_{grid} - EF_{BL,EL}\right), 0\right) \quad \text{Equation (8)}$$

Where:

$LE_{EL,y}$	=	Leakage emissions from the decrease in the electricity supply to the grid during the year y, (tCO2e)
$EG_{min,hist}$	=	Minimum historic annual amount of electricity supplied to the grid over the three most recent years prior to the start of the project activity, (MWh)
$EG_{PA,y}$	=	Monitored actual quantity of electricity supplied by the project activity to the grid in the year y, (MWh)
EF_{grid}	=	Emission factor of the electricity grid system (tCO2/MWh)
$EF_{BL,EL}$	=	Baseline emission factor for the electricity production, as calculated in the baseline emissions section (tCO2/MWh)

42. The EF_{grid} is to be calculated using the latest version of the "Tool to calculate the emission factor for an electricity system".

5.5.2. Leakage due to fuel switch

43. No calculation of leakage effect is required for project activities using the same fossil fuel type in the project activity (power plant and centralized boiler) and in the heat-only boilers of baseline scenario.

44. In cases, where the fuel used in the project activity and IHSs in baseline scenario are different, upstream emissions associated with the production, processing, transportation and distribution of fossil fuels may be significant and are considered as part of leakage emissions $LE_{FS,y}$ to be estimated applying the latest version of the methodological tool "Upstream leakage emissions associated with fossil fuel use".

5.6. Emission Reductions

45. Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y \quad \text{Equation (9)}$$

Where:

ER_y	=	Emission reductions due to the project activity during the year y, (tCO_2e)
BE_y	=	Baseline emissions during the year y, (tCO_2e)
PE_y	=	Project emissions during the year y, (tCO_2e)
LE_y	=	Leakage emissions in the year y, (tCO_2e)

5.7. Data and parameters not monitored

46. 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 table 1.

Data / Parameter:	$EG_{max,hist}$
Data unit:	MWh
Description:	Maximum annual amount of electricity supplied by the power plant to the grid prior to the start of the project activity
Source of data:	Historic electricity generation data of last 3 years before project implementation
Measurement procedures (if any):	–
Any comment:	-

Data / Parameter table 2.

Data / Parameter:	$EG_{min,hist}$
Data unit:	MWh
Description:	Minimum annual amount of electricity supplied by the power plant to the grid prior to the start of the project activity
Source of data:	Historic electricity generation data of last 3 years before project implementation
Measurement procedures (if any):	–
Any comment:	-

Data / Parameter table 3.

Data / Parameter:	$COEF_{BL,HG,j}$
Data unit:	t CO_2/GJ fuel
Description:	CO_2 emission factor of the fossil fuel used in IHS *j*
Source of data:	The following data sources may be used if the relevant conditions apply:

Data sources	**Condition for using the data sources**
(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) and (b) are not available
(d) IPCC default average values as provided in table 1.4 of Chapter 1 of vol. 2 (Energy) of 2006 IPCC Guidelines on National GHG Inventories	If other options are not available

Measurement procedures (if any):	Once during the first year of the project For (a) and (b) measurements should be undertaken in line with national or international fuel standards
Any comment:	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 table 4.

Data / Parameter:	$\varepsilon_{BL,HG,j}$
Data unit:	%
Description:	Energy efficiency of the heat generation in IHS *j*
Source of data:	Conduct a representative number of sample measurements of $\varepsilon_{BL,HG}$ for categories of similar boiler types (e.g. for new coal-fired boilers) at the project site prior to the implementation of the project activity or at other sites with comparable circumstances
Measurement procedures (if any):	*Sample measurement* Use recognized standards for the measurement of the boiler efficiency, such as the "*British Standard Methods for Assessing the thermal performance of boilers for steam, hot water and high temperature heat transfer fluids*" (BS845). Where possible, use preferably the direct method (dividing the net heat generation by the energy content of the fuels fired during a representative time period), as it is better able to reflect average efficiencies during a representative time period compared to the indirect method (determination of fuel supply or heat generation and estimation of the losses). Document measurement procedures and results and manufacturer's information transparently in the CDM-PDD.
Any comment:	Alternatively, project proponents may use manufacturer data or default values as presented in the methodological tool "Determining the baseline efficiency of thermal or electric energy generation systems". All efficiencies are on NCV basis. Project proponents may propose to get the parameter's value through a survey following the methodological standard "Sampling and surveys for CDM project activities and programme of activities".

Data / Parameter table 5.

