METHODOLOGY

BM EN01.00XX

Electricity and Heat Generation from Biomass

Publication Date: DD MM YYYY

Version 1.0

Sectoral scope(s): Energy

Table of Contents

1. Introduction

1. This methodology is adopted and refers to the latest approved version of the following UNFCCC Clean Development Mechanism Methodologies:
   - ACM0006 (as valid from 11 March 2022),
   - ACM0018 (as valid from 11 March 2022) and
   - AM0036 (as valid from 11 March 2022).

2. It shall be the responsibility of the non-obligated entity and Accredited Carbon Verification Agency (ACVA) to note of any subsequent changes or revisions in the above-mentioned methodologies while developing projects and performing validation and/or verification activity respectively.

3. The following table describes the key elements of the methodology:

Table 1. Methodology key elements

Typical project(s)	• Co-generation of power and heat using biomass. Typical activities are new plant, capacity expansion, energy efficiency improvements or fuel switch projects. • Generation of power using biomass as fuel, in new biomass-based power plants at sites where currently no power generation occurs (greenfield), replacement or installation of operation units next to existing power plants (capacity expansion project activities), energy efficiency improvement project activities or replacement of fossil fuel by biomass in existing power plants (fuel switch project activities). The biomass-based power generation may be combined with solar thermal power generation. • Fuel switch from fossil fuels to biomass in the generation of heat. Applicable activities are retrofit or replacement of existing heat generation equipment and installation of new heat generation equipment.
Type of GHG emissions mitigation action	• Renewable energy. • Energy efficiency. • Fuel switch. • GHG emission avoidance. • Displacement of more GHG-intensive electricity generation in the grid or on-site;

2. Scope & Applicability

2.1. Scope

4. This methodology is applicable to project activities that operate biomass (co-)fired power-and-heat plants, generate power using biomass as fuel, optionally combining with solar thermal power generation and operate biomass (co-)fired heat generation equipment. The ICM project activity may include the following activities or, where applicable, combinations of these activities:

   (a) The installation of new plants at a site where currently no power or heat generation occurs (Greenfield projects);

   (b) The installation of new plants at a site where currently power or heat generation occurs. The new plant replaces or is operated next to existing plants (capacity expansion projects);

(c) The improvement of energy efficiency of existing biomass-based power-and-heat plants (energy efficiency improvement projects), which can also lead to a capacity expansion, e.g. by retrofitting the existing plant;

(d) The total or partial replacement of fossil fuels by biomass in existing power-and-heat plants or in new power-and-heat plants that would have been built in the absence of the project (fuel switch projects), e.g. by increasing the share of biomass use as compared to the baseline, by retrofitting an existing plant to use biomass.

(e) Project activities that generate power using biomass as fuel, optionally combining with solar thermal power generation. The project may be a Greenfield, capacity expansion or fuel switch project; or

2.2. Applicability

5. The heat generated in the heat generation equipment is either not used for power generation or, if power is generated using the heat generated by the heat generation equipment, it is not increased as a result of the project activity, i.e.:

   i. The power generation capacity installed remains unchanged due to the implementation of the project activity and is maintained at the pre-project level throughout the crediting period; and

   ii. The annual power generation during the crediting period is not more than 10% larger than the highest annual power generation in the most recent three years prior to the implementation of the project activity.

6. The use of biomass residues or increasing the use of biomass residues beyond historical levels is technically not possible at the project site without a significant capital investment in:

   i. Either the retrofit or replacement of existing heat generation equipment or the installation of new heat generation equipment; or

   ii. Establishing a new dedicated biomass supply chain for the purpose of the project activity (e.g. collecting and cleaning contaminated new sources of biomass residues that could otherwise not be used for energy purposes).

7. The methodology is applicable under the following conditions:

   (a) Biomass used by the project plant is limited to biomass residues, biogas, RDF[1] and/or biomass from dedicated plantations; Refuse Plastic Fuel (RPF) can also be co-fired in the equipment, but for the purpose of this methodology RDF and RPF shall be considered as fossil fuels;[2]

   (b) Fossil fuels may be co-fired in the project plant. However, the amount of fossil fuels co-fired does not exceed 80% of the total fuel fired on energy basis;

   (c) For projects that use biomass residues from a production process (e.g. production of sugar or wood panel boards), the implementation of the project

---

[1] Refuse Derived Fuel (RDF) may be used in the project plant but all carbon in the fuel, including carbon from biogenic sources, shall be considered as fossil fuel.

[2] If the non-obligated entities want to claim emission reduction for the biodegradable component in RPF, a revision to this methodology shall be required.

does not result in an increase of the processing capacity of (the industrial facility generating the residues) raw input (e.g. sugar, rice, logs, etc.) or in other substantial changes (e.g. product change) in this process;

(d) The biomass used by the project plant is not stored for more than one year;

(e) The biomass used by the project plant is not processed chemically or biologically (e.g. through esterification, fermentation, hydrolysis, pyrolysis, bio- or chemical-degradation, etc.) prior to combustion. Drying and mechanical processing, such as shredding and pelletisation, are allowed.

(f) No power and heat plant operates at the project site during the crediting period;

(g) If any heat is generated for purposes other than power generation (e.g. heat which is produced in boilers or extracted from the header to feed thermal loads in the process) during the crediting period or was generated prior to the implementation of the project activity, by any on-site or off-site heat generation equipment connected to the project site, the following conditions should apply:

(i) The implementation of the project activity does not influence directly or indirectly the operation of the heat generation equipment, i.e. the heat generation equipment would operate in the same manner in the absence of the project activity;

(ii) The heat generation equipment does not influence directly or indirectly the operation of the project plant (e.g. no fuels are diverted from the heat generation equipment to the project plant); and

(iii) The amount of fuel used in the heat generation equipment can be monitored and clearly differentiated from any fuel used in the project activity;

8. In the case of fuel switch project activities, the use of biomass or the increase in the use of biomass as compared to the baseline scenario is technically not possible at the project site without a capital investment in:

(a) The retrofit or replacement of existing heat generators/boilers; or

(b) The installation of new heat generators/boilers; or

(c) A new dedicated supply chain of biomass established for the purpose of the project (e.g. collecting and cleaning contaminated new sources of biomass residues that could otherwise not be used for energy purposes); or

(d) Equipment for preparation and feeding of biomass.

9. If biogas is used for power and heat generation, the biogas must be generated by anaerobic digestion of wastewater[3], and:

(a) If the wastewater generation source is registered as an ICM project activity, the details of the wastewater project shall be included in the PDD, and emission reductions from biogas energy generation are claimed using this methodology.

[3] Landfill gas project activities should refer to the consolidated methodology “WA03.002: Flaring or use of landfill gas”.

(b) If the wastewater source is not an ICM project, the amount of biogas does not exceed 50% of the total fuel fired on energy basis.

10. In the case biomass from dedicated plantations is used, the “BM-T-010: Project and leakage emissions from biomass” shall apply to determine the relevant project and leakage emissions from cultivation of biomass and from the utilization of biomass residues.

11. The methodology is only applicable if the baseline scenario, as identified per the “Selection of the baseline scenario and demonstration of additionality” section hereunder, is:

    (a) For power generation: scenarios P2 to P7, or a combination of any of those scenarios; and

    (b) For heat generation: scenarios H2 to H7, or a combination of any of those scenarios;

    (c) If some of the heat generated by the ICM project activity is converted to mechanical power through steam turbines, for mechanical power generation: scenarios M2 to M5:

        (i) In cases M2 and M3, if the steam turbine(s) are used for mechanical power in the project, the turbine(s) used in the baseline shall be at least as efficient as the steam turbine(s) used for mechanical power in the project;

        (ii) In cases M4 and M5, steam turbine(s) generating mechanical power to be used for the same purpose as in the baseline are not allowed;

    (d) For the use of biomass residues: scenarios B1 to B5, or a combination of any of those scenarios;

    (e) For the use of biogas: scenarios BG1 to BG3, or a combination of any of those scenarios.

12. The methodology is not applicable if the baseline scenario involves the cultivation of biomass in dedicated plantations.

13. In case of project activities that involve the replacement or retrofit of existing heat generation equipment, emission reductions may only be accounted until the time when the existing equipment would have reached the end of its technical time in the crediting period, i.e. after the point in time when the existing equipment would have to be replaced due to the expiry of its technical lifetime in the baseline scenario, emission reductions cannot be accounted. For the purpose of demonstrating this applicability condition, non-obligated entities should determine and document the remaining lifetime of each unit of the existing heat generation equipment in accordance with BM-T-015. In the case of several existing units with a different remaining lifetime, the shortest lifetime among the units should be used to determine the point in time until which CCCs can be claimed.

2.3. Methodology Approval Date

14. The date of adoption of this document shall be effective from DD MM YYYY.

2.4. Applicability of sectoral scopes

15. For validation and verification of ICM projects and programme of activities by a designated ACVA using this methodology where biomass is used for both heat and electricity generation

and only electricity is generated from biomass in power-only plants, application of sectoral scope "*01: Energy"* is mandatory.

16. For validation and verification of ICM projects by a designated ACVA using this methodology where biomass is used in heat generation equipment, application of sectoral scope "*01: Energy" and "02: Industries"* are mandatory

17. In case biomass is used for electricity generation in power-only plants, if emission reductions are claimed for preventing disposal and/or preventing uncontrolled burning of biomass residues in the baseline, then sectoral scope "03: Waste Handling and Disposal" shall apply.

2.5. Applicability of approved adopted tools

18. This methodology also refers to the latest approved versions of the following adopted ICM tools:

    a. "BM-T-001: Combined tool to identify the baseline scenario and demonstrate additionality" (hereinafter referred as "BM-T-001");

    b. "BM-T-002: Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" (hereinafter referred as "BM-T-002");

    c. "BM-T-003: Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" (hereinafter referred as "BM-T-003");

    d. "BM-T-006: Determining the baseline efficiency of thermal or electric energy generation systems" (hereinafter referred as "BM-T-006");

    e. "BM-T-007: Project and leakage emissions from transportation of freight" (hereinafter referred as "BM-T-007");

    f. "BM-T-010: Project and leakage emissions from biomass" (hereinafter referred as "BM-T-010").

    g. "BM-T-011: Emissions from solid waste disposal sites" (hereinafter referred as "BM-T-011");

    h. "BM-T-015: Tool to determine the remaining lifetime of equipment" (hereinafter referred as "BM-T-015").

3. Definitions

19. The definitions contained in the Detail Procedure for Offset Mechanism shall apply.

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

    (a) **Cogeneration plant** - a power-and-heat plant in which at least one heat engine simultaneously generates both process heat and power;

    (b) **Dedicated plantations** - plantations that are newly established as part of the ICM project activity for the purpose of supplying cultivated biomass to the project plant;

    (c) **Heat** - useful thermal energy that is generated in a heat generator (e.g. a boiler, a cogeneration plant, thermal solar panels, etc.) and transferred to a heat carrier (e.g. hot liquids, hot gases, steam, etc.) for utilization in thermal applications and processes, including power generation. For the purposes of this methodology, heat does not include waste heat, i.e. heat that is transferred to the environment without utilization, for example, heat in flue gas, heat transferred to cooling towers or any other heat losses. Note that heat refers to the *net* quantity of thermal energy that is transferred to a heat carrier at the heat generation unit. For example, in case of a boiler it refers to the difference of the enthalpy of the steam generated in the boiler and the enthalpy of the feed water or, if applicable, any condensate return;

(d) **Heat generator** - a facility that generates heat by combustion of fuels. This includes, for example, a boiler that supplies steam or hot water, a heater that supplies hot oil or thermal fluid, or a furnace that supplies hot gas or combustion gases. When several heat generators are included in one project activity, each heat generator is referred to as “unit”;

(e) **Heat-to-power ratio** - the quantity of process heat recovered from a heat engine per unit of electricity generated in the same heat engine, measured in the same energy units. For example, a heat engine producing 1 MWh_{el} of electricity and 2 MWh_{th} of process heat has a heat-to-power ratio of 2;

(f) **Net quantity of electricity generation** - the electricity generated by a power plant unit after exclusion of parasitic and auxiliary loads, i.e. the electricity consumed by the auxiliary equipment of the power plant unit (e.g. pumps, fans, flue gas treatment, control equipment etc.) and equipment related to fuel handling and preparation.

(g) **Process heat -** the useful heat that is not used for electric power generation. It could include the heat used for mechanical power generation, where applicable;

(h) **Power -** electric power, unless explicitly mentioned otherwise;

(i) **Power plant** - an installation that generates electric power through the conversion of heat to power using a heat engine. The heat is produced in a heat generator and consumed in a heat engine (e.g. steam turbine) coupled to an electricity generator;

(j) **Power-only plant** - a power plant to which the following conditions apply:

(i) All heat engines of the power plant produce only power and do not cogenerate heat; and

(ii) The thermal energy (e.g. steam) produced in equipment of the power plant (e.g. a boiler) is only used in heat engines (e.g. turbines or motors) and not for other processes (e.g. heating purposes or as feedstock in processes). For example, in the case of a power plant with a steam header, this means that all steam supplied to the steam header must be used in turbines;

(k) **Power-and-heat plant** - Power-and-heat plants encompass two broad categories of power plants: cogeneration plants (as defined above) and plants in which heat and power are produced at the same installation although not in cogeneration mode, e.g. a common heat header supplies heat for both process heat and power generation.

(l) **An off-grid power plant** - a power plant which is located at a site that has no connection to the electricity grid. The power plant provides electricity only to identified consumers through dedicated distribution line(s) which are only served by power plants from the project site. The consumers are not connected to the grid and do not receive electricity from power plants other than the plants included in the project boundary;

(m) **Net quantity of electricity generation -** The electricity generated by the power plant unit after exclusion of parasitic and auxiliary loads, i.e. the electricity consumed by the auxiliary equipment of the power plant unit (e.g. pumps, vans, flue gas treatment, control equipment, etc.) and equipment related to fuel handling and preparation;

(n) **Efficiency of electricity generation -** Defined as the net quantity of electricity generated per quantity of fuel fired in the relevant power plant (expressed in the same energy units). The average efficiency refers to the generation efficiency over a longer time period (e.g. one year) that includes different loads and operational modes, including start-ups.

(o) **Efficiency of heat generation** - the quantity of heat generated per unit quantity of fuel fired (both expressed in terms of energy using the same units). The average net efficiency of heat generation refers to the efficiency of heat generation over a longer time interval (e.g. one year) that is representative for different loads and operation modes, including start-ups. When considering more than one unit, the average efficiency of heat generation corresponds respectively to the heat generated by all units divided by the quantity of fuel fired in the same units (based on Net Calorific Values).

4. Methodology: Baseline Component

4.1. Project boundary

21. The spatial extent of the project boundary encompasses:

(a) All plants generating power and/or heat located at the project site, whether fired with biomass, fossil fuels or a combination of both[4];

(b) All power plants connected physically to the electricity system (grid) that the project plant is connected to;

(c) If applicable, all off-site heat sources that supply heat to the site where the ICM project activity is located (either directly or via a district heating system);

(d) The means of transportation of biomass to the project site;

(e) If the feedstock is biomass residues, the site where the biomass residues would have been left for decay or dumped;

(f) If the feedstock is biomass produced in dedicated plantations the geographic boundaries of the dedicated plantations;

(g) The wastewater treatment facilities used to treat the wastewater produced from the treatment of biomass;

(h) If biogas is included, the site of the anaerobic digester.

(i) The project activity power-only plant(s);

(j) All other on-site power-only plants, whether fired with biomass, fossil fuels or a combination of both;

(k) If the biomass involve any type of processing prior to combustion such as drying, palletisation, shredding, briquetting, etc., two options can be considered

[4] Note that the project boundary encompasses not only the plants generating power and/or heat that are directly affected by the ICM project activity (e.g. retrofitted or installed) but also all other plants generating power and/or heat located at the same site as the ICM project activity, whether fired with biomass, fossil fuels or a combination of both. Thus, power and heat generation, grid power and heat imports/exports should be considered for the whole site where the ICM project activity is located and all facilities are to be included in the power and heat balances.

a. The biomass processing plant can be included in the project boundary and the primary source of the biomass is assessed according to the procedures described in the following section; or else

b. The biomass processing plant is not included in the project boundary and then the processed biomass obtained from that plant should be considered as alternative B4 following the guidance in BM-T-016.

(l) The heat generation equipment and related equipment at the project site;

(m) The site where the biomass residues would have been left for decay under anaerobic conditions. This is applicable only to cases where the biomass residues would in the absence of the project activity be dumped and left to decay under anaerobic conditions;

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

<table>
<tr><th colspan="2">Source</th><th>Gas</th><th>Included</th><th>Justification/Explanation</th></tr>
<tr><td rowspan="15">Baseline</td><td rowspan="3">Electricity and heat generation</td><td>CO_2</td><td>Yes</td><td>Main emission source</td></tr>
<tr><td>CH_4</td><td>No</td><td>Excluded for simplification. This is conservative</td></tr>
<tr><td>N_2O</td><td>No</td><td>Excluded for simplification. This is conservative</td></tr>
<tr><td rowspan="3">Uncontrolled burning or decay of surplus biomass residues</td><td>CO_2</td><td>No</td><td>It is assumed that CO_2 emissions from surplus biomass residues do not lead to changes of carbon pools in the LULUCF sector</td></tr>
<tr><td>CH_4</td><td>Yes or No</td><td>Non-obligated entities may decide to include this emission source, where case B1, B2 or B3 has been identified as the most likely baseline scenario</td></tr>
<tr><td>N_2O</td><td>No</td><td>Excluded for simplification. This is conservative. Note also that emissions from natural decay of biomass are not included in GHG inventories as anthropogenic sources</td></tr>
<tr><td rowspan="3">Electricity generation</td><td>CO_2</td><td>Yes</td><td>Main emission source</td></tr>
<tr><td>CH_4</td><td>No</td><td>Excluded for simplification. This is conservative</td></tr>
<tr><td>N_2O</td><td>No</td><td>Excluded for simplification. This is conservative</td></tr>
<tr><td rowspan="3">Fossil fuel combustion for heat generation</td><td>CO_2</td><td>Yes</td><td>Important emission source</td></tr>
<tr><td>CH_4</td><td>No</td><td>Excluded for simplification. This is conservative</td></tr>
<tr><td>N_2O</td><td>No</td><td>Excluded for simplification. This is conservative</td></tr>
<tr><td rowspan="4">Project activity</td><td rowspan="3">On-site fossil fuel consumption</td><td>CO_2</td><td>Yes</td><td>May be an important emission source</td></tr>
<tr><td>CH_4</td><td>No</td><td>Excluded for simplification. This emission source is assumed to be very small</td></tr>
<tr><td>N_2O</td><td>No</td><td>Excluded for simplification. This emission source is assumed to be very small</td></tr>
<tr><td></td><td>CO_2</td><td>Yes</td><td>May be an important emission source</td></tr>
</table>

Source		Gas	Included	Justification/Explanation
	Off-site transportation of biomass	CH_4	No	Excluded for simplification. This emission source is assumed to be very small
		N_2O	No	Excluded for simplification. This emission source is assumed to be very small
	Combustion of biomass for electricity and heat	CO_2	No	It is assumed that CO_2 emissions from surplus biomass do not lead to changes of carbon pools in the LULUCF sector
		CH_4	Yes or No	This emission source must be included if CH_4 emissions from uncontrolled burning or decay of biomass residues in the baseline scenario are included
		N_2O	No	Excluded for simplification. This emission source is assumed to be small
	Wastewater from the treatment of biomass	CO_2	No	It is assumed that CO_2 emissions from surplus biomass do not lead to changes of carbon pools in the LULUCF sector
		CH_4	Yes	This emission source shall be included in cases where the waste water is treated (partly) under anaerobic conditions
		N_2O	No	Excluded for simplification. This emission source is assumed to be small
	Cultivation of land to produce biomass feedstock	CO_2	Yes	This emission source shall be included in cases biomass from dedicated plantation is used
		CH_4	Yes	This emission source shall be included in cases biomass from dedicated plantation is used
		N_2O	Yes	This emission source shall be included in cases biomass from dedicated plantation is used
	On-site and off-site transportation and processing of biomass	CO_2	Yes	May be an important emission source
		CH_4	No	Excluded for simplification. This emission source is assumed to be very small
		N_2O	No	Excluded for simplification. This emission source is assumed to be very small

4.2. Additionality

Selection of Baseline scenario and demonstration of additionality

22. The selection of the baseline scenario and demonstration of additionality shall be conducted by following BM-T-001 using the following guidance.

4.2.1. Identification of alternative scenarios

23. The alternative scenarios shall specify:

(a) How electric power would be generated in the absence of the ICM project activity (P scenarios);

(b) How heat would be generated in the absence of the ICM project activity (H scenarios);

(c) If the ICM project activity generates mechanical power through steam turbine(s): how the mechanical power would be generated in the absence of the ICM project activity (M scenarios);

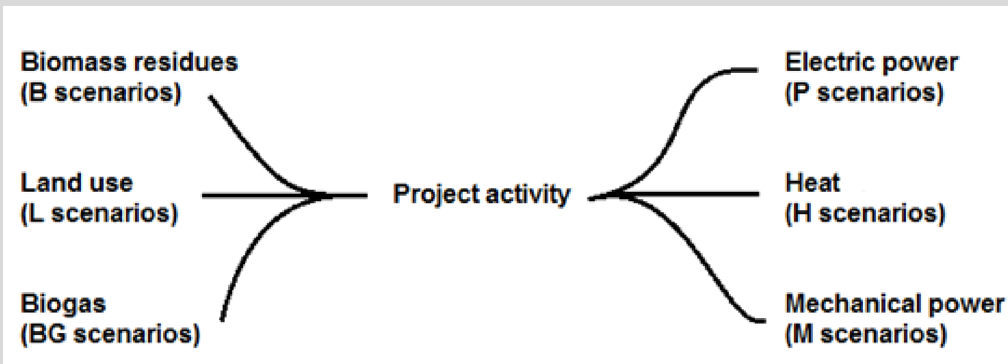
(d) If the ICM project activity uses biomass residues, what would happen to the biomass residues in the absence of the ICM project activity (B scenarios);

(e) If the ICM project activity uses biomass cultivated in dedicated plantations, what the land use would be in the absence of the ICM project activity (L scenarios); and

(f) If the ICM project activity uses biogas from on-site wastewater, what would happen to the biogas in the absence of the ICM project activity (BG scenarios).

Box 1. Non-binding best practice example 1: Selection of the baseline scenario

Non-obligated entities should identify all alternative scenarios in terms of input and output in the absence of the project activity, including the project activity not being undertaken as an ICM project activity, the continuation of the current situation and all plausible and relevant alternatives scenarios.



24. The alternative scenarios for electric power should include, but not be limited to the scenarios below, including the combination of relevant scenarios:

(a) P1: The proposed project activity not undertaken as an ICM project activity;

(b) P2: If applicable[5], the continuation of power generation in existing power plants at the project site. The existing plants would operate at the same conditions (e.g. installed capacities, average load factors, or average energy efficiencies, fuel mixes, and equipment configuration) as those observed in the most recent three years prior to the starting date of the ICM project activity;

(c) P3: If applicable (see footnote 4), the continuation of power generation in existing power plants at the project site. The existing plants would operate with different conditions from those observed in the most recent three years prior to the starting date of the ICM project activity;

(d) P4: If applicable[6], the retrofitting of existing power plants at the project site. The retrofitting may or may not include a change in fuel mix;

[5] This alternative is only applicable if there are existing plants operating at the project site.

[6] This alternative is only applicable if there are existing plants operating at the project site.

(e) P5: The installation of new power plants at the project site different from those installed under the ICM project activity;

(f) P6: The generation of power in specific off-site plants, excluding the power grid;

(g) P7: The generation of power in the power grid.

(h) P8: The installation of new power-only plants fired with biomass or fossil fuels, or a combination of both, at the project site, using the same amount or less biomass than under scenario P1, both with and without solar thermal power generation, if applicable;[7]

(i) P9: The installation of new power-only plants fired with biomass or fossil fuels, or a combination of both, at the project site, using more biomass than under scenario P1, both with and without solar thermal power generation, if applicable;[3]

(j) P10: If applicable,[3] the installation of new solar thermal power-only plant without biomass utilisation.

25. The alternative scenarios for heat should include, but not be limited to, inter alia:

(a) H1: The proposed project activity not undertaken as an ICM project activity (Heat generation with biomass);

(b) H2: If applicable (see footnote 5), the continuation of heat generation in existing plants at the project site. The existing plants would operate at the same conditions (e.g. installed capacities, average load factors, or average energy efficiencies, fuel mixes, and equipment configuration) as those observed in the most recent three years prior to the ICM project activity;

(c) H3: If applicable (see footnote 5), the continuation of heat generation in existing plants at the project site. The existing plants would operate with different conditions from those observed in the most recent three years prior to the ICM project activity;

(d) H4: If applicable (see footnote 5), the retrofitting of existing plants at the project site. The retrofitting may or may not include a change in fuel mix;

(e) H5: The installation of new plants at the project site different from those installed under the ICM project activity;

(f) H6: The generation of heat in specific off-site plants;

(g) H7: The use of heat from district heating.

[7] This alternative is only applicable if the project activity includes the utilization of solar thermal energy.

26. The alternative scenarios for mechanical power should include, but not be limited to, inter alia:

(a) M1: The proposed project activity not undertaken as an ICM project activity;

(b) M2: If applicable (see footnote 5), the continuation of mechanical power generation from the same steam turbines in existing plants at the project site;

(c) M3: The installation of new steam turbines at the project site;

(d) M4: If applicable (see footnote 5), the continuation of mechanical power generation from electrical motors in existing plants at the project site;

(e) M5: The installation of new electrical motors at the project site.

27. For any of the alternative scenarios described above, all assumptions with respect to installed capacities, load factors, energy efficiencies, fuel mixes, and equipment configuration, should be clearly described and justified in the ICM-PDD;

28. If existing plants operated at the project site prior to the implementation of the ICM project activity, the remaining lifetime of the existing equipment shall be determined as per BM-T-015 and a baseline based on historical performance only applies until the existing power plant would have been replaced or retrofitted in the absence of the ICM project activity.

29. When using biomass residues, the alternative scenarios of the biomass residues in absence of the project activity shall be determined following BM-T-010.

30. In addition to the alternative scenarios (B scenarios) included in BM-T-010, the non-obligated entities shall include scenario B5:

31. The biomass residues are used for power or heat generation at the project site in new and/or existing plants.

32. When using biomass cultivated in dedicated plantations, the project shall consider what the land use would be in the absence of the ICM project activity (L scenario).[8]

33. In case the proposed project activity includes the use of biogas, the project shall consider the following baseline alternatives for the biogas:

(a) BG1: No biogas would be generated, and wastewater would not be treated by anaerobic digestion;

(b) BG2: Biogas is captured and flared;

(c) BG3: Biogas is captured and used to produce electricity and/or thermal energy;

(d) BG4: Biogas is captured and used as feedstock or transportation fuel.

34. When defining plausible and credible alternative scenarios for the use of biogas, the guidance below should be followed:

(a) If scenario BG1 and BG2 are selected, no biogas shall be included in the baseline scenario of the proposed project activity;[9]

[8] The methodology is not applicable if the baseline scenario involves the cultivation of biomass in dedicated plantations.

[9] Project activities that intend to claim emission reductions for the avoidance of methane as per scenario BG1, shall be developed as a separate biogas ICM project activity.

(b) If scenario BG3 is selected, the same amount of biogas produced in the project shall be included in the baseline scenario.

(c) In case the biogas is supplied by an existing ICM project activity its reference shall be included in the PDD.

4.3. Baseline

4.3.1. If biomass is used for both heat and electricity generation

35. In many cases, it may be difficult to clearly determine the precise mix of power generation in the grid and power or heat generation with biomass residues or fossil fuels that would have occurred in the absence of the ICM project activity. For this reason, this methodology adopts a conservative approach based on the following assumptions and taking into account any technical and operational constraints:

a) Biomass residues, if available in the baseline scenario, would be used in the baseline as a priority for the generation of power and heat over the use of any fossil fuels;

b) When different types of biomass result in different levels of heat generation efficiency, the allocation of biomass shall be guided to maximize the heat generation efficiency of the set of heat generators;

c) If different types of fossil fuels can technically be used in the heat generators, the type of fossil fuel used should be guided by the principle that fossil fuels would be used so as to maximize the heat generation efficiency of the set of heat generators;

d) Where heat can technically be generated in more than one heat generator, it should be assumed that it is generated from the most efficient to the less efficient heat generators to the maximum extent possible, taking into account any technical and operational constraints, including co-firing and the partial use of the heat generator in the previous steps;

e) The heat provided by heat generators is used first in heat engines which operate in cogeneration mode, then in thermal applications to satisfy the heat demand, and after that in heat engines which operate for the generation of power only;

f) Where heat can technically be used in more than one engine type, it should be allocated from the most efficient to the less efficient heat engines to the maximum extent possible;

g) Where heat can technically be used in more than one cogeneration heat engine type, it should be assumed that it is allocated so as to maximize the cogeneration of process heat.

36. Non-obligated entities shall document and justify in the ICM-PDD in a transparent manner the allocation approach.

37. Baseline emissions are calculated as follows:

$$BE_y = EL_{BL,GR,y} \times EF_{EG,GR,y} + \sum_f FF_{BL,HG,y,f} \times EF_{FF,y,f} + EL_{BL,FF/GR,y} \times min\left(EF_{EG,GR,y}, EF_{EG,FF,y}\right) + BE_{BR,y} \quad \text{Equation (1)}$$

Where:

BE_y = Baseline emissions in year *y* (t CO_2)

$EL_{BL,GR,y}$	=	Baseline electricity sourced from the grid in year *y* (MWh)
$EF_{EG,GR,y}$	=	Grid emission factor in year *y* (t CO_2/MWh)
$FF_{BL,HG,y,f}$	=	Baseline fossil fuel demand for process heat in year *y* (GJ)
$EF_{FF,y,f}$	=	CO_2 emission factor for fossil fuel type *f* in year *y* (t CO_2/GJ)
$EL_{BL,FF/GR,y}$	=	Baseline uncertain electricity generation in the grid or on-site or off-site power-only units in year *y* (MWh)
$EF_{EG,FF,y}$	=	CO_2 emission factor for electricity generation at the project site or off-site plants in the baseline in year *y* (t CO_2/MWh)
$BE_{BR,y}$	=	Baseline emissions due to disposal of biomass residues in year *y* (t CO_{2e})
f	=	Fossil fuel type

38. The procedure to determine baseline emissions can be summarized as follows:

   a) Step 1: Determine the total baseline process heat generation, electricity generation and capacity constraints, and efficiencies;

   b) Step 2: Determine the baseline electricity sourced from the grid and emission factors;

   c) Step 3: Determine the baseline biomass-based heat and power generation;

   d) Step 4: Determine the baseline demand for fossil fuels to meet the balance of process heat and the corresponding electricity generation;

   e) Step 5: Determine the baseline emissions due to uncontrolled burning or decay of biomass residues.

4.3.1.1. Step 1: Determine the total baseline process heat generation *($HC_{BL,y}$)*, electricity generation and capacity constraints, and efficiencies

4.3.1.1.1. Step 1.1: Determine the total baseline process heat generation

39. The amount of process heat that would be generated in the baseline in year y ($HC_{BL,y}$) is determined based on continuously monitored data of process heat generated in the project

scenario.[10] [11]The process heat should be calculated net of any parasitic heat used for drying of biomass.

40. This methodology assumes for the sake of simplicity that the steam consumed in the baseline scenario would be the same quality as the steam used in the proposed ICM project activity and transported through one steam header in both scenarios.[12]

4.3.1.1.2. Step 1.2: Determine the baseline capacity of electricity generation *($CAP_{EG,total,y}$)*

41. The total capacity of electricity generation available in the baseline is calculated as follows:

$$CAP_{EG,total,y} = LOC_y \times \left[\sum_i \left(CAP_{EG,CG,i} \times LFC_{EG,CG,i}\right) + \sum_j \left(CAP_{EG,PO,j} \times LFC_{EG,PO,j}\right)\right]$$ Equation (2)

Where:

$CAP_{EG,total,y}$	=	Baseline electricity generation capacity in on-site and off-site plants in year y (MWh)
$CAP_{EG,CG,i}$	=	Baseline electricity generation capacity of cogeneration-type heat engine *i* (MW)
$CAP_{EG,PO,j}$	=	Baseline electricity generation capacity of power-only-type heat engine *j* (MW)
$LFC_{EG,CG,i}$	=	Baseline load factor of cogeneration-type heat engine *i* (ratio)
$LFC_{EG,PO,j}$	=	Baseline load factor of power-only-type heat engine *j* (ratio)
LOC_y	=	Operation of the industrial facility using the process heat in year *y* (hour)
i	=	Cogeneration-type heat engine in the baseline scenario
j	=	Power-only-type heat engine in the baseline scenario

[10] Heat supplied during the ICM project activity to a district heating system shall count as process heat and be included in the process heat.
[11] Heat supplied during the ICM project activity to a mechanical steam turbine shall count as process heat and be included in the process heat.
[12] In case the baseline scenario involves steam headers with different steam enthalpies the non-obligated entities shall assume the use of the header that ensures a conservative estimation of the baseline emissions.

4.3.1.1.3. Step 1.3: Determine the efficiencies of heat generators, and efficiencies and heat-to-power ratio of heat engines

42. The efficiencies of heat generators ($\eta_{BL,HG,BR,h}/\eta_{BL,HG,FF,h}$) and heat engines ($\eta_{BL,EG,CG,i/j}/\eta_{BL,EG,PO,j}$) shall be calculated as per BM-T-006.

43. The heat-to-power ratio of cogeneration-type heat engines (e.g. backpressure and heat-extraction steam turbines) is calculated as follows:

    i. **Case 1:** For existing heat engines with a minimum three-year operational history prior to the ICM project activity:

$$HPR_{BL,EG,CG,/PO,i/j} = \frac{1}{3.6} \times MAX\left\{\frac{HC_{BR,CG/PO,x,i/j}}{EL_{BR,CG/PO,x,i/j}}; \frac{HC_{BR,CG/PO,x-1,i/j}}{EL_{BR,CG/PO,x-1,i/j}}; \frac{HC_{BR,CG/PO,x-2,i/j}}{EL_{BR,CG/PO,x-2,i/j}}\right\}$$ Equation (3)

Where:

$HPR_{BL,i}$	=	Baseline heat-to-power ratio of the heat engine *i* (ratio)
$HC_{BR,CG/PO,x,i/j}$	=	Quantity of process heat extracted from the heat engine *i/j* in year *x* (GJ)
$EL_{BR,CG/PO,x,i/j}$	=	Quantity of electricity generated in heat engine *i/j* in year *x* (MWh)
x	=	Last calendar year prior to the start of the crediting period
i	=	Cogeneration-type heat engine in the baseline scenario
j	=	Power-only-type heat engine in the baseline scenario

    ii. **Case 2:** For heat engines without a minimum three-year operational history prior to the ICM project activity the heat-to-power ratio should be determined as per the design conditions of the plant, for the configuration identified as baseline scenario”.

4.3.1.2. Step 2: Determine the baseline electricity generation in the grid and emission factors

4.3.1.2.1. Step 2.1: Determine the baseline electricity generation *($EL_{BL,y}$)*

44. The amount of electricity that would be generated in the baseline in year *y* equals the amount of electricity generated in the project scenario as follows:

$$EL_{BL,y} = EL_{PJ,gross,y} + EL_{PJ,imp,y} - EL_{PJ,aux,y}$$ Equation (4)

Where:

$EL_{BL,y}$	=	Baseline electricity generation in year *y* (MWh)
$EL_{PJ,gross,y}$	=	Gross quantity of electricity generated in all power plants included in the project boundary in year *y* (MWh)
$EL_{PJ,imp,y}$	=	Project electricity imports from the grid in year *y* (MWh)
$EL_{PJ,aux,y}$	=	Total auxiliary electricity consumption required for the operation of the power plants in year *y* (MWh)

Box 2. Non-binding best practice example 2: Auxiliary electricity requirement

Non-obligated entities should account for the total auxiliary electricity consumption ($EL_{PJ,aux,y}$) required for the operation of the power plants at the project site. When appropriate, the total auxiliary electricity consumption may be estimated by considering the consumption capacity of all the installed equipment and assuming that they operated at maximum load during the monitoring period. Example – A project activity involves the use of biomass residues to produce electricity and heat in an existing industrial facility. In order to operate the project activity, the non-obligated entities installed a biomass drier and a conveyor belt and utilizes auxiliary electricity for the actual operation of the power plant. As a conservative approach, the non-obligated entity calculates the total auxiliary electricity consumption during year *y* as the sum of the capacity of each equipment, times 8760 hours of operation per year (24 hours/day).