Data / Parameter:	$EF_{FF,BL,EL}$
Data unit:	t C/mass or volume unit
Description:	CO_2 emission factor for the fossil fuel fired in the power plant

Source of data:	The following data sources may be used if the relevant conditions apply: Data source: (a) Values provided by the fuel supplier in invoices — Conditions for using the data source: This is the preferred source (b) Measurements by the project participants — If (a) is not available (c) Regional or national default values — If (a) and (b) are not available (d) 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 — If other options are not available
Measurement procedures (if any):	For (a) and (b): Measurements should be undertaken in line with national or international fuel standards. 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
Any comment:	Fixed as part of first monitoring period

Data / Parameter table 6.

Data / Parameter:	$NCV_{FF,BL,EL}$
Data unit:	TJ/mass or volume unit
Description:	Net calorific value of fossil fuel fired in the power plant used prior to the start of the implementation of the project activity
Source of data:	Preferably specifications from fuel supplier or use accurate and reliable local or national data where available
Measurement procedures (if any):	Use mass or volume meters
Any comment:	Where such local or national data are not available, IPCC default emission factors (country-specific, if available) may be used if they are deemed to reasonably represent local circumstances. Note that IPCC default values are provided in the unit of TJ/Gg. To convert from mass to volume unit, the density of the fuel should be determined in accordance with the options and relevant conditions provided in the latest approved version of the "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion".

Data / Parameter table 7.

Data / Parameter:	***Subscripts e, n***
Data unit:	-
Description:	Sub-stations supplying heat to existing/new users

Source of data:	The responsible heat or urban planning authority and the maps or schematic-plan diagrams of the district heating system obtained at the district heating company. The differentiation between e and n substation is explained in paragraph 28
Measurement procedures (if any):	-
Any comment:	Data shall be stored in a database/excel sheet and checked during first monitoring report.

Data / Parameter table 8.

Data / Parameter:	$\eta_{BL,EL}$
Data unit:	%
Description:	Efficiency of the power plant used prior to the start of the implementation of the project activity
Source of data:	-
Measurement procedures (if any):	Can be either measured according to the manufacturers' procedures to measure efficiency at the commissioning or the plant; or taken from the manufacturer's specification of efficiency at optimum load
Any comment:	Shall in general remain fixed throughout the crediting period. However, if during the crediting period a technical measure is taken to improve efficiency of the project power plant and the efficiency increases by x%, then the efficiency of the baseline power plant $\eta_{BL,EL}$ should also be increased by the same x%. Efficiency is on NCV basis.

6. Monitoring methodology

6.1. Monitoring procedures

47. Monitoring includes the monitoring of parameters used for calculation of both baseline emissions and project emissions.

48. All heat supplied to final consumers should be measured at each sub-station as part of the monitoring plan. For each sub-station, the quantity of heat supplied should be measured continuously. If points of heat measurement are changed (e.g. due to a change in the heating network) or added during the crediting period (e.g. due to the construction of new buildings within the project boundary), this should be documented transparently in the CDM-PDD and the monitoring reports.

49. All monitored data should be recorded in an electronic database (e.g. Excel sheets) with specifications of the points of measurement, the variable name and description, the corresponding value and unit as well as the time of measurement, the period for which the measurement is valid and the persons who are responsible for making the measurements and carrying out the records. An extract of the complete database shall be included in each monitoring report.

50. Data to be monitored for determination of the baseline emissions:

    (a) The quantity of heat supplied by the district heating system during each year for each point of heat measurement: For that purpose meters should be installed at

all points of heat measurement (sub-stations). The corresponding heat delivery has to be measured continuously and recorded at least annually. The meter readings should be documented in the above-mentioned database. The meter readings have to be crosschecked against the meter readings of the heat extracted from the power plant as well as against fuel consumption and heat invoices to ensure that the heat records are plausible and reliable. Moreover, the corresponding meters have to be subject to regular maintenance and calibration in order to ensure measurements with a low degree of uncertainty;

(b) Amount of electricity generated in project activity.

51. Data to be monitored for determination of the project emissions:

(a) For parameters to be monitored for the calculation of project emissions please refer to the latest approved version of the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion".

(b) Monitoring requirements for some parameters are described below.

Data / Parameter table 9.