4.3.1.2.2. Step 2.2: Determine the baseline electricity sourced from the grid *($EG_{BL,GR,y}$)*

45. The amount of electricity that would be sourced from the grid in the baseline is calculated assuming that the amount of electricity generated on-site and off-site in the baseline shall be limited by the installed capacity of power generation available in the baseline scenario (on-site and off-site):

$$EL_{BL,GR,y} = \max\left(0, EL_{BL,y} - CAP_{EG,total,y}\right) \qquad \text{Equation (5)}$$

Where:

$EL_{BL,GR,y}$	=	Baseline electricity sourced from the grid in year *y* (MWh)
$EL_{BL,y}$	=	Baseline electricity generation in year *y* (MWh)
$CAP_{EG,total,y}$	=	Baseline electricity generation capacity in on-site and off-site plants in year *y* (MWh)

46. For baseline alternatives not connected to the grid or otherwise technically or legally impossible to import/export power from/to the grid, it shall be assumed that $EL_{BL,GR,y} = 0$

4.3.1.2.3. Step 2.3: Determine the emission factor of grid electricity generation *($EF_{EG,GR,y}$)*

47. The grid emission factor ($EF_{EG,GR,y}$) shall be determined using the latest approved version of CEA Database.

4.3.1.2.4. Step 2.4: Determine the emission factor of on-site electricity generation with fossil fuels ($EF_{EG,FF,y}$)

48. If no fossil fuel based power generation was identified as part of the baseline scenario, or if fossil fuel based power generation was identified as part of the baseline scenario, but all capacity of power generation based on fossil fuels is used in the cogeneration mode (i.e. up to step 4.2), then it should be assumed in equation (2) that $EF_{EG,FF,y} = EF_{EG,GR,y}$.

49. When fossil fuel based power only generation is identified as part of the baseline scenario and if fossil fuel power plants were operated at the project site prior to the implementation of the ICM project activity, either Option A or Option B can be used to determine the emission

factor ($EF_{EG,FF,y}$). For new power plants that would be constructed at the project site in the baseline scenario, Option B shall be used.

i. **Option A:** Determine $EF_{EG,FF,y}$ as per the procedure described under "Scenario B: Electricity consumption from an off-grid captive power plant" in the latest approved version of BM-T-003, using data from the three calendar years prior the date of submission of the PDD for validation of the ICM project activity;

ii. **Option B:** Determine a default emission factor for $EF_{EG,FF}$ based on the efficiency of the power plant that would be operated at the project site in the baseline and a default CO_2 emission factor for the fossil fuel types[13] that would be used, as follows:

$$EF_{EG,FF} = 3.6 \times \frac{EF_{BL,CO2,FF}}{\eta_{BL,FF}} \quad \text{Equation (6)}$$

Where:

$EF_{EG,FF,y}$	=	CO_2 emission factor for electricity generation with fossil fuels at the project site in the baseline in year *y* (tCO_2/MWh)
$EF_{BL,CO2,FF}$	=	CO_2 emission factor of the fossil fuel type that would be used for power generation at the project site in the baseline (tCO_2/GJ)
$\eta_{BL,FF}$	=	Efficiency of the fossil fuel power plant(s) at the project site in the baseline (ratio)

4.3.1.3. Step 3: Determine the baseline biomass-based heat and power generation

4.3.1.3.1. Step 3.1: Determine the baseline biomass-based heat generation ($HG_{BL,BR,y}$)

50. It is assumed that the use of biomass residues for which scenario B5 has been identified as the baseline scenario ($BR_{B5,n,y}$) would be prioritized over the use of any fossil fuels in the baseline. Assuming that the equivalent amount of heat that would be generated with biomass residues ($HG_{BL,BR,y}$) shall be determined as follows[14]:

$$HG_{BL,BR,y} = \sum_{h}\sum_{n}\left(BR_{B5,n,h,y} \times NCV_{BR,n,y} \times \eta_{BL,HG,BR,h}\right) \quad \text{Equation (7)}$$

Where:

$HG_{BL,BR,y}$	=	Baseline biomass-based heat generation in year *y* (GJ)
$BR_{B5,n,h,y}$	=	Quantity of biomass residues of category *n* used in heat generator *h* in year *y* with baseline scenario B5 (tonne on dry-basis)
$NCV_{BR,n,y}$	=	Net calorific value of biomass residue of category *n* in year *y* (GJ/tonne on dry-basis)

---

[13] In the situation where there are several plants using different fossil fuels, the emission factor shall be determined ensuring a conservative estimation of baseline emissions.

[14] The biomass residues used in each heat generator ($BR_{B5,n,h,y}$) shall not exceed the total amount of biomass residues available and the heat generation in each heat generator should not exceed the total capacity of the heat generator.

$\eta_{BL,HG,BR,h}$ = Baseline biomass-based heat generation efficiency of heat generator *h* (ratio)

51. The allocation of biomass residues to the different heat generators ($BR_{B5,n,h,y}$) shall be guided so as to maximize the heat generation efficiency of the set of heat generators, taking into account the following:

    a) Where only one category of biomass residues would be used in the baseline in clearly identifiable baseline heat generators, the monitored quantities of biomass residues used in the project can be directly allocated to those baseline heat generators;

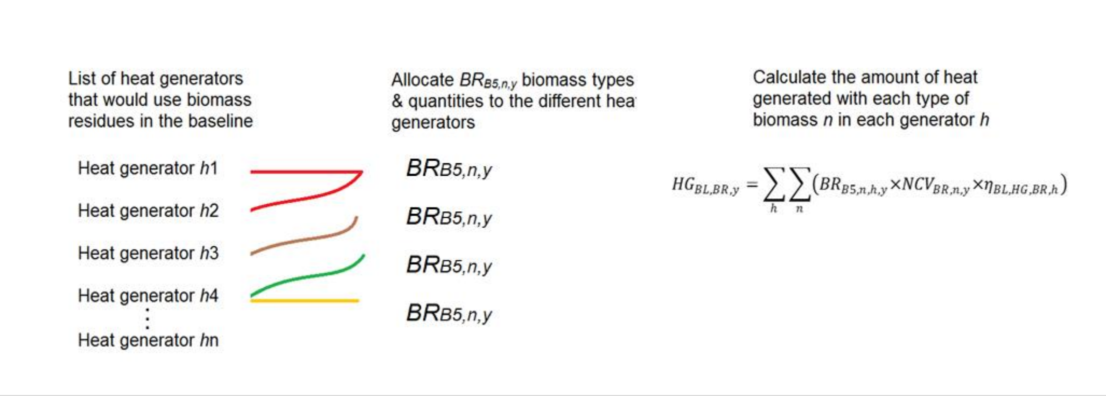
    b) Where one category of biomass residue from one particular source could be used in the baseline in two or more heat generators with different efficiencies, the non-obligated entities shall specify in a transparent manner how the respective amounts of biomass residues are allocated to each of the heat generators;

    c) Where one category of biomass residue category can technically be used in heat generators which do not require co-firing fossil fuels as well as heat generators which require co-firing fossil fuels, it should be assumed that the biomass is used to the maximum extent possible in the heat generator which does not require co-firing fossil fuels, taking into account any technical and operational constraints. Any remaining biomass residue quantities are then allocated to the subsequent heat generators which require co-firing fossil fuels;

    d) Where biomass residues could be used for power generation at the project site (B5), the respective amounts shall be determined based on the largest amounts of that category of biomass used for power and/or heat generation in the most recent three calendar years prior the date of submission of the PDD for validation of the ICM project activity.

Box 3. Non-binding best practice example 3: Baseline biomass-based heat generation (step 3.1)

This methodology assumes that the use of biomass residues ($BR_{B5,n,y}$) would be prioritized over the use of any fossil fuels in the baseline. The equivalent amount of heat that would be generated with biomass residues ($HG_{BL,BR,y}$) should be determined based on the allocation of the quantities of each type of biomass to the different generators.



4.3.1.3.2. Step 3.2: Determine the baseline biomass-based cogeneration of process heat and electricity and heat extraction

52. It is assumed that cogeneration of process heat and power using biomass-based heat ($HG_{BL,BR,y}$) would be prioritized over other uses of this biomass-based heat as well as over the use of fossil fuels for the generation of process heat and power on-site. With that assumption the equivalent amount of electricity ($EL_{BL,BR,CG,y}$) and process heat ($HC_{BL,BR,CG,y}$) that would be generated from biomass-based heat ($HG_{BL,BR,y}$) are determined as follows: [15]

53. Calculate

$$EL_{BL,BR,CG,y} = \frac{1}{3.6} \times \sum_i \left(\frac{1}{(HPR_{BL,i} + 1)} \times \eta_{BL,EG,CG,i} \times HG_{BL,BR,CG,y,i} \right)$$ Equation (8)

$$HC_{BL,BR,CG,y} = \sum_i \left(\frac{HPR_{BL,i}}{(HPR_{BL,i} + 1)} \times \eta_{BL,EG,CG,i} \times HG_{BL,BR,CG,y,i} \right)$$ Equation (9)

Where:

$EL_{BL,BR,CG,y}$	=	Baseline biomass-based cogenerated electricity in year *y* (MWh)
$\eta_{BL,EG,CG,i}$	=	Baseline electricity generation efficiency of heat engine *i* (MWh/GJ)
$HG_{BL,BR,CG,y,i}$	=	Baseline biomass-based heat used in heat engine *i* in year *y* (GJ)
$HC_{BL,BR,CG,y}$	=	Baseline biomass-based process heat cogenerated in year *y* (GJ)
$HPR_{BL,i}$	=	Baseline heat-to-power ratio of the heat engine *i* (ratio)

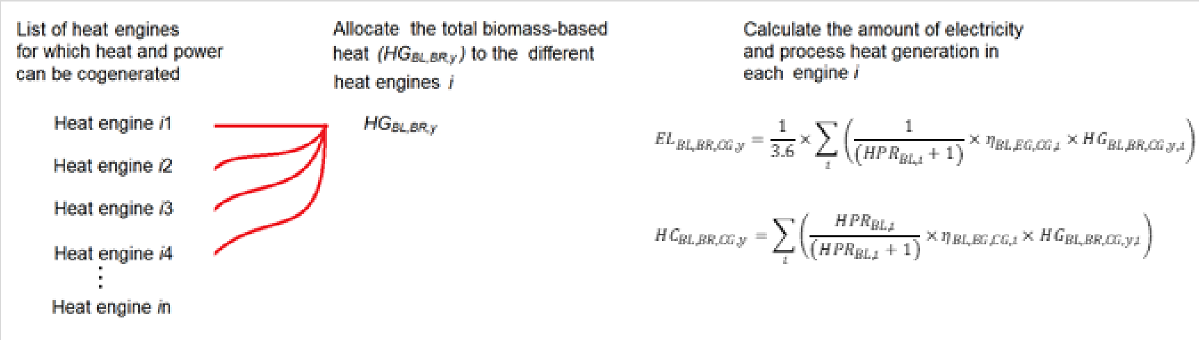
54. The total biomass-based heat ($HG_{BL,BR,y}$) shall be allocated to the different heat engines ($HG_{BL,BR,CG,y,i}$) so as to maximize the cogeneration of process heat. For instance, in case of steam cycles, if both back-pressure and heat-extraction steam turbines are identified in the baseline, heat should be first allocated to back-pressure turbines and then to heat extraction

[15] The biomass-based heat used in cogeneration mode ($HG_{BL,BR,CG,y,i}$) should not exceed the total biomass-based heat generated and the electricity generation in each heat engine should not exceed the total capacity of the heat engine.

turbines to the maximum extent possible, taking into account any technical and operational constraints.

Box 4. Non-binding best practice example 4: Baseline biomass-based cogeneration (step 3.2)

This methodology assumes that cogeneration of process heat and power using biomass-based heat ($HG_{BL,BR,y}$) would be prioritized over the use of fossil fuels. The equivalent amount of electricity ($EL_{BL,BR,CG,y}$) and process heat ($HC_{BL,BR,CG,y}$) that would be generated are determined based on the allocation of biomass based heat to the different engines *i*.



55. The next step to be followed depends on the outcomes of the calculations above. The following cases are possible:

(a) Cases 3.2.1: all the heat that would be generated using biomass residues in the baseline would be used in cogeneration-type heat engines:

i. Case 3.2.1.1: all the heat that would be generated using biomass residues in the baseline would be used in cogeneration-type heat engines and would match all process heat demand;

ii. Case 3.2.1.2: all the heat that would be generated using biomass residues in the baseline would be used in cogeneration-type heat engines, but still some process heat demand would remain to be met using fossil fuel;

(b) Case 3.2.2: excess biomass-based heat would be available after meeting the baseline process heat demand with biomass-based heat sourced from co-generation units, and used for generation of power in power-only mode;

(c) Cases 3.2.3: biomass-based heat exceeds or equals the demand of cogeneration-type heat engines:

i. Case 3.2.3.1: the biomass-based heat equals the remaining demand for process heat. Then, there is no more biomass-based heat available and the demand for process heat has been met;

ii. Case 3.2.3.2: excess biomass-based heat is less than the remaining demand for process heat. Then, all biomass-based heat is used and there still remains process heat demand to be met using fossil fuels;

iii. Case 3.2.3.3: excess biomass-based heat is greater than the remaining demand for process heat, then there remains some biomass-based heat to be used after the demand for process heat was met in power-only generation units.

56. Case 3.2.1.1: $HG_{BL,BR,y} = \sum_i HG_{BL,BR,CG,y,i}$ and $HC_{BL,y} = HC_{BL,BR,CG,y}$ If all the heat that would be generated using biomass residues in the baseline would be used in cogeneration-type heat engines and would match the demand of process heat, it is assumed that the use of fossil fuels on-site and off-site in the baseline scenario would be uncertain (except for the amount required due to technical constraints) because it would depend on a number of factors that are not taken into account in this methodology.

57. Based on these assumptions:

    a. $EL_{BL,FF/GRy} = EL_{BL,y} - EL_{BL,GR,y} - EL_{BL,BR,CG,y}$,

    b. $EL_{PJ,offset,y}$ = 0, and

    c. $EL_{BL,HG,y,f}$ = 0

Where:

$EL_{BL,FF/GR,y}$	=	Baseline uncertain electricity sourced from the grid or o n-site or off-site power-only units in year *y* (MWh)[16]
$EL_{PJ,offset,y}$	=	Electricity that would be generated in the baseline that exceeds the generation of electricity during year y (MWh) [17]
$EL_{BL,HG,y,f}$	=	Baseline electricity generation using fossil fuel *f* in year *y* (MWh)
f	=	Fossil fuel type

58. Then, non-obligated entities may proceed to Step 5: Determine the baseline emissions due to uncontrolled burning or decay of biomass residues.

59. Case 3.2.1.2: $HG_{BL,BR,y} = \sum_i HG_{BL,BR,CG,y,i}$ and $HC_{BL,y} > HC_{BL,BR,CG,y}$ If all the heat that would be generated using biomass residues in the baseline would be used in cogeneration-type heat engines but still some process heat demand would remain to be met, it is assumed that the remaining process heat balance is met with fossil fuels.

60. Under these assumptions:

    a. $HC_{balance,FF,y} = HC_{BL,y} - HC_{BL,BR,CG}$, and

    b. $EL_{balance,FF,y} = EL_{BL,y} - EL_{BL,GR,y} - EL_{BL,BR,CG,y}$,

Where:

$HC_{balance,FFy}$	=	Process heat balance demand after cogeneration in year *y* (GJ).
$EL_{balance,FF,y}$	=	Balance of electricity generated with fossil fuels in year y (MWh)

61. Then, non-obligated entities should proceed to Step 4: Determine the baseline demand for fossil fuels to meet the balance of process heat and the corresponding electricity generation.

62. Case 3.2.2: $HG_{BL,BR,y} > \sum_i HG_{BL,BR,CG,y,i}$ and $HC_{BL,y} = HC_{BL,BR,CG,y}$If all process heat demand would be met with biomass-based heat in the baseline and still there would be some biomass-

[16] Please refer to Equation 2.

[17] Please refer to Equation 36.

based heat to be used, it is assumed that this heat would be used for generation of power in power-only mode, i.e. without cogeneration of process heat.

63. Non-obligated entities shall define:

a. $HG_{balance,BR,PO,y} = HG_{BL,BR,y} - \sum_i HG_{BL,BR,CG,y,i}$, and

b. $EL_{balance,PO,y} = EL_{BL,y} - EL_{BL,GR,y} - EL_{BL,BR,CG,y}$

Where:

$HG_{balance,BR,POy}$	=	Balance of heat produced using biomass residues used in power-only mode in year *y* (GJ).
$EL_{balance,PO,y}$	=	Balance of electricity generated in power-only in year y (MWh)

64. Then, non-obligated entities should proceed to Step 3.3: Determine the baseline biomass-based electricity generated in power-only mode.

65. Case 3.2.3: $HG_{BL,BR,y} > \sum_i HG_{BL,BR,CG,y,i}$ and $HC_{BL,y} \geq HC_{BL,BR,CG,y}$, If there would be biomass-based heat in the baseline that could still be used and process heat demand to be met, it is assumed then that this balance of biomass-based heat would be extracted from the heat header and used to meet the process heat demand without cogeneration of power. Three cases should thus be considered.

66. Case 3.2.3.1: $HC_{BL,y} - HC_{BL,BR,CG,y} = \frac{h_{LOW,y}}{h_{HIGH,y}} \times \left(HG_{BL,BR,y} - \sum_i HG_{BL,BR,CG,y,i}\right)$, If the balance of biomass-based heat (right-hand side of the equation) equals the remaining demand for process heat (left-hand side of the equation), then there is no more biomass-based heat available and the demand for process heat has been met. It is assumed then that the use of fossil fuels on-site would be uncertain in the baseline scenario (except for the amount required due to technical constraints) because it would depend on a number of factors that are not taken into account in this methodology.

67. Under these assumptions:

(a) $EL_{BL,FF/GR,y} = EL_{BL,y} - EL_{BL,GR,y} - EL_{BL,BR,CG,y}$, and

(b) $EL_{PJ,offset,y} = 0$, and

(c) $FF_{BL,HG,y,f} = 0$

Where:

$EL_{BL,FF/GR,y}$	=	Baseline uncertain electricity sourced from the grid or on-site or off-site power-only units in year *y* (MWh)
$EL_{PJ,offset,y}$	=	Electricity that would be generated in the baseline that exceeds the generation of electricity during year *y* (MWh)
$FF_{BL,HGy,f}$	=	Baseline fossil fuel demand for process heat in year *y* (GJ)
$h_{LOW,y}$	=	Specific enthalpy of the heat carrier at the process heat demand side (GJ/tonnes)
$h_{HIGH,y}$	=	Specific enthalpy of the heat carrier at the heat generator side (GJ/tonnes)

68. Then, non-obligated entities should proceed to Step 5: Determine the baseline emissions due to uncontrolled burning or decay of biomass residues.

69. Case 3.2.3.2: $HC_{BL,y} - HC_{BL,BR,CG,y} > \frac{h_{LOW,y}}{h_{HIGH,y}} \times \left(HG_{BL,BR,y} - \sum_i HG_{BL,BR,CG,y,i}\right)$If the balance of biomass-based heat (right-hand side of the equation) is less than the remaining demand for process heat (left-hand side of the equation), then all biomass-based heat was used and there still remains process heat demand to be met. It is assumed then that this process heat demand would be met by using fossil fuels in the baseline.

70. Under these assumptions:

a) $$HC_{balance,FF,y} = \left(HC_{BL,y} - HC_{BL,BR,CG,y}\right) - \frac{h_{LOW}}{h_{HIGH}} \times \left(HG_{BL,BR,y} - \sum_i \mathrm{HG}_{\mathrm{BL,BR,CG,\,y,i}}\right)$$

and

b) $$EL_{balance,FF,y} = EL_{BL,y} - EL_{BL,GR,y} - EL_{BL,BR,CG,y}$$

Where:

$HC_{balance,FFy}$	=	Process heat balance demand after cogeneration in year y (GJ).
$EL_{balance,FF,y}$	=	Balance of electricity generated with fossil fuels in year y (MWh)

71. Then, non-obligated entities should proceed to Step 4: Determine the baseline demand for fossil fuels to meet the balance of process heat and the corresponding electricity generation.

72. Case 3.2.3.3: $HC_{BL,y} - HC_{BL,BR,CG,y} < \frac{h_{LOW}}{h_{HIGH}} \times \left(HG_{BL,BR,y} - \sum_i HG_{BL,BR,CG,y,i}\right),$ If the balance of biomass-based heat (right-hand side of the equation) is greater than the remaining demand for process heat (left-hand side of the equation), then there remains some biomass-based heat to be used after the demand for process heat was met. It is assumed then that this heat would be used to generate electricity in power-only mode, i.e. without cogeneration of process heat.

73. Under these assumptions:

(a) $$HG_{balance,BR,PO,y} = \left(HG_{BL,BL,y} - \sum_i HG_{BL,BR,CG,y,i}\right) - \frac{h_{HIGH}}{h_{LOW}} \times \left(HC_{BL,y} - HC_{BL,BR,CG,y}\right),$$

and

(b) $$EL_{balance,PO,y} = EL_{BL,y} - EL_{BL,GR,y} - EL_{BL,BR,CG,y}$$

Where:

$HG_{BL,BR,PO,y,j}$	=	Baseline biomass-based heat used in heat engine *j* in year *y* (GJ)
$HC_{BL,BR,CG,y}$	=	Baseline biomass-based process heat cogenerated in year *y* (GJ)
$EL_{balance,PO,y}$	=	Balance of electricity generated in power-only in year y (MWh)

74. Then, non-obligated entities should proceed to Step 3.3: Determine the baseline biomass-based electricity generated in power-only mode.

4.3.1.3.3. Step 3.3: Determine the baseline biomass-based electricity generated in power-only mode

75. If power-only-type heat engines have been identified in the baseline scenario, it is assumed that the balance of heat produced using biomass residues, if any, would be used in power-only mode.

76. The amount of biomass-based electricity generated in power-only mode in the baseline[18] is calculated as follows:

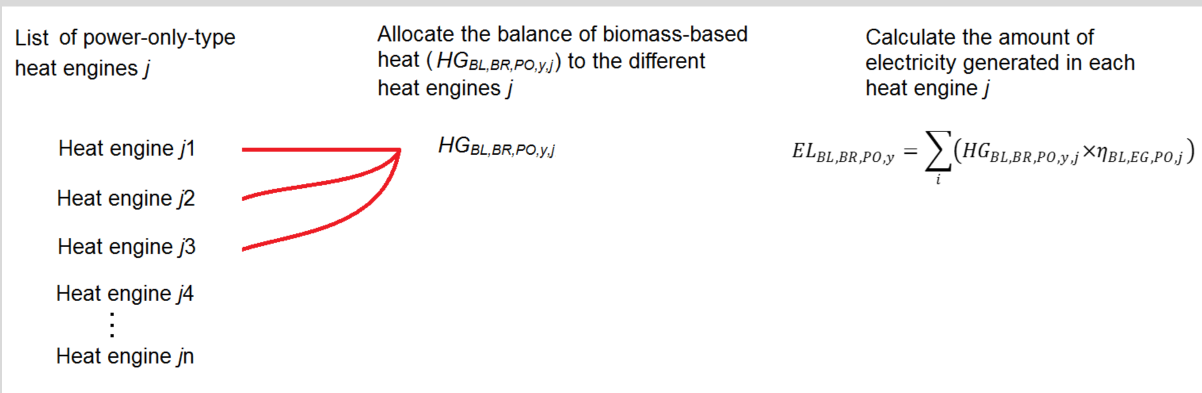
$$EL_{BL,BR,PO,y} = \sum_{i} \left(HG_{BL,BR,PO,y,j} \times \eta_{BL,EG,PO,j} \right) \quad \text{Equation (10)}$$

Where:

$EL_{BL,BR,PO,y}$	=	Baseline biomass-based electricity (power-only) in year *y* (MWh)
$HG_{BL,BR,PO,y,j}$	=	Baseline biomass-based heat used in heat engine *j* in year *y* (GJ)
$\eta_{BL,EG,PO,j}$	=	Average electric power generation efficiency of heat engine *j* (MWh/GJ)

Box 5. Non-binding best practice example 5: Baseline biomass-based power-only (step 3.3)

This methodology assumes that if power-only-type heat engines have been identified in the baseline scenario, the balance of heat produced using biomass residues, if any, would be used in power-only mode. The baseline biomass-based electricity in power-only ($EL_{BL,BR,PO,y,j}$) is determined based on the allocation of the balance of biomass-based heat to the different engines *i*.



77. The following cases are possible depending on the results of the calculations above:

a) Case 3.3.1: the amount of electricity generated on-site in the baseline is either equal to or less than the amount of electricity generated in the project scenario;

[18] The biomass-based heat used in the heat engines should not exceed the biomass-based heat balance and the electricity generation in each heat engine should not exceed the total capacity of the heat engine.

b) Case 3.3.2: the amount of electricity generated on-site in the baseline is larger than the amount of electricity generated in the project scenario, and grid-export was available in the baseline.

78. Case 3.3.1: If $EL_{balance,PO,y} \geq EL_{BL,BR,PO,y}$, the amount of electricity generated on-site in the baseline is either equal to or less than the amount of electricity generated in the project scenario, Non-obligated entities shall define:

a. $EL_{BL,FF/GR,y} = EL_{balance,PO,y} - EL_{BL,BR,PO,y}$,

b. $EL_{PJ,offset,y} = 0$, and

c. $FF_{BL,HG,y,f} = 0$

Where:

$EL_{BL,FF/GR,y}$	=	Baseline uncertain electricity sourced from the grid or on-site or off-site power-only units in year *y* (MWh)
$EL_{PJ,offset,y}$	=	Electricity that would be generated in the baseline that exceeds the generation of electricity during year *y* (MWh)
$FF_{BL,HGy,f}$	=	Baseline fossil fuel demand for process heat in year *y* (GJ).

79. Then, non-obligated entities should proceed to Step 5: Determine the baseline emissions due to uncontrolled burning or decay of biomass residues.

80. Case 3.3.2: If $EL_{balance,PO,y} < EL_{BL,BR,PO,y}$, the amount of electricity generated on-site in the baseline is larger than the amount of electricity generated in the project scenario, and if grid-export was available in the baseline, this result indicates that the ICM project activity results in a decrease of power output which is likely to be supplied by the grid.[19] As a consequence, project emissions in the form of generation of electricity in the grid should be accounted as $EL_{PJ,offset,y}$. Under these assumptions,:

a. $EL_{BL,FF/GR,y} = 0$,

b. $EL_{PJ,offset,y} = EL_{BL,BR,PO,y} - EL_{balance,PO,y}$, and

c. $FF_{BL,HG,y,f} = 0$

Where:

$EL_{BL,FF/GR,y}$	=	Baseline uncertain electricity sourced from the grid or on-site or off-site power-only units in year *y* (MWh)
$EL_{PJ,offset,y}$	=	Electricity that would be generated in the baseline that exceeds the generation of electricity during year *y* (MWh)
$FF_{BL,HGy,f}$	=	Baseline fossil fuel demand for process heat in year *y* (GJ).

(A) Then, non-obligated entities may proceed to Step 5: Determine the baseline emissions due to uncontrolled burning or decay of biomass residues.

[19] This situation should not be expected, as eligible project activities under this methodology should lead to using biomass more efficiently, which should result in surplus of power generation when compared to the baseline scenario.

4.3.1.4. Step 4: Determine the baseline demand for fossil fuels to meet the balance of process heat and the corresponding electricity generation

4.3.1.4.1. Step 4.1: Determine the baseline fossil fuel-based cogeneration of process heat and electricity and the remaining process heat demand

81. When the amount of biomass residues available is not sufficient to generate the heat required to meet the process heat demand[20], it is assumed that the balance of process heat is met using fossil fuels, resulting in related fossil fuel baseline emissions. Where fossil fuel-based cogeneration, capacity is available it is assumed that the remaining process heat demand will first be supplied by cogeneration and then by direct use of heat supplied by heat generators.

82. The amount of cogenerated electricity and the amount of heat that would need to be generated with fossil fuels in heat generators in order to supply the cogeneration heat engine i, shall be calculated as follows[21]:

$$HG_{BL,FF,CG,y,i} = \frac{\left(HPR_{BL,i} + 1 + GGL_{default}\right)}{HPR_{BL,i}} \times HC_{BL,FF,CG,y,i}$$ Equation (11)

i.e.

Where:

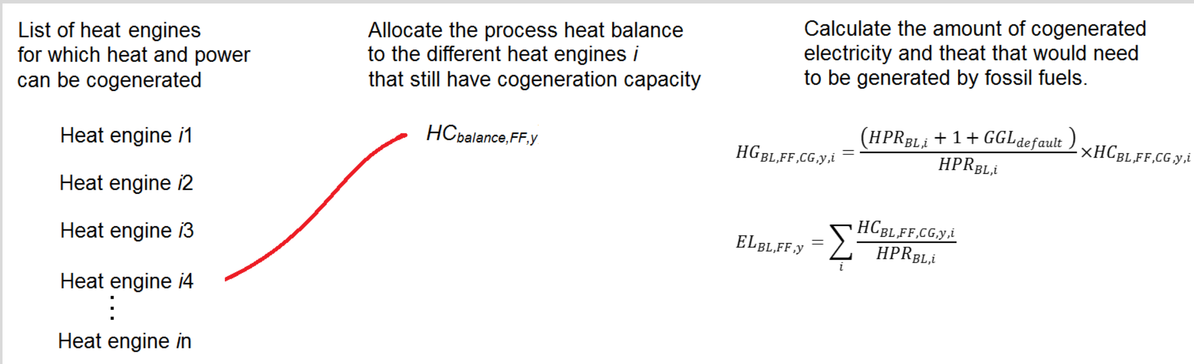
$HG_{BL,FF,CG,y,i}$	=	Baseline fossil-based heat used in heat engine *i* in year *y* (GJ)
$HC_{BL,CG,FF,y}$	=	Baseline fossil based process heat cogenerated in year *y* (GJ)
$GGL_{default}$	=	The default value for the losses linked to the electricity generator group (turbine, couplings and electricity generator. (Default value of 0.05) (ratio)
$HPR_{BL,i}$	=	Baseline Heat Power Ratio of heat engine *i* (ratio)

[20] Cases 3.2.2 and 3.2.4.3 above.

[21] The fossil fuel based cogenerated process heat ($HC_{BL,FF,CG,y,i}$) should not exceed the balance of process heat demand ($HC_{balance,FF,y}$).

Box 6. Non-binding best practice example 6: Baseline fossil fuel based cogeneration (step 4.1)

This methodology assumes that in many cases, the amount of biomass residues available is not enough to generate the heat required to meet the process heat demand. In such cases, and if fossil-fuel-based heat generators have been identified in the baseline scenario, it is assumed that the balance of process heat is met using fossil fuels. The amount of cogenerated electricity and heat that would need to be generated by fossil fuels are determined based on the allocation of the heat balance to the different engines *i*.



83. When after step 4.1 $HC_{balance,FF,y} > HC_{BL,FF,CG,y}$, there would still be process heat demand to be met, it is assumed then that this balance of process heat would be generated with fossil fuels and extracted from the heat header and used to meet the process heat demand without cogeneration of power until all baseline process heat is met.

$$HG_{BL,FF,DHE,y} = (HC_{balance,FF,y} - HC_{BL,FF,CG,y}) \times \frac{h_{HIGH,y}}{h_{LOW,y}}$$ Equation (12)

$$HG_{BL,FF,y} = HG_{BL,FF,CG,y} + HG_{BL,FF,DHE,y}$$ Equation (13)

Where:

$HC_{balance,FF,y}$	=	Balance of process heat demand after cogeneration in year *y* (GJ)
$HC_{BL,FF,CG,y}$	=	Baseline fossil-fuel-based process heat cogenerated in year *y* (GJ)
$h_{LOW,y}$	=	Specific enthalpy of the heat carrier at the process heat demand side (GJ/tonnes)
$h_{HIGH,y}$	=	Specific enthalpy of the heat carrier at the heat generator side (GJ/tonnes)
$HG_{BL,FF,y}$	=	Baseline fossil-based heat generation in year *y* (GJ)
$HG_{BL,FF,DHE,y}$	=	Baseline fossil-based heat used to meet baseline process heat demand via direct heat extraction in year *y* (GJ)
$HG_{BL,FF,CG,y}$	=	Baseline fossil-based heat cogeneration in year *y* (GJ)

84. The following cases are possible depending on the results of the calculations above:

a) Case 4.1.1: the amount of electricity generated on-site in the baseline is either equal to or less than the amount of electricity generated in the project scenario;

b) Case 4.1.2: the amount of electricity generated on-site in the baseline exceeds the amount of electricity generated in the project scenario and grid-export was available in the baseline.

85. Case 4.1.1: $EL_{balance,FF,y} \geq EL_{BL,FF,y}$: The amount of electricity generated on-site in the baseline is either equal to or less than the amount of electricity generated in the project scenario. In order to determine the resulting baseline emissions non-obligated entities should define:

a. $EL_{BL,FF/GR,y} = EL_{balance,FF,y} - EL_{BL,FF,y}$, and

86. $EL_{PJ,offset,y} = 0$, then non-obligated entities should proceed to Step 4.2.

87. Case 4.1.2: $EL_{balance,FF,y} < EL_{BL,FF,y}$The amount of electricity generated on-site in the baseline exceeds the amount of electricity generated in the project scenario. If grid-export was available in the baseline, this result indicates that the ICM project activity results in a decrease of power output which is likely to be supplied by the grid. As a consequence, project emissions in the form of generation of electricity in the grid should be accounted for via the parameter $EL_{PJ,offset,y}$.

88. Non-obligated entities shall define:

a. $EL_{BL,FF/GR,y} = 0$, and

b. $EL_{PJ,offset,y} = EL_{BL,FF,y} - EL_{balance,FF,y}$

Then, non-obligated entities should proceed to Step 4.2.

4.3.1.4.2. Step 4.2: Determine the baseline heat generation to meet the fossil-based cogeneration of heat and power and the heat to meet the balance of process heat

89. Estimate the total amount of fossil fuels required to generate the heat required for the cogeneration[22] in Step 4.1 and the balance of process heat as follows:

$$\sum_h HG_{BL,FF,y,h} = HG_{BL,FF,DHE,y} + HG_{BL,FF,CG,y}$$ Equation (14)

$$FF_{BL,HG,y,f} = \sum_h \left(\frac{HG_{BL,FF,y,h}}{\eta_{BL,HG,FF,h}} \right)$$ Equation (15)

Where:

$FF_{BL,HG,y,f}$	=	Baseline fossil fuel demand for process heat in year *y* (GJ)
$HG_{BL,FF,y,h}$	=	Baseline fossil-based heat generation in heat generator *h* in year *y* (GJ)

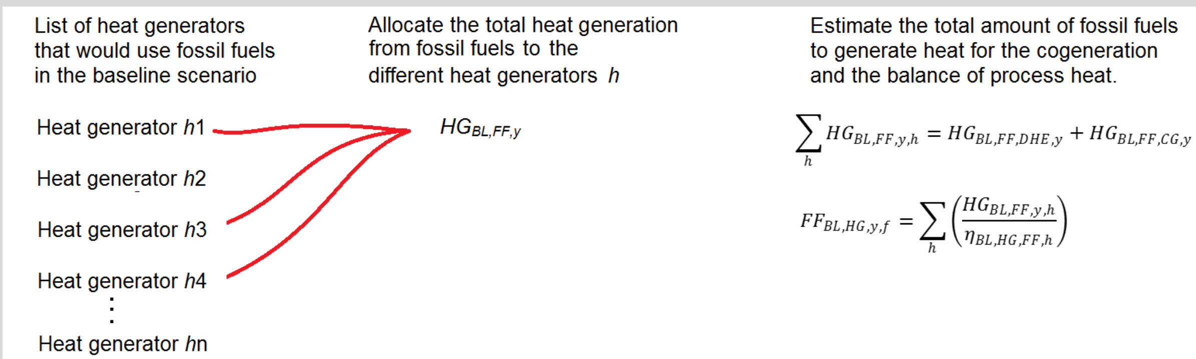
[22] The heat generation in each heat generator ($HG_{BL,FF,y,h}$) should not exceed the total capacity of the heat generator.