Data / Parameter:	**Status of the district heating system and capacity**
Data unit:	Number of sub-stations and corresponding MW heat
Description:	Dates of commissioning and status of rated capacity of boilers
Source of data:	The responsible heat or urban planning authority and the maps or schematic-plan diagrams of the district heating system obtained at the district heating company
Measurement procedures (if any):	Maps or schematic-plan diagrams of the district heating system should be updated on the basis of information from boiler supplier, manufacturers specification or catalogue references and SCADA systems
Monitoring frequency:	Recorded at start of the project and whenever the newly installed sub-stations start producing thermal energy
QA/QC procedures:	Data gathered monthly to establish starting date for each sub-station and monthly status of the scope of the district heating system
Any comment:	-

Data / Parameter table 10.

Data / Parameter:	$Q_{extracted,y}$
Data unit:	GJ
Description:	Quantity of heat extracted/recovered from the power plant during the year *y*
Source of data:	Heat meter at supply side of heat exchanger
Measurement procedures (if any):	Hourly measurement of in- and out flow temperatures and water flow in m^3
Monitoring frequency:	Hourly measurements, registered for the project at least on an annual basis

QA/QC procedures:	The meter readings should be crosschecked against the meter readings of the point of heat supply as well as against heat invoices to district heating company to ensure that the heat records are plausible and reliable. Moreover, the corresponding meters have to be subject to regular maintenance in order to ensure measurements with a low degree of uncertainty. Data to be stored electronically (database)
Any comment:	-

Data / Parameter table 11.

Data / Parameter:	$Q_{HOB,y}$
Data unit:	GJ
Description:	Quantity of heat extracted from all heat only/peak load boilers during the year *y*
Source of data:	Heat meter at supply side of any heat only boiler or peak load boiler
Measurement procedures (if any):	Hourly measurement of in- and out flow temperatures and water flow in m^3
Monitoring frequency:	Hourly measurements, registered for the project at least on an annual basis
QA/QC procedures:	The meter readings should be cross-checked against the meter readings of the point of heat supply as well as against heat invoices to district heating company to ensure that the heat records are plausible and reliable. Moreover, the corresponding meters have to be subject to regular maintenance in order to ensure measurements with a low degree of uncertainty. Data to be stored electronically (database)
Any comment:	-

Data / Parameter table 12.

Data / Parameter:	$Q_{e,y}$ / $Q_{n,y}$
Data unit:	GJ
Description:	Quantity of heat supplied by sub-station *e/n*
Source of data:	On site measurements of heat meter at sub station
Measurement procedures (if any):	Hourly measurement of in- and out flow temperatures and water flow in m^3
Monitoring frequency:	Hourly measurements, registered for the project at least on an annual basis
QA/QC procedures:	The meter readings should be cross-checked against the meter readings of the heat extracted from the power plant ($Q_{extracted,y}$) and generated in heat only boilers ($Q_{HOB,y}$) as well as against heat invoices to ensure that the heat records are plausible and reliable. Moreover, the corresponding meters have to be subject to regular maintenance in order to ensure measurements with a low degree of uncertainty. Data to be stored electronically (database).
Any comment:	All heat supplied to final consumers (excluding industrial consumers) should be measured at sub-stations *e/n* as part of the monitoring plan. For this purpose, each sub-station should have a unique identifier.

Data / Parameter table 13.

Data / Parameter:	$EG_{PA,y}$
Data unit:	MWh
Description:	Actual quantity of electricity supplied to the grid in the year *y*
Source of data:	Electricity meter
Measurement procedures (if any):	-
Monitoring frequency:	Continuous
QA/QC procedures:	-
Any comment:	-

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Document information

Version	*Date*	*Description*
04.0	23 October 2015	MP 68, Annex 4 To be considered by the Board at EB87. This draft methodology was available for public input from 10 July to 8 August 2015. It received one input. Revision to: • Expand the applicability, removing obsolete criteria; • Allow additionality demonstration for the project participants rather than end users; • Simplify baseline emissions calculation. Due to the overall modification of the document, no highlights of the changes are provided.
03.1	30 July 2010	EB 55, Annex 8 Editorial revision to clarify the meaning of lifetime of the project activity.
03.0	28 May 2009	EB 47, Annex 4 Revision to: • Address the issue related to potential leakage emissions when the electricity fed to the grid by the power plant supplying the heat to the project, is significantly lower under the project than under the baseline; and • Include editorial revisions to improve the clarity in the definition of the project activity, i.e. to implement a primary district heating system that uses heat extracted from an existing power plant.
02.0	26 September 2008	EB 42, Annex 5 The methodology was revised to expand its applicability to backpressure plants.

Version	*Date*	*Description*
01.0	19 October 2007	EB 35, Annex 1 Initial adoption.

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