$\eta_{BL,HG,FF,h}$	=	Baseline fossil-based heat generation efficiency of heat generator *h* (ratio)[23]
$HG_{BL,FF,DHE,y}$	=	Baseline fossil-based heat used to meet baseline process heat demand via direct heat extraction in year *y* (GJ)
$HG_{BL,FF,CG,y}$	=	Baseline fossil-based heat cogeneration in year *y* (GJ)

90. The total heat generation required from fossil fuels ($HG_{BL,FF,y}$) shall be allocated to the different heat generators ($HG_{BL,FF,y,h}$), so as to maximize the heat generation efficiency, subject to the difference in heat content in the different heat carriers, up to the level required for meeting the balance of process heat demand.

Box 7. Non-binding best practice example 7: Baseline heat generation to meet the fossil-based cogeneration (step 4.2)

This methodology considers that several heat generators might be identified as part of the baseline scenario. In such cases, the total heat generation required from fossil fuels is allocated to the different heat generators *h* in order to determine the total amount of fossil fuels required to generate the heat required for the cogeneration and the balance of process heat.



4.3.1.5. Step 5: Determine the baseline emissions due to uncontrolled burning or decay of biomass residues

91. The calculation of baseline emissions due to uncontrolled burning or decay of biomass residues is optional and non-obligated entities can decide whether to include these emission sources or not. If non-obligated entities wish to include these emission sources, the procedure below should be followed, and emissions from combustion of biomass residues under the ICM project activity should also be determined. Otherwise, this section does not need to be

[23] In case of connection to a district heating system or off-site heat supply from which the individual sources cannot be identified, the district heating system shall be considered the most efficient heat source. The capacity of the district heating system shall be considered unlimited unless it can be justified (based on historical consumption data or heat purchase contracts) that the amount of heat to be consumed from/ or delivered to the district heat system was limited. The emission factor of the district heating system shall be considered 0.

applied, and project emissions do not need to include emissions from the combustion of biomass residues under the ICM project activity.

92. Baseline emissions due to uncontrolled burning or decay of biomass residues are only determined for those categories of biomass residues for which B1, B2 or B3 has been identified as the baseline scenario.

93. The emissions are determined separately for biomass residues categories for which scenarios B1 and B3 (aerobic decay or uncontrolled burning) apply, and for biomass residues categories for which scenario B2 (anaerobic decay) apply:

$$BE_{BR,y} = BE_{BR,B1/B3,y} + BE_{BR,B2,y} \quad \text{Equation (16)}$$

Where:

$BE_{BR,y}$	=	Baseline emissions due to disposal of biomass residues in year *y* (t CO_{2e})
$BE_{BR,B1/B3y}$	=	Baseline emissions due to aerobic decay or uncontrolled burning of biomass residues in year *y* (t CO_2)
$BE_{BR,B2,y}$	=	Baseline emissions due to anaerobic decay of biomass residues in year *y* (t CO_2)

4.3.1.5.1. Step 5.1: Determine $BE_{BR,B1/B3,y}$

94. For the biomass residues categories for which the most likely baseline scenario is either that the biomass residues would be dumped or left to decay under mainly aerobic conditions (B1), or burnt in an uncontrolled manner without utilizing them for energy purposes (B3), baseline emissions are calculated assuming, for both scenarios (aerobic decay and uncontrolled burning), that the biomass residues would be burnt in an uncontrolled manner.

95. Baseline emissions are calculated as follows:

$$BE_{BR,B1/B3,y} = GWP_{CH4} \times \sum_{n} BR_{B1/B3,n,y} \times NCV_{BR,n,y} \times EF_{BR,n,y} \quad \text{Equation (17)}$$

Where:

$BE_{BR,B1/B3y}$	=	Baseline emissions due to aerobic decay or uncontrolled burning of biomass residues in year *y* (t CO_2)
GWP_{CH4}	=	Global Warming Potential of methane valid for the commitment period ($tCO_2/t\ CH_4$)
$BR_{BR,B1/B3,n,y}$	=	Quantity of biomass residues of category *n* used in the ICM project activity in year *y* for which the baseline scenario is B1 or B3 (tonnes on dry-basis)
$NCV_{BR,n,y}$	=	Net calorific value of biomass residue of category *n* in year *y* (GJ/tonne on dry-basis)
$EF_{BR,n,y}$	=	CH_4 emission factor for uncontrolled burning of the biomass residues category *n* during the year *y* (tCH_4/GJ)
n	=	Biomass residue category

96. To determine the CH_4 emission factor ($EF_{BR,n,y}$), non-obligated entities may undertake measurements or use referenced default values.

97. In the absence of more accurate information for $NCV_{BR,n,y}$ and $EF_{BR,n,y}$.[24], a default value of 0.0027 t CH_4/ t biomass is recommended[25], adjusted by a conservativeness factor (i.e. 0.73) to address the high level of uncertainty. In this case, an emission factor of 0.001971 t CH_4/t biomass should be used.

Box 8. Non-binding best practice example 8: Baseline emissions due to uncontrolled burning (step 5.1)

Non-obligated entities may opt to consider baseline emissions due to uncontrolled burning for those categories of biomass residues which baseline has been identified as B1 (biomass residues are dumped or left to decay mainly under aerobic conditions) or B3 (the biomass residues are burnt in an uncontrolled manner).

Example – A project activity involves the utilization of wood residues that are burnt in an uncontrolled manner in the baseline, and empty fruit bunches that are left to decay aerobically. The non-obligated entities choose to determine baseline emissions due to uncontrolled burning of biomass based on the monitored quantities of each type of biomass and the default emission factor of 0.001971 t CH_4/t biomass.

$$BE_{BR,B1/B3,y} = GWP_{CH4} \times \left(BR_{woodresidues,y} + BR_{emptyfruitbunches,y}\right) \times\ 0.001971\ (\text{tCH4/t})$$

4.3.1.5.2. Step 5.2: Determine $BE_{BR,B2,y}$

98. For the biomass residues categories, as described in the biomass residues categories table, for which the most likely alternative scenario is that the biomass residues would decay under clearly anaerobic conditions (case B2), non-obligated entities shall calculate baseline emissions using the latest approved version of the BM-T-011. The variable $BE_{CH4,SWDS,y}$ calculated by tool corresponds to $BE_{BR,B2,y}$ in this methodology. The non-obligated entities shall use as waste quantities prevented from disposal ($W_{j,x}$) in tool, those quantities of biomass residues ($BR_{n,B2,y}$) for which B2 has been identified as the baseline scenario.

99. The determination of $BR_{n,B2,y}$ shall be based on the monitored amounts of biomass residues used in power plants included in the project boundary. Where all biomass residues with the alternative scenario B2 come from one particular source, the monitored quantities of biomass residues used from that source in the project plant can be directly used. Where only parts of the biomass residues from one source would be dumped and left for decay under clearly anaerobic conditions (B2), an allocation should be made consistently with the information provided for the ICM project activity in the ICM-PDD. The allocation should be made in a conservative manner and consistent with the guidance provided for $BR_{B4,n,y}$.

4.3.2. If electricity is generated from biomass in power-only plants

$BE_y = BE_{EL,y} + BE_{BR,y}$

Where:

BE_y	= Baseline emissions during year *y* (t CO_2)

[24] 2006 IPCC Guidelines, Volume 4, Table 2.5, default value for agricultural residues.
[25] 2006 IPCC Guidelines, Volume 4, Table 2.5, default value for agricultural residues.

$BE_{EL,y}$		= Baseline emissions due to generation of electricity in year *y* (tCO_2)
$BE_{BR,y}$		= Baseline emissions due to uncontrolled burning or decay of biomass residues in year *y* (t CO_{2e})

100. Baseline emissions are determined through the following steps:

4.3.2.1. Step 1: Determination of $BE_{EL,y}$

101. Baseline emissions from electricity generation are calculated based on the net quantity of electricity generated at the project site under the project scenario ($EG_{PJ,y}$) and a baseline emission factor ($EF_{BL,EL,y}$) which expresses the weighted average CO_2 intensity of electricity generation in the baseline, as follows:

$$BE_{EL,y} = EG_{PJ,y} \times EF_{BL,EL,y} \quad \text{Equation (3)}$$

Where:

$BE_{EL,y}$	=	Baseline emissions due to generation of electricity in year *y* (t CO_2)
$EG_{PJ,y}$	=	Net quantity of electricity generated in all power plants which are located at the project site and included in the project boundary in year *y* (MWh)
$EF_{BL,EL,y}$	=	Emission factor for electricity generation in the baseline in year *y* (t CO_2/MWh)

102. For this methodology, it is assumed that transmission and distribution losses in the electricity grid are not influenced significantly by the project activity and are therefore not accounted for.

4.3.2.1.1. Step 1.1: Determination of $EG_{PJ,y}$

103. The net quantity of electricity generated in all power plants which are located at the project site and included in the project boundary ($EG_{PJ,y}$) is determined as the difference between the gross electricity generation at the project site ($EG_{PJ,gross,y}$) and the auxiliary electricity consumption required for the operation of the power plants at the project site ($EG_{PJ,aux,y}$), as follows:

$$EG_{PJ,y} = EG_{PJ,gross,y} - EG_{PJ,aux,y} \quad \text{Equation (4)}$$

Where:

$EG_{PJ,y}$	= Net quantity of electricity generated in all power plants which are located at the project site and included in the project boundary in year *y* (MWh)
$EG_{PJ,gross,y}$	= Gross quantity of electricity generated in all power plants which are located at the project site and included in the project boundary in year *y* (MWh)
$EG_{PJ,aux,y}$	= Total auxiliary electricity consumption required for the operation of the power plants at the project site (MWh)

104. $EG_{PJ,aux,y}$ shall include all electricity required on-site for the operation of equipment related to the preparation, processing, storage and transport of biomass (e.g. for mechanical treatment of the biomass, conveyor belts, driers, palletisation, shredding, briquetting processes, etc.) and electricity required for the operation of all power plants which are located at the project site and included in the project boundary (e.g. for pumps, fans, cooling towers, instrumentation and control, etc.).

4.3.2.1.2. Step 1.2: Determination of $EF_{BL,EL,y}$

105. The electricity generated under the project activity could be generated in the baseline in three different ways, depending on the baseline scenario and the particular situation of the project activity:

(a) Use of biomass residues at the project site. Electricity could be generated with biomass residues in power plants at the project site. This applies, for example, if

(i) The project activity is a replacement of an existing biomass residues fired power plant;

(ii) The project activity is a capacity expansion of an existing biomass residues fired power plant by installing a new biomass residues fired power plant that is operated next to the existing plant;

(iii) The project activity is a fuel switch project activity where some biomass residues have already been used prior to the implementation of the project activity;

and/or

(b) Use of fossil fuels at the project site. Electricity could be generated with fossil fuels in power plants at the project site. This applies, for example, if:

(i) The project activity is a fuel switch from fossil fuels to biomass residues;

(ii) In the baseline, a fossil fuel power plant would continue to operate at the project site in parallel with a new biomass residues power plant;

and/or

(c) Power generation in the electricity grid. Electricity could be generated by power plants in the electricity grid. This applies, for example, if

(i) The project activity exports all electricity to the grid and no electricity would be produced at the project site in the baseline;

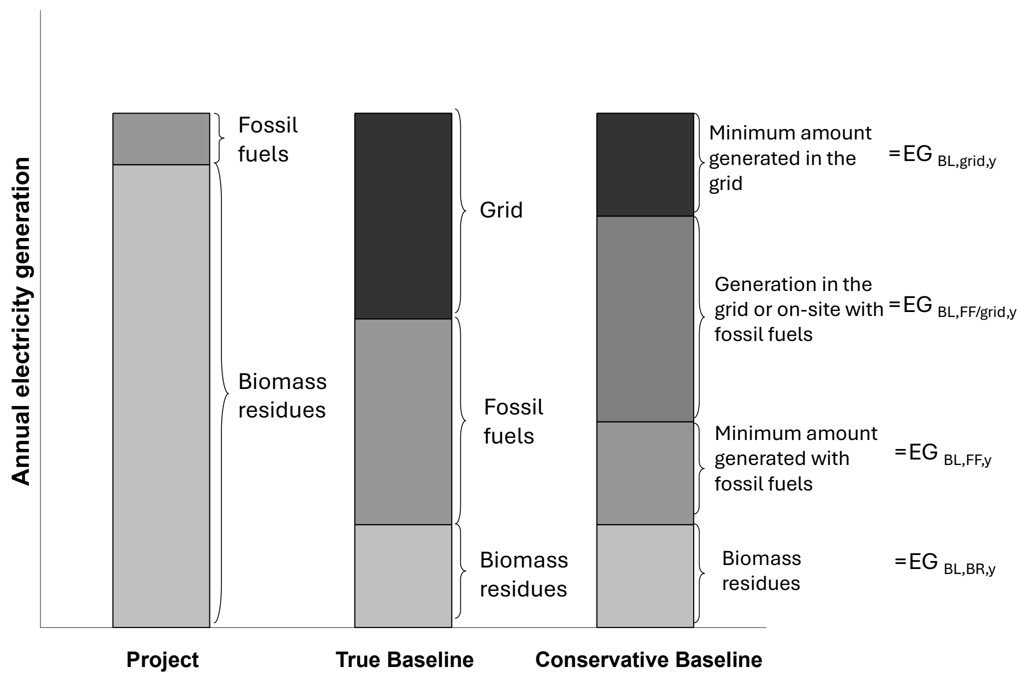
(ii) The project activity results in an increase of the quantity of electricity produced by power plants included in the project boundary and this increased electricity is exported to the grid or would in the baseline be purchased from the grid.

106. For some project types, electricity would be generated in the baseline by a combination of these three ways. Therefore, $EF_{BL,EL,y}$ is a weighted average baseline emission factor: it is determined based on each of the three ways electricity could be generated (grid, biomass

residues, fossil fuels), multiplied with its respective emission factor over the total amount of electricity produced in the baseline.

107. Figure 1 illustrates this general case. Under the project activity, electricity is generated with biomass residues and fossil fuels. This is illustrated in the bar labelled as “Project” in the figure. The bar labelled as “True Baseline” represents the scenario that would truly represent the mix of grid, biomass residues and fossil fuels based electricity that would be generated in the absence of the project activity.

Figure 1. Illustration of the determination of $EF_{BL,EL,y}$



108. In many situations, it is difficult to clearly determine the precise mix of grid, biomass residues and fossil fuels based electricity that would be generated in the absence of the project activity. If electricity can be generated in an on-site fossil fuel power plant or can be purchased from the grid, it is particularly challenging to determine how electricity would be generated in the baseline. For example, to what extent an existing coal power plant is dispatched and to what extent electricity is purchased from the grid can depend on the prices for electricity and coal which change over time.

109. For this reason, this methodology adopts a conservative approach and defines four parameters to be used for the calculation of the weighted average baseline emission factor $EF_{BL,EL,y}$. This is illustrated in the bar labelled “Conservative Baseline” in Figure 1. These four different electricity quantities are $EG_{BL,BR,y}$, $EG_{BL,grid,y}$, $EG_{BL,FF,y}$ and $EG_{BL,FF/grid,y}$:

(d) $EG_{BL,BR,y}$ corresponds to the amount of electricity that would be generated with biomass residues in power-only plants operated at the project site in the baseline;

(e) $EG_{BL,grid,y}$ corresponds to the amount of electricity for which it can be clearly identified that it would be generated in the electricity grid in the baseline. For example, the amount of electricity generated under the project activity that exceeds the amount that could be generated with the capacity of the baseline plants operated at the project site could only be generated in the grid in the baseline;

(f) $EG_{BL,FF,y}$ corresponds to the amount of electricity for which it can be clearly identified that it would be generated in the baseline with fossil fuels at the project site. For example, in the case of a co-fired boiler operated in the baseline, certain amounts of fossil fuels may need to be fired for technical or operational reasons;

(g) $EG_{BL,FF/grid,y}$ corresponds to the amount of electricity that could be generated in the baseline either by power plants in the electricity grid or with fossil fuels at the site of the project activity. As it cannot be clearly identified which of these two options would be used in the baseline, the lower CO_2 emission factor between the grid emission factor and the emission factor of fossil fuel power plants operated at the site of the project activity is used for this amount of electricity.

Based on this approach, $EF_{BL,EL,y}$ is calculated as follows:

$$EF_{BL,EL,y} = \frac{EG_{BL,FF,y} \times EF_{BL,FF,y} + EG_{BL,grid,y} \times EF_{grid,CM,y} + EG_{BL,FF/grid,y} \times \text{MIN}\left(EF_{BL,FF,y}, EF_{grid,CM,y}\right)}{EG_{BL,BR,y} + EG_{BL,FF,y} + EG_{BL,grid,y} + EG_{BL,FF/grid,y}}$$

Where:

$EF_{BL,EL,y}$	=	Emission factor for electricity generation in the baseline in year *y* (t CO_2/MWh)
$EG_{BL,BR,y}$	=	Amount of electricity that would be generated with biomass residues in power-only plants operated at the project site in the baseline in year *y* (MWh)
$EG_{BL,FF,y}$	=	Minimum amount of electricity that would be generated with fossil fuels at the project site in the baseline in year *y* (MWh)
$EG_{BL,grid,y}$	=	Minimum amount of electricity that would be generated by power plants in the electricity grid in the baseline in year *y* (MWh)
$EG_{BL,FF/grid,y}$	=	Amount of electricity that could be generated in the baseline either by power plants in the electricity grid or by power plants at the project site using fossil fuels in year *y* (MWh)
$EF_{grid,CM,y}$	=	Combined margin CO_2 emission factor for grid-connected electricity generation in year *y* (t CO_2/MWh)
$EF_{BL,FF,y}$	=	CO_2 emission factor for electricity generation with fossil fuels in power plant(s) at the project site in the baseline in year *y* (t CO_2/MWh)

110. In the following, first the amounts of electricity generated from the various sources in the baseline ($EG_{BL,BR,y}$, $EG_{BL,grid,y}$, $EG_{BL,FF,y}$ and $EG_{BL,FF/grid,y}$) are determined, taking into account

the project configuration and the baseline scenario. Therefore, different cases have to be considered. Then the emission factors ($EF_{grid,CM,y}$ and $EF_{BL,FF,y}$) are determined.

4.3.2.1.3. Step 1.3: Determination of $EG_{BL,BR,y}$

111. The amount of electricity that would be generated with biomass residues in power-only plants operated at the project site in the baseline ($EG_{BL,BR,y}$) should, in accordance with the baseline scenario and the historical situation before project implementation, be determined as follows:

4.3.2.1.3.1. Case 1: No power generation with biomass residues in the baseline

112. If Scenario B5 does not apply to any biomass residue category (i.e. if no biomass residues would be used for electricity generation in power-only plants in the baseline), then: $EG_{BL,BR,y} = 0$;

4.3.2.1.3.2. Case 2: Power generation with biomass residues in the baseline

113. If Scenario B5 applies to all or parts of the biomass residues fired in the power plant(s) included in the project boundary (i.e. if all or parts of the biomass residues would be used in the baseline for electricity generation in power-only plants included in the baseline boundary), then $EG_{BL,BR,y}$ is calculated as follows:

$$EG_{BL,BR,y} = \frac{1}{3.6} \times \sum_{n} \sum_{p} \eta_{BL,BR,p} \times BR_{BL,n,p,y} \times NCV_{n,y}$$

Equation (18)

Where:

$EG_{BL,BR,y}$	=	Amount of electricity that would be generated with biomass residues in power-only plants operated at the project site in the baseline in year *y* (MWh)
$\eta_{BL,BR,p}$	=	Efficiency of electricity generation of baseline power plant *p* if fired only with biomass residues and not with fossil fuels (ratio)
$BR_{BL,n,p,y}$	=	Quantity of biomass residues of category *n* that would be fired in power-only plant *p* in the baseline in year *y* (tonnes on dry-basis)
$NCV_{n,y}$	=	Net calorific value of biomass residues of category *n* in year *y* (GJ/tonnes on dry-basis)
n	=	Biomass residues categories
p	=	Power-only plants at the site of the project activity that would (partly) use biomass residues to generate electricity in the baseline

4.3.2.1.3.2.1. Determination of $BR_{BL,n,p,y}$

114. Where case 2 above applies, $BR_{BL,n,p,y}$ shall be based on the monitored amounts of category of biomass residues used in power plants included in the project boundary. Note that $BR_{BL,n,p,y}$ only includes those biomass residues categories which would also be used in the

baseline for electricity generation in power-only plants (i.e. for which B5 or BG3 is the baseline scenario).

115. Where the whole amount of biomass residues of one particular category and from one particular source would be used in the baseline in only one clearly identifiable baseline power plant *p*, the monitored quantities of biomass residues used in the project ($BR_{PJ,n,y}$) can be directly allocated to their use in the baseline scenario ($BR_{BL,n,p,y}$).

116. However, there may be cases where:

(a) One biomass residue category from one particular source could be used in the baseline in two or more power plants *p* (and not only in one power plant) or in different boilers of that power plant. In this case, the use of this biomass residue category from this source has to be allocated to the different baseline power plants *p* or different boilers should they have a different efficiency;

(b) One biomass residue category from one particular source could have two different fates in the baseline scenario (partly dumped (B1) and partly used for power generation at the project site (B5)). In this case, the biomass residue quantity used under the project shall be allocated to the following fates in the baseline scenario:

(i) Electricity generation in power-only plants at the project site (B5);

(ii) Dumping, leaving to decay or burning (B1, B2 and/or B3); or

(iii) Other fates (B4).

117. The non-obligated entities should specify and justify in the ICM-PDD in a transparent manner how the relevant allocations should be made and how $BR_{BL,n,p,y}$ should be determined for the relevant biomass residue category *n* and each power plant *p* based on the monitored quantities. The approaches used should be consistent with the identified baseline scenario and reflect the particular situation of the underlying project activity. In doing so, the following allocation rules should be adhered to:

(c) The sum of biomass residues used in the baseline in all power plants *p* shall correspond to the total amount of biomass residues which are used under the project activity and for which the baseline scenario is B5:

$$\sum_{n}\sum_{p} BR_{BL,n,p,y} = \sum_{n} BR_{PJ,n,y} \quad \text{Equation (19)}$$

Where:

$BR_{BL,n,p,y}$	=	Quantity of biomass residues of category *n* that would be fired in power-only plant *p* in the baseline in year *y* (tonnes on dry-basis)
$BR_{PJ,n,y}$	=	Quantity of biomass residues of category *n* used in power plants which are located at the project site and included in the project boundary in year *y* (tonnes on a dry-basis)
n	=	Biomass residues categories
p	=	Power-only plants at the site of the project activity that would (partly) use biomass residues to generate electricity in the baseline

(d) The allocation of biomass residue should be undertaken in a conservative manner. This means that in case of uncertainty an allocation rule should favour the option that results in lower emission reductions;

(e) If several biomass residue plants *p* or several boilers supplying one power plant would operate in the baseline and if it is technically feasible to use a biomass residue category in different power plants *p* or boilers, one of the following two approaches should be applied:

(i) Assume the most efficient operation mode which results in the greatest amount of electricity generation from biomass residues;

(ii) Choose for the determination of $\eta_{BL,BR,p}$ below the same conservative default efficiency for all power plants *p* that would be operated in the baseline at the project. In this case, no allocation of biomass residues to different power plants is required.

(f) In the case a biomass residues category from one particular source has been used prior to the implementation of the project activity partly in power-only plants operated at the project site (scenario B5) and partly has been dumped, left to decay or burnt (scenarios B1, B2, B3) and if this situation would continue in the baseline scenario, then use, as a conservative approach to address the uncertainty associated with such an allocation, the maximum value among the following two approaches for the quantity of biomass residue allocated to scenario B5:

(i) The highest annual historical use of that biomass residue category from that source in power-only plants operated at the project site observed in the most recent three calendar years prior to the implementation of the project activity; and

(ii) In the case of project activities that use biomass residues from an on-site production process (e.g. production of sugar cane or rice), calculated as follows:

$$BR_{PJ,n,B5,y} = P_y \times MAX\left\{\frac{BR_{n,power-only,x}}{P_x};\frac{BR_{n,power-only,x-1}}{P_{x-1}};\frac{BR_{n,power-only,x-2}}{P_{x-2}}\right\}$$ Equation (20)

Where:

$BR_{PJ,n,B5,y}$	=	Quantity of biomass residues of category *n* used in year *y* in power-only plants which are located at the project site and included in the project boundary and for which B5 is the baseline scenario (tonnes on dry-basis)
$BR_{n,power-only,x}$	=	Quantity of biomass residues of category *n* used in year *x* in power-only plants which were used at the project site prior to the implementation of the project activity (tonnes on dry-basis)
P_y	=	Quantity of the main product of the production process (e.g. sugar cane, rice) produced in year *y* from plants operated at the project site

P_x	=	Quantity of the main product of the production process (e.g. sugar cane, rice) produced in year *x* from plants operated at the project site
x	=	Last calendar year prior to the start of the crediting period
n	=	Biomass residue category from one particular source for which the baseline scenario is partly B5 and partly B1/B2/B3 B1 is the baseline scenario

4.3.2.1.3.2.2. Determination of $\eta_{BL,BR,p}$

118. This methodology covers situations where a power plant p includes different heat generators which can use different fuel types and which operate in parallel, supplying heat to a common heat header, as well as several heat engines with different efficiencies that also operate in parallel and all use heat from the common heat header. Therefore, the definition of a single efficiency of electricity generation for a baseline power plant p is challenging, and a simplified and conservative approach (i.e. an approach that tends to overestimate ηBL,BR,p) is taken.

119. The parameter ηBL,BR,p shall be calculated for each power plant p in accordance with BM-T-006.

4.3.2.1.4. Step 1.4: Determination of $EG_{BL,FF,y}$

120. The minimum amount of electricity that would be generated with fossil fuels at the project site in the baseline in year *y* ($EG_{BL,FF,y}$) should, in accordance with the baseline scenario and the historical situation before project implementation, be determined as follows:

4.3.2.1.4.1. Case 1: No use of fossil fuels in the baseline

121. This case applies if no fossil fuels would be used for electricity generation in the baseline scenario at the project site. In this case, $EG_{BL,FF,y} = 0$.

4.3.2.1.4.2. Case 2: No connection to the electricity grid

122. This case applies if all power plants included in the project boundary are off-grid power plants. In this case, the electricity generated by the project can only displace on-site electricity generation with fossil fuel and/or biomass residues ($EG_{PJ,y} = EG_{BL,FF,y} + EG_{BL,BR,y}$). Accordingly, $EG_{BL,FF,y}$ is calculated as follows:

$$EG_{BL,FF,y} = EG_{PJ,y} - EG_{BL,BR,y} \quad \text{Equation (21)}$$

Where:

$EG_{BL,FF,y}$	=	Minimum amount of electricity that would be generated with fossil fuels at the project site in the baseline in year *y* (MWh)
$EG_{PJ,y}$	=	Electricity generated in power plants included in the project boundary in year *y* (MWh/yr)
$EG_{BL,BR,y}$	=	Amount of electricity that would be generated with biomass residues in power-only plants operated at the project site in the baseline in year *y* (MWh/yr)

4.3.2.1.4.3. Case 3: Grid connection and historical use of fossil fuels

123. This case applies if:

(a) At least one power plant included in the project boundary is not an off-grid plant;

(b) Fossil fuels were used for power generation at the project site at any point in time during the most recent three calendar years prior to the implementation of the project activity; and

(c) The baseline scenario includes the continued use of fossil fuels for power generation at the project site either in existing or new (co-fired) power plant(s) at the project site which is/are (co-)fired with fossil fuels.

124. In this case, it is assumed that at least the lowest annual amount of fossil fuel use during the most recent three years would continue to be used for electricity generation in the baseline. $EG_{BL,FF,y}$ is then determined as the lowest annual amount of electricity generation with fossil fuels during the most recent three years prior to the implementation of the project activity, as follows:

$$EG_{BL,FF,y} = MIN\left(EG_{FF,x}; EG_{FF,x-1}; EG_{FF,x-2}\right) \quad \text{Equation (22)}$$

Where:

$EG_{BL,FF,y}$	=	Minimum amount of electricity that would be generated with fossil fuels at the project site in the baseline in year *y* (MWh/yr)
$EG_{FF,x}$	=	Electricity generation with fossil fuels in power plant(s) operated in year *x* at the project site and included in the project boundary (MWh/yr)
$EG_{FF,x-1}$	=	Electricity generation with fossil fuels in power plant(s) operated in year *x*-1 at the project site and included in the project boundary (MWh/yr)
$EG_{FF,x-2}$	=	Electricity generation with fossil fuels in power plant(s) operated in year *x*-2 at the project site and included in the project boundary (MWh/yr)
x	=	Last calendar year prior to the start of the crediting period

125. If only fossil fuels and no biomass residues were used for electricity generation at the project site prior to the implementation of the project activity, then $EG_{FF,x}$, $EG_{FF,x-1}$ and $EG_{FF,x-2}$ can be obtained directly from historical electricity generation records.

126. If fossil fuels and biomass residues were used for electricity generation at the project site prior to the implementation of the project activity, then $EG_{FF,x}$, $EG_{FF,x-1}$ and $EG_{FF,x-2}$ are determined as follows:

$$EG_{FF,x} = \sum_{m}\sum_{p} \eta_{p,FF} \times \frac{1}{3.6} \times FF_{m,p,x} \times NCV_{m,x} \quad \text{Equation (23)}$$

Where:

$EG_{FF,x}$	=	Electricity generation with fossil fuels in power plant(s) operated in year *x* at the project site and included in the project boundary (MWh/yr)
$\eta_{p,FF}$	=	Efficiency of electricity generation of power plant *p* if fired only with fossil fuels and not with biomass residues
$FF_{m,p,x}$	=	Quantity of fossil fuel type *m* fired in power plant *p* in year *x* (mass or volume unit/yr)
$NCV_{m,x}$	=	Net calorific value of fossil fuel type *m* in year *x* (GJ/mass or volume unit)
m	=	Fossil fuel types used in the power plants *p* in years *x*, *x*-1 and *x*-2
p	=	Power plants that are operated at the site of the project activity, included in the project boundary, and (partially) fired with fossil fuels in the years *x*, *x*-1 and *x*-2
x	=	Last calendar year prior to the start of the crediting period

4.3.2.1.4.4. Case 4: Grid connection, no historical use of fossil fuels, and construction of a new power plant (co-)fired with fossil fuels in the baseline scenario

127. This case applies if:

a. At least one power plant included in the project boundary is not an off-grid plant;

b. No fossil fuels were used for power generation at the project site during the most recent three years prior to the implementation of the project activity; and

c. The baseline scenario is the construction of new power plant(s) at the project site which is/are (co-)fired with fossil fuels.

128. In this case, it is difficult to establish a reasonable minimum amount of electricity that would be generated with fossil fuels at the project site. The project activity could displace electricity in both on-site fossil fuel fired power plants or in the grid. To what extent the on-site power plant(s) is/are dispatched and to what extent grid electricity is used could depend on several parameters, including the price of electricity, the price of the fossil fuels, the on-site demand for electricity and/or the reliability of the grid. However, all these parameters may change during the crediting period.

129. For this reason, the following conservative approach is taken:

(a) If the new power plant constructed in the baseline scenario would only use fossil fuels and not co-fire any biomass residues, then $EG_{BL,FF,y}$ = 0. This implies that the amount of electricity that could displace on-site electricity generation with fossil fuels is allocated to $EG_{BL,FF/grid,y}$;

(b) If the new power plant constructed in the baseline scenario would co-fire fossil fuels and biomass residues, then $EG_{BL,FF,y}$ corresponds to the minimum amount of fossil fuels that must be used due to technical or operational constraints to operate the power plant. This quantity shall be determined based on technical specifications obtained from manufacturers. The determination of this amount shall be transparently documented and explained in the ICM-PDD. Otherwise, if there are no technical constraints, if these cannot be demonstrated or if the non-obligated entities do not wish to determine a minimum amount, it should be assumed that $EG_{BL,FF,y}$ = 0.

4.3.2.1.4.5. Step 1.5: Determination of $EG_{BL,grid,y}$

130. The minimum amount of electricity that would be generated by power plants in the electricity grid in the baseline ($EG_{BL,grid,y}$) shall, in accordance with the baseline scenario, be determined as follows:

4.3.2.1.4.5.1. Case 1: No connection to the electricity grid

131. If all power plants included in the project boundary are off-grid power plants, then the project does not displace grid electricity and $EG_{BL,grid,y}$ = 0.

4.3.2.1.4.5.2. Case 2: No electricity generation at the project site in the baseline

132. If no power plants would be operated at the project site in the baseline, then all electricity **generated** by the project displaces grid electricity and $EG_{BL,grid,y} = EG_{PJ,y}$.

4.3.2.1.4.5.3. Case 3: Use of only biomass residues for electricity generation at the project site in the baseline

133. If only biomass residues and no fossil fuels would be used for electricity generation at the project site in the baseline, then the electricity generated by the project displaces grid electricity and electricity generated with biomass residues ($EG_{PJ,y} = EG_{BL,grid,y} + EG_{BL,BR,y}$). Accordingly, $EG_{BL,grid,y}$ is calculated as follows:

$$EG_{BL,grid,y} = EG_{PJ,y} - EG_{BL,BR,y}$$ Equation (24)

Where:

$EG_{BL,grid,y}$	=	Minimum amount of electricity that would be generated by power plants in the electricity grid in the baseline in year *y* (MWh/yr)
$EG_{PJ,y}$	=	Electricity generated in power plants included in the project boundary in year *y* (MWh/yr)
$EG_{BL,BR,y}$	=	Amount of electricity that would be generated with biomass residues in power-only plants operated at the project site in the baseline in year *y* (MWh/yr)

4.3.2.1.4.5.4. Case 4: Use of only fossil fuels for electricity generation at the project site in the baseline

134. If only fossil fuel and no biomass residues would be used for electricity generation at the project site in the baseline, then the electricity generated by the project can displace grid electricity and electricity generated with fossil fuels at the project site.

135. $EG_{BL,grid,y}$ represents the amount of electricity that could not be generated in on-site power plant(s) using fossil fuels and would have to be supplied by the grid. This applies to the amount of electricity generated in the project activity that exceeds the maximum amount of electricity

that could be generated with fossil fuels at the project site in the baseline ($EG_{BL,MAX,FF}$). Accordingly, $EG_{BL,grid,y}$ is calculated as follows:

$$EG_{BL,grid,y} = \begin{cases} EG_{PJ,y} - EG_{BL,MAX,FF,y} \text{ if } EG_{PJ,y} > EG_{BL,MAX,FF} \\ \text{or} \\ 0 \text{ if } EG_{PJ,y} \leq EG_{BL,MAX,FF} \end{cases} \quad \text{Equation (25)}$$

Where:

$EG_{BL,grid,y}$	=	Minimum amount of electricity that would be generated by power plants in the electricity grid in the baseline in year *y* (MWh/yr)
$EG_{PJ,y}$	=	Electricity generated in power plants included in the project boundary in year *y* (MWh/yr)
$EG_{BL,MAX,FF,y}$	=	Maximum amount of electricity that could be generated with fossil fuels at the project site in the baseline (MWh/yr)

4.3.2.1.4.5.5. Case 5: Use of fossil fuels and biomass residues for electricity generation at the project site in the baseline

136. If biomass residues and fossil fuels would be used for electricity generation at the project site in the baseline, then the electricity generated by the project can displace grid electricity, electricity generated with fossil fuels at the project site and electricity generated with biomass residues at the project site. The following scenarios can occur:

a) **Use of all biomass residues in co-fired heat generator(s):** all biomass residues that would be used in the baseline for electricity generation would be co-fired with fossil fuels. In this case, $EG_{BL,grid,y}$ corresponds to the amount of electricity generated in the project activity that exceeds the maximum amount of electricity generation that could be generated by co-firing fossil fuels and biomass residues in plants at the project site in the baseline ($EG_{BL,MAX,FF/BR}$). Accordingly, $EG_{BL,grid,y}$ is calculated as follows:

$$EG_{BL,grid,y} = \begin{cases} EG_{PJ,y} - EG_{BL,MAX,\frac{FF}{BR},y} \text{ if } EG_{PJ,y} > EG_{BL,MAX,\frac{FF}{BR},y} \\ \text{or} \\ 0 \text{ if } EG_{PJ,y} \leq EG_{BL,MAX,FF/BRy} \end{cases} \quad \text{Equation (26)}$$

Where:

$EG_{BL,grid,y}$	=	Minimum amount of electricity that would be generated by power plants in the electricity grid in the baseline in year *y* (MWh/yr)
$EG_{PJ,y}$	=	Electricity generated in power plants included in the project boundary in year *y* (MWh/yr)
$EG_{BL,MAX,FF/BR,y}$	=	Maximum amount of electricity that could be generated with fossil fuels and any co-firing of biomass residues at the project site in the baseline in year *y* (MWh/yr)

b) **Use of all biomass residues in biomass residues only heat generator(s):** all biomass residues that would be used in the baseline for electricity generation would be used in heat generator(s) that use only biomass residues and no fossil fuels. In this case, $EG_{BL,grid,y}$ is determined as follows:

Equation (27)

$$EG_{BL,grid,y} = \begin{cases} EG_{PJ,y} - EG_{BL,BR,y} - EG_{BL,MAX,FF,y} \text{ if } EG_{PJ,y} > \left(EG_{BL,BR,y} + EG_{BL,MAX,FF}\right) \\ \text{or} \\ 0 \text{ if } EG_{PJ,y} \leq \left(EG_{BL,BR,y} + EG_{BL,MAX,FF}\right) \end{cases}$$

Where:

$EG_{BL,grid,y}$	=	Minimum amount of electricity that would be generated by power plants in the electricity grid in the baseline in year *y* (MWh/yr)
$EG_{PJ,y}$	=	Electricity generated in power plants included in the project boundary in year *y* (MWh/yr)
$EG_{BL,BR,y}$	=	Amount of electricity that would be generated with biomass residues in power-only plants operated at the project site in the baseline in year *y* (MWh/yr)
$EG_{BL,MAX,FF,y}$	=	Maximum amount of electricity that could be generated with fossil fuels at the project site in the baseline (MWh/yr)

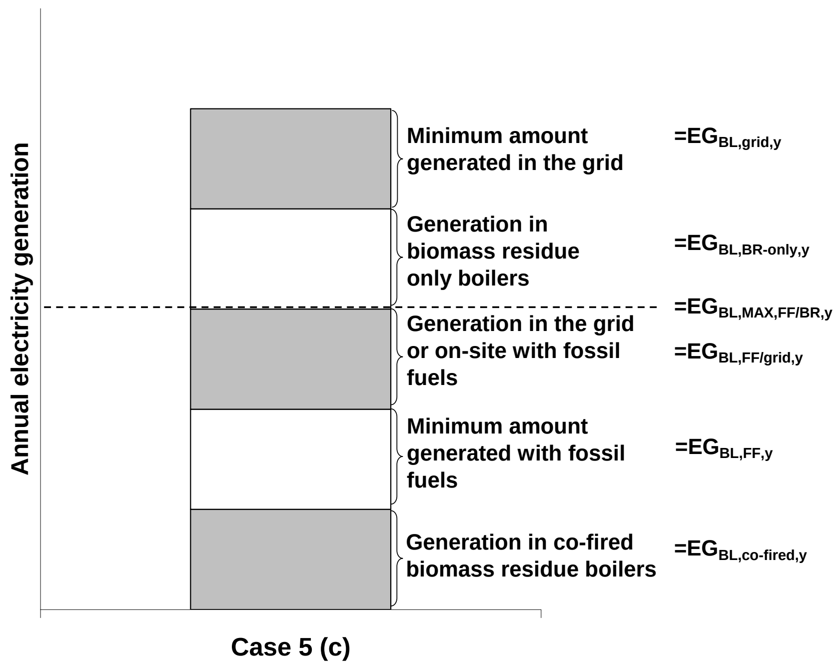
c) **Use of biomass residues in both biomass residues only heat generator(s) and co-fired heat generator(s):** the biomass residues that would be used in the baseline for electricity generation would partially be co-fired in fossil fired heat generator(s) and partially be used in heat generator(s) that use only biomass residues. In this case, the non-obligated entities shall document and justify in the ICM-PDD what quantities of which types of biomass residues would be used in each type of heat generator, ensuring that:

Equation (28)

$$\sum_{n}\sum_{p} BR_{BL,n,p,y} = BR_{BL,BR-only,y} + BR_{BL,co-fired,y}$$

Where:

$BR_{BL,n,p,y}$	=	Quantity of biomass residues of category *n* that would be fired in power-only plant *p* in the baseline in year *y* (tonnes on dry-basis)
$BR_{BL,BR-only,y}$	=	Quantity of biomass residues that would be fired in biomass-residue-only heat generators (of power-only plants) in the baseline in year *y* (tonnes on dry-basis)
$BR_{BL,co-fired,y}$	=	Quantity of biomass residues that would be fired in co-fired heat generators (of power-only plants) in the baseline in year *y* (tonnes on dry-basis)



137. In this case, $EG_{BL,grid,y}$ corresponds to the amount of electricity generated in the project activity that exceeds the maximum amount of electricity generation that could be generated by co-firing fossil fuels and biomass residues in plants at the project site in the baseline ($EG_{BL,MAX,FF/BR,y}$) and by firing biomass residues in biomass residues only heat generators ($EG_{BL,BR\text{-}only,y}$). Accordingly, $EG_{BL,grid,y}$ is calculated as follows:

$$EG_{BL,grid,y} = \begin{cases} EG_{PJ,y} - EG_{BL,BR,only,y} - EG_{BL,MAX,\frac{FF}{BR},y} \text{ if } EG_{PJ,y} > \begin{pmatrix} EG_{BL,BR,only,y} + \\ EG_{BL,MAX,\frac{FF}{BR},y} \end{pmatrix} \\ \text{or} \\ 0 \text{ if } EG_{PJ,y} \leq \begin{pmatrix} EG_{BL,BR,only,y} + \\ EG_{BL,MAX,FF/BR,y} \end{pmatrix} \end{cases} \quad \text{Equation (29)}$$

Where:

$EG_{BL,grid,y}$	=	Minimum amount of electricity that would be generated by power plants in the electricity grid in the baseline in year *y* (MWh/yr)
$EG_{PJ,y}$	=	Electricity generated in power plants included in the project boundary in year *y* (MWh/yr)
$EG_{BL,BR,only,y}$	=	Amount of electricity that would be generated with biomass-residue-only heat generators at the project site in the baseline in year *y* (MWh/yr)
$EG_{BL,MAX,FF/BR,y}$	=	Maximum amount of electricity that could be generated with fossil fuels and any co-firing of biomass residues at the project site in the baseline in year *y* (MWh/yr)

138. The parameter $EG_{BL,BR\text{-}only,y}$ shall be estimated based on the parameter $BR_{BL,BR\text{-}only,y}$ and the corresponding efficiency of power generation.

4.3.2.1.4.6. Determination of $EG_{BL,MAX,FF,y}$

139. $EG_{BL,MAX,FF,y}$ corresponds to the maximum amount of electricity that could be generated with fossil fuels at the project site in the baseline. This parameter needs to be determined if fossil fuels would be used for electricity generation at the project site in the baseline (cases 4 and 5 above).

140. $EG_{BL,MAX,FF,y}$ is determined as follows:

$$EG_{BL,MAX,FF,y} = \sum_{p} CAP_{FF,p} \times LF_{p}$$ Equation (30)

Where:

$EG_{BL,MAX,FF,y}$	=	Maximum amount of electricity that could be generated with fossil fuels at the project site in the baseline in year *y* (MWh/yr)
$CAP_{FF,p}$	=	Maximum electricity generation capacity of baseline power plant *p* if fired only with fossil fuels (MW)
LF_{p}		Load factor of baseline power plant *p* (ratio)
p	=	Power-only plants that would operate at the project site in the baseline scenario

4.3.2.1.4.7. Determination of $EG_{BL,MAX,FF/BR,y}$

141. $EG_{BL,MAX,FF/BR,y}$ corresponds to the maximum amount of electricity that could be generated with fossil fuels and any co-firing of biomass residues at the project site in the baseline in year *y* (MWh/yr). This parameter needs to be determined if fossil fuels and biomass residues would be co-fired in heat generators of any power plant that would be used for electricity generation at the project site in the baseline (case 5(c) above).

142. $EG_{BL,MAX,FF/BR,y}$ is determined as follows:

$$EG_{BL,MAX,FF/BR,y} = \sum_{p} CAP_{FF/BR,p,y} \times 0.9 \times 8.760\ hours/yr$$ Equation (31)

Where:

$EG_{BL,MAX,FF/BR,y}$	=	Maximum amount of electricity that could be generated with fossil fuels and any co-firing of biomass residues at the project site in the baseline in year *y* (MWh/yr)
$CAP_{FF/BR,p,y}$	=	Maximum electricity generation capacity of baseline power plant *p* in year *y* if fossil-fuel-only heat generators and co-fired heat generators are used (MW)
p	=	Power-only plants that would operate at the project site in the baseline scenario

143. $CAP_{FF/BR,p,y}$ shall be based on the maximum heat quantity that can be generated for use in heat engines if fossil-fuel-only heat generators and co-fired heat generators are used (but

no biomass-residue-only heat generators). Note that $CAP_{FF/BR,p,y}$ depends on the amount of biomass residues co-fired in heat generators of the power plant. It is therefore determined based on the monitored amounts of biomass residues that would be co-fired in heat generators in year *y* ($BR_{BL,co\text{-}fired,y}$).

144. Alternatively, as a conservative approach, the following can be assumed: $EG_{BL,MAX,FF/BR,y} = EG_{BL,MAX,FF}$.

4.3.2.1.4.6. Step 1.6: Determination of $EG_{BL,FF/grid,y}$

145. $EG_{BL,FF/grid,y}$ represents the amount of electricity that could be generated in the baseline in the grid or at the project site using fossil fuels. $EG_{BL,FF/grid,y}$ corresponds to the remainder of electricity generation, i.e. the amount that exceeds the minimum amount of electricity that would be generated by power plants in the electricity grid ($EG_{BL,grid,y}$), the minimum amount of electricity that could be generated with fossil fuels at the project site ($EG_{BL,FF,y}$), and the amount of electricity that would be generated with biomass residues at the project site ($EG_{BL,BR,y}$). Accordingly, $EG_{BL,FF/grid,y}$ is calculated as follows:

$$EG_{BL,FF/grid,y} = EG_{Pj,y} - EG_{BL,BR,y} - EG_{BL,FF,y} - EG_{BL,grid,y}$$ Equation (32)

Where:

$EG_{BL,FF/grid,y}$	=	Amount of electricity that could be generated in the baseline either by power plants in the electricity grid or by power plants at the project site using fossil fuels in year *y* (MWh)
$EG_{Pj,y}$	=	Electricity generated in power plants included in the project boundary in year *y* (MWh)
$EG_{BL,BR,y}$	=	Amount of electricity that would be generated with biomass residues in power-only plants operated at the project site in the baseline in year *y* (MWh)
$EG_{BL,FF,y}$	=	Minimum amount of electricity that would be generated with fossil fuels at the project site in the baseline in year *y* (MWh)
$EG_{BL,grid,y}$	=	Minimum amount of electricity that would be generated by power plants in the electricity grid in the baseline in year *y* (MWh)

4.3.2.1.4.7. Step 1.7: Determination of $EF_{BL,FF,y}$

146. $EF_{BL,FF,y}$ shall be determined using Option A or Option B below. If fossil fuel power plants were operated at the project site prior to the implementation of the project activity, either

Option A or Option B can be used to determine $EF_{BL,FF,y}$. For new power plants that would be constructed at the project site in the baseline scenario, Option B shall be used.

4.3.2.1.4.7.1. Option A

147. Determine $EF_{BL,FF,y}$ as per the procedure described under "Scenario B: Electricity consumption from an off-grid captive power plant" in the latest approved version of BM-T-003, using data from the three calendar years prior to the implementation of the project activity.

4.3.2.1.4.7.2. Option B

148. Determine a default emission factor for $EF_{BL,FF,y}$ based on a default efficiency of the power plant that would be operated at the project site in the baseline and a default CO_2 emission factor for the fossil fuel types that would be used, as follows:

$$EF_{BL,FF,y} = 3.6 \times \frac{EF_{BL,CO2,FF}}{\eta_{BL,FF}} \quad \text{Equation (33)}$$

Where:

$EF_{BL,FF,y}$	=	CO_2 emission factor for electricity generation with fossil fuels in power plant(s) at the project site in the baseline in year *y* (t CO_2/MWh)
$EF_{BL,CO2,FF}$	=	CO_2 emission factor of the fossil fuel type that would be used for power generation at the project site in the baseline (t CO_2/GJ)
$\eta_{BL,FF}$	=	Efficiency of the fossil fuel power plant(s) at the project site in the baseline

4.3.2.1.4.8. Step 1.8: Determination of $EF_{grid,CM,y}$

149. $EF_{grid,CM,y}$ shall be determined as the combined margin CO_2 emission factor for grid connected power generation in year *y*, calculated using the latest approved version of CEA database.

4.3.2.2. Step 2: Determination of baseline emissions due to uncontrolled burning or decay of biomass residues ($BE_{BR,y}$)

150. The calculation of baseline emissions due to uncontrolled burning or decay of biomass residues is optional and non-obligated entities can decide whether to include these emission sources or not. If non-obligated entities wish to include these emission sources, the procedure below shall be followed, and emissions from combustion of biomass residues under the project activity shall be also be determined. Otherwise, this section does not need to be

applied and project emissions do not need to include emissions from the combustion of biomass residues under the project activity.

151. Baseline emissions due to uncontrolled burning or decay of biomass residues are only determined for those categories of biomass residues for which B1, B2 or B3 has been identified as the baseline scenario.

152. The emissions are determined separately for biomass residues categories for which scenarios B1 and B3 (aerobic decay or uncontrolled burning) apply, and for biomass residues categories for which scenario B2 (anaerobic decay) apply:

$$BE_{BR,y} = BE_{BR,B1/B3,y} + BE_{BR,B2,y}$$ Equation (34)

Where:

$BE_{BR,y}$	=	Baseline emissions due to uncontrolled burning or decay of biomass residues in year *y* (t CO_2)
$BE_{BR,B1/B3,y}$	=	Baseline emissions due to aerobic decay or uncontrolled burning of biomass residues in year *y* (t CO_2)
$BE_{BR,B2,y}$	=	Baseline emissions due to anaerobic decay of biomass residues in year *y* (t CO_2)

4.3.2.2.1. Step 2.1: Determination of $BE_{BR,B1/B3,y}$

153. For the biomass residues categories, for which the most likely baseline scenario is either that the biomass residues would be dumped or left to decay under mainly aerobic conditions (B1), or burnt in an uncontrolled manner without utilizing them for energy purposes (B3), baseline emissions are calculated assuming, for both scenarios (aerobic decay and uncontrolled burning), that the biomass residues would be burnt in an uncontrolled manner.

154. Baseline emissions are calculated as follows:

$$BE_{BR,B1/B3,y} = GWP_{CH4} \times \sum_{n} BR_{n,B1/B3,y} \times NCV_{n,y} \times EF_{BR,n,y}$$ Equation (35)

Where:

$BE_{BR,B1/B3,y}$	=	Baseline emissions due to aerobic decay or uncontrolled burning of biomass residues in year *y* (t CO_2)
GWP_{CH4}	=	Global warming potential of methane valid for the commitment period (t CO_2/t CH_4)
$BR_{n,B1/B3,y}$	=	Amount of biomass residues category *n* used in the project plant(s) included in the project boundary in year *y* for which B1 or B3 has been identified as the baseline scenario (tonnes on dry-basis)
$NCV_{n,y}$	=	Net calorific value of the biomass residues category *n* in year *y* (GJ/tonnes on dry-basis)
$EF_{BR,n,y}$	=	CH_4 emission factor for uncontrolled burning of the biomass residues category *n* during the year *y* (t CH_4/GJ)
n	=	Categories of biomass residues

155. To determine the CH_4 emission factor, non-obligated entites may undertake measurements or use referenced default values.

156. In the absence of more accurate information for $NCV_{BR,n,y}$ and $EF_{BR,n,y}$[26], a default value of 0.0027 tCH_4/ tbiomass is recommended27, adjusted by a conservativeness factor (i.e. 0.73) to address the high level of uncertainty. In this case, an emission factor of 0.001971 tCH_4/t biomass should be used.

4.3.2.2.2. Step 2.2: Determination of $BE_{BR,B2,y}$

157. For the biomass residues categories, as described in the biomass residues categories table, for which the most likely baseline scenario is that the biomass residues would decay under clearly anaerobic conditions (case B2), non-obligated entities shall calculate baseline emissions using the latest approved version of BM-T-011. The variable $BE_{CH4,SWDS,y}$ calculated by the tool corresponds to $BE_{BR,B2,y}$ in this methodology. The non-obligated entites shall use as waste quantities prevented from disposal ($W_{j,x}$) in the tool, those quantities of biomass residues ($BR_{n,B2,y}$) for which B2 has been identified as the baseline scenario.

158. The determination of $BR_{n,B2,y}$ shall be based on the monitored amounts of biomass residues used in power plants included in the project boundary. Where all biomass residues with the baseline scenario B2 come from one particular source, the monitored quantities of biomass residues used from that source in the project plant ($BR_{PJ,n,y}$) can be directly used. Where only parts of the biomass residues from one source would be dumped and left to decay under clearly anaerobic conditions (B2), an allocation shall be made as provided for the project activity in the ICM-PDD. The allocation shall be made in a conservative manner and consistent with the guidance provided before for $BR_{BL,n,p,y}$. The non-obligated entities shall specify and justify in the ICM-PDD in a transparent manner how the relevant allocations should be made and how to determine $BR_{n,B2,y}$ for the relevant biomass residue category n based on the monitored quantities. The approaches used shall be consistent with the identified baseline scenario and reflect the particular situation of the underlying project activity.

4.3.3. If biomass is used in heat generation equipment

159. Baseline emissions include CO_2 emissions from fossil fuel combustion in the heat generation equipment in the absence of the project activity and, if included in the project boundary, CH_4 emissions from the treatment of biomass in the absence of the project activity:

$$BE_y = BE_{HG,y} + BE_{BR,y} \quad \text{Equation (36)}$$

Where:

BE_y	=	Baseline emissions during the year *y* (tCO_2e/yr)
$BE_{HG,y}$	=	Baseline emissions from fossil fuel combustion for heat generation in the heat generation equipment in year *y* (tCO_2/yr)
$BE_{BR,y}$	=	Baseline emissions due to uncontrolled burning or decay of the biomass residues in year *y* (tCO_2e/yr)

[26] 2006 IPCC Guidelines, Volume 4, Table 2.5, default value for agricultural residues.
[27] 2006 IPCC Guidelines, Volume 4, Table 2.5, default value for agricultural residues.

4.3.3.1. Baseline emissions from fossil fuel combustion for heat generation ($BE_{HG,y}$)

160. Baseline emissions from fossil fuel combustion in the heat generation equipment are determined as follows:

$$BE_{HG,y} = \frac{HG_{PJ,biomass,y} \times EF_{FF,CO2,y}}{\eta_{heat,FF}} \quad \text{Equation (37)}$$

Where:

$BE_{HG,y}$	=	Baseline emissions from fossil fuel combustion for heat generation in the heat generation equipment in year *y* (tCO_2e/yr)
$HG_{PJ,biomass,y}$	=	Incremental heat generated with biomass used as a result of the project activity during the year *y* (GJ/yr)
$EF_{FF,CO2,y}$	=	CO_2 emission factor of the fossil fuel type displaced by biomass for the year *y* (tCO_2e/GJ)
$\eta_{heat,FF}$	=	Average net efficiency of the heat generation equipment if fired with fossil fuels in the baseline (ratio)

4.3.3.1.1. Determination of $EF_{FF,CO2,y}$

161. For the purpose of determining $EF_{FF,CO2,y}$, as a conservative approach, the least carbon intensive fuel type (i.e. the fuel type with the lowest CO_2 emission factor per GJ) shall be used among the fossil types used in the baseline heat generation equipment at the project site during the most recent three years prior to the implementation of the project activity and the fossil fuel types used in the heat generation equipment at the project site during the year *y*.

162. The average net efficiency of the heat generation equipment if fired with fossil fuels in the baseline shall be determined using the latest approved version of “BM-T-006: Determining the baseline efficiency of thermal or electric energy generation systems”.

4.3.3.1.2. Determination of $HG_{PJ,biomass,y}$

163. The determination of $HG_{PJ,biomass,y}$ depends on whether only fossil fuels would be used for heat generation in the absence of the project activity (case A) or whether along with fossil fuels some biomass also would be used in the absence of the project activity (case B).

164. The guidance under case A should be followed if:

a) No biomass has been used for heat generation at the project site during the most recent three years prior to the implementation of the project activity; and

b) The most plausible baseline scenario is that heat would continue to be generated only with fossil fuels.

165. The guidance under case B should be followed if:
Biomass has already been used in heat generation equipment for heat generation at the project site prior to the implementation of the project activity; and
The most plausible baseline scenario is that heat would continue to be generated partly with fossil fuels and partly with biomass.

4.3.3.1.2.1. Case A: No use of biomass for heat generation in the absence of the project activity

166. In this case, $HG_{PJ,biomass,y}$ corresponds to the total quantity of heat generated from firing biomass ($HG_{PJ,biomass,y} = HG_{PJ,biomass,total,y}$).

167. $HG_{PJ,biomass,total,y}$ is determined based on the fraction of biomass that are used for heat generation in the heat generation equipment, taking into account all biomass types k and fossil fuel types i fired in the project heat generation equipment during a year y, as follows:

$$HG_{PJ,biomass,total,y} = HG_{PJ,total,y} \times \frac{\sum_k BF_{k,y} \times NCV_k}{\sum_k BF_{k,y} \times NCV_k + \sum_i FC_{i,y} \times NCV_i}$$ Equation (38)

Where:

$HG_{PJ,biomass,total,y}$	=	Total heat generated from firing biomass in all heat generation equipment at the project site during the year *y* (GJ/yr)
$HG_{PJ,total,y}$	=	Total heat generated in the heat generation equipment at the project site, using both biomass and fossil fuels, during the year *y* (GJ/yr)
$BF_{k,y}$	=	Quantity of biomass types *k* fired in all units of heat generation equipment at the project site during the year *y* (tons of dry matter or litre)[28]
NCV_k	=	Net calorific value of the biomass types *k* (GJ/ton of dry matter or GJ/litre)
$FC_{i,y}$	=	Quantity of fossil fuel types *i* fired in all heat generation equipment at the project site during the year *y* (mass or volume unit)[29]
NCV_i	=	Net calorific value of the fossil fuel types *i* (GJ/mass or volume unit)

4.3.3.1.2.2. Case B: Use of some biomass for heat generation in the absence of the project activity

168. In this case, only the use of biomass beyond historical levels should be attributed to the ICM project activity. Hence, $HG_{PJ,biomass,y}$ refers to the additional (i.e. additional to the baseline scenario) quantity of heat generated from the combustion of biomass, as a result of the ICM project activity.

169. As the level of biomass use in the absence of the project activity is associated with significant uncertainty, use, as a conservative approach, for $HG_{PJ,biomass,y}$ the minimum value among the following two options:

(g) The difference between the total quantity of heat generated from biomass in all heat generation equipment at the project site in the year *y* ($HG_{PJ,biomass,total,y}$) and

[28] Use tons of dry matter for solid biomass and for biogas the volume shall be referred to Normal Temperature and Pressure conditions (NTP).

[29] Use a mass unit for solid fuels and a volume unit for liquid and gaseous fuels.

the highest annual historical heat generation with biomass among the most recent three years prior to the implementation of the project activity, as follows:

$$HG_{PJ,biomass,y} = HG_{PJ,biomass,total,y} - MAX\{HG_{biomass,historic,n}; HG_{biomass,historic,n-1}; HG_{biomass,historic,n-2}\}$$ Equation (39)

Where:

$HG_{PJ,biomass,y}$	=	Incremental heat generated with biomass used as a result of the project activity during the year *y* (GJ/yr)
$HG_{PJ,biomass,total,y}$	=	Total heat generated from firing biomass in all heat generation equipment at the project site during the year *y* (GJ/yr)
$HG_{biomass,historic,n}$	=	Historical annual heat generation from firing biomass in the heat generation equipment at the project site during the year *n* (GJ/yr)
n	=	Year prior to the implementation of the project activity

(h) The difference between the total quantity of heat generated from biomass in all heat generation equipment in the year *y* ($HG_{PJ,biomass,total,y}$) and the total heat generation during the year *y* ($HG_{PJ,total,y}$) multiplied with the highest historical fraction of heat generation with biomass residues from the most recent three years, as follows:

$$HG_{PJ,biomass,y} = HG_{PJ,biomass,total,y} - HG_{PJ,total,y} \times MAX\left\{\frac{HG_{biomass,historic,n}}{HG_{total,historic,n}}; \frac{HG_{biomass,historic,n-1}}{HG_{total,historic,n-1}}; \frac{HG_{biomass,historic,n-2}}{HG_{total,historic,n-2}}\right\}$$ Equation (40)

Where:

$HG_{PJ,biomass,y}$	=	Incremental heat generated with biomass used as a result of the project activity during the year *y* (GJ/yr)
$HG_{PJ,biomass,total,y}$	=	Total heat generated from firing biomass in all heat generation equipment at the project site during the year *y* (GJ/yr)
$HG_{PJ,total,y}$	=	Total heat generated in heat generation equipment at the project site, using both biomass and fossil fuels, during the year *y* (GJ/yr)
$HG_{biomass,historic,n}$	=	Historical annual heat generation from using biomass in heat generation equipment at the project site during the year *n* (GJ/yr)
$HG_{total,historic,n}$	=	Historical annual total heat generation, from using biomass and fossil fuels, in heat generation equipment at the project site during the year *n* (GJ/yr)
n	=	Year prior to the implementation of the project activity

170. The historical fraction of heat generation with biomass can be determined based on the quantities of biomass types *k* and fossil fuel types *i* used historically in the heat generation equipment operated at the project site, as follows:

$$\frac{HG_{biomass,historic,n}}{HG_{total,historic,n}} = \frac{\sum_k BF_{k,n} \times NCV_k}{\sum_k BF_{k,n} \times NCV_k + \sum_i FC_{i,n} \times NCV_i}$$ Equation (41)

Where:

$HG_{biomass,historic,n}$	=	Historical annual heat generation from using biomass in heat generation equipment at the project site during the year *n* (GJ/yr)
$HG_{total,historic,n}$	=	Historical annual total heat generation, from using biomass and fossil fuels, in heat generation equipment at the project site during the year *n* (GJ/yr)
$BF_{k,n}$	=	Quantity of biomass types *k* used in all heat generation equipment at the project site during the historical year *n* (tons of dry matter or litre)[28]
NCV_k	=	Net calorific value of the biomass types *k* (GJ/ton of dry matter or GJ/litre)
$FC_{i,n}$	=	Quantity of fossil fuel types *i* fired in all heat generation equipment at the project site during the historical year *n* (mass or volume unit)[29]
NCV_i	=	Net calorific value of the fossil fuel types *i* (GJ/mass or volume unit)
n	=	Year prior to the implementation of the project activity

4.3.3.2. Baseline emissions due to uncontrolled burning or decay of the biomass residues ($BE_{BR,y}$)

171. If included in the project boundary, baseline emissions due to uncontrolled burning or decay of the biomass residues ($BE_{BR,y}$) shall be determined consistently with the most plausible baseline scenario for the use of the biomass residues, following the procedures for the respective baseline scenario, as outlined below. Where different baseline scenarios apply to different types or quantities of biomass residues, the procedures as outlined below should be applied respectively to the different quantities and types of biomass residues.

172. For this purpose, determine for each biomass residue types k the quantity of biomass residue used for heat generation as a result of the project activity ($BR_{PJ,k,y}$) as follows:

a) If **no biomass** has been used for heat generation at the project site during the most recent three years prior to the implementation of the project activity and if the most plausible baseline scenario is that heat would continue to be generated only with fossil fuels, use $BR_{PJ,k,y} = BR_{k,y}$ for all biomass residue types *k*;

b) If only **one type of biomass residue** *k* has been used for heat generation at the project site prior to the implementation of the project activity and if only this type of biomass residue is used during the year *y* after implementation of the project activity, use for $BR_{PJ,k,y}$ the product of the quantity of biomass residue types *k* fired in all heat generation equipment at the project site during the year *y* ($BR_{k,y}$) and the fraction of heat generated with biomass residues as a result of the project activity, as follows:

$$BR_{PJ,k,y} = BR_{k,y} \times \frac{HG_{PJ,biomass,y}}{HG_{PJ,biomass,total,y}}$$ Equation (42)

Where:

$BR_{PJ,k,y}$	=	Quantity of biomass residue types *k* used for heat generation as a result of the project activity during the year *y* (tons of dry matter or litre)[28]
$BR_{k,y}$	=	Quantity of biomass residue types *k* fired in all units of heat generation equipment at the project site during the year *y* (tons of dry matter or litre)[28]

$HG_{PJ,biomass,y}$	=	Incremental heat generated with biomass used as a result of the project activity during the year *y* (GJ/yr)
$HG_{PJ,biomass,total,y}$	=	Total heat generated from firing biomass residues in all heat generation equipment at the project site during the year *y* (GJ/yr)

c) In all **other cases** (use of more than one type of biomass residue), determine $BR_{PJ,k,y}$ based on the specific circumstances of the project activity, thereby ensuring that the total quantity of all biomass residues types *k* used for heat generation as a result of the project activity is related to the increase in heat generation from biomass as a result of the project activity, as follows:

$$\sum_k BR_{PJ,k,y} \times NCV_k = \sum_k BR_{k,y} \times NCV_k \times \frac{HG_{PJ,biomass,y}}{HG_{PJ,biomass,total,y}}$$ Equation (43)

Where:

$BR_{PJ,k,y}$	=	Quantity of biomass residue types *k* used for heat generation as a result of the project activity during the year *y* (tons of dry matter or litre)[28]
$BR_{k,y}$	=	Quantity of biomass residue types *k* fired in all units of heat generation equipment at the project site during the year *y* (tons of dry matter or litre)[28]
NCV_k	=	Net calorific value of the biomass residue types *k* (GJ/ton of dry matter or GJ/litre)
$HG_{PJ,biomass,y}$	=	Incremental heat generated with biomass used as a result of the project activity during the year *y* (GJ/yr)
$HG_{PJ,biomass,total,y}$	=	Total heat generated from firing biomass residues in all heat generation equipment at the project site during the year *y* (GJ/yr)

4.3.3.2.1. Aerobic decay or uncontrolled burning of the biomass residues (cases B1 and B3)

173. If the most likely baseline scenario for the use of the biomass residues is either that the biomass residues would be dumped or left to decay under mainly aerobic conditions (case B1 as described in BM-T-010) or burnt in an uncontrolled manner without utilizing them for energy purposes (case B3), baseline emissions are calculated assuming, for both scenarios viz., natural decay and uncontrolled burning, that the biomass residues would be burnt in an uncontrolled manner.

174. Baseline emissions due to uncontrolled burning or decay of the biomass residues are calculated as follows:

$$BE_{BR,y} = GWP_{CH4} \times \sum_k BR_{PJ,k,y} \times NCV_k \times EF_{burning,CH4,k,y}$$ Equation (44)

Where:

$BE_{BR,y}$	=	Baseline emissions due to uncontrolled burning or decay of the biomass residues in year *y* (tCO_2e/yr)
GWP_{CH4}	=	Global Warming Potential of methane valid for the commitment period (tCO_2e/tCH_4)
$BR_{PJ,k,y}$	=	Quantity of biomass residue types *k* used for heat generation as a result of the project activity during the year *y* (tons of dry matter or litre)[28]

NCV_k	=	Net calorific value of the biomass residue types *k* (GJ/ton of dry matter or GJ/litre)
$EF_{burning,CH4,k,y}$	=	CH_4 emission factor for uncontrolled burning of the biomass residue types *k* during the year *y* (tCH_4/GJ)
k	=	Types of biomass residues for which the identified baseline scenario is B1 or B3 as described in “BM-T-010: Project and leakage emissions from biomass”

175. To determine the CH_4 emission factor, non-obligated entities may undertake measurements or use referenced default values.

176. In the absence of more accurate information for $NCV_{BR,n,y}$ and $EF_{burning,CH4,k,y}$[30], a default value of 0.0027 t CH_4/ t biomass is recommended,[31] adjusted by a conservativeness factor (i.e. 0.73) to address the high level of uncertainty. In this case, an emission factor of 0.001971 t CH_4/t biomass should be used.

4.3.3.2.2. Anaerobic decay of the biomass residues (case B2)

177. If the most likely baseline scenario for the use of the biomass residues is that the biomass residues would decay under clearly anaerobic conditions (case B2 as described in BM-T-010), non-obligated entities shall calculate baseline emissions using the latest approved version of BM-T-011 The variable $BE_{CH4,SWDS,y}$ calculated by the tool corresponds to $BE_{BR,y}$ in this methodology. Use as waste quantities prevented from disposal ($W_{j,x}$) in the tool those quantities of biomass residues ($BR_{PJ,k,y}$) for which B2 as described in BM-T-010 has been identified as the most plausible baseline scenario.

4.3.3.2.3. Use for energy or feedstock purposes (cases B4 or B5)

178. The biomass residues would not decay or be burnt in an uncontrolled manner and $BE_{BR,y} = 0$.

4.4. Project Emissions

4.4.1. If biomass is used to generate both heat and electricity

179. Project emissions are calculated as follows:

$$PE_y = PE_{Biomas,y} + PE_{FF,y} + PE_{GR1,y} + PE_{GR2,y} + PE_{CBR,y} + PE_{BG2,y} \quad \text{Equation (45)}$$

Where:

PE_y	=	Project emissions in year *y* ($t\ CO_2$)
$PE_{Biomass,y}$	=	Project emissions associated with the biomass and biomass residues in year *y* ($t\ CO_2$)
$PE_{FF,y}$	=	Emissions during the year *y* due to fossil fuel consumption at the project site ($t\ CO_2$)

[30] 2006 IPCC Guidelines, Volume 4, Table 2.5, default value for agricultural residues.
[31] 2006 IPCC Guidelines, Volume 4, Table 2.5, default value for agricultural residues.

$PE_{GR1,y}$	=	Emissions during the year *y* due to grid electricity imports to the project site (t CO_2)
$PE_{GR2,y}$	=	Emissions due to a reduction in electricity generation at the project site in year *y* (t CO_2)
$PE_{CBR,y}$	=	Emissions from the combustion of biomass during the year *y* (t CO_{2e})
$PE_{BG2,y}$	=	Emissions from the production of biogas in year *y* (t CO_{2e})

4.4.1.1. Determination of $PE_{Biomass,y}$

180. $PE_{Biomass,y}$ shall be determined by applying the provisions form BM-T-010 and involve the following emission sources:

a) Project emissions resulting from the cultivation of biomass in a dedicated plantation of an ICM project activity that uses biomass (PE_{BC});

b) Project emissions resulting from the transportation of biomass (PE_{BT});

c) Project emissions resulting from the processing of biomass (PE_{BP});

d) Project emissions resulting from the transportation of biomass residues (PE_{BRT}) if the project consumes biomass residues;

e) Project emissions resulting from the processing of biomass residues (PE_{BRP}) if the project consumes biomass residues.

4.4.1.2. Determination of $PE_{FF,y}$

181. The following emission sources shall be included in determining $PE_{FF,y}$:

(a) Emissions from on-site fossil fuel consumption for the generation of electric power and heat. This includes all fossil fuels used at the project site in heat generators (e.g. boilers) for the generation of electric power and heat; and

(b) Emissions from on-site fossil fuel consumption of auxiliary equipment and systems related to the generation of electric power and heat. This includes fossil fuels required for the operation of auxiliary equipment related to the power and heat plants (e.g. for pumps, fans, cooling towers, instrumentation and control, etc.) which are not accounted in (a) above.

182. The latest approved version of BM-T-002 shall be used to calculate $PE_{FF,y}$. All combustion processes j as described in the two bullets above should be included.

183. Fossil fuels required for the operation of equipment related to on-site or off-site preparation, storage, processing and transportation of fuels and biomass and/or biomass

residues (e.g. for mechanical treatment of the biomass, conveyor belts, driers, palletisation, shredding, briquetting processes, etc.) shall be treated under $PE_{Biomass,y}$.

Box 9. Non-binding best practice example 9: Emissions due to fossil fuel consumption

> Non-obligated entities should determine the project emissions due to fossil fuel consumption taking into account the on-site fossil fuel consumption for the generation of electric power and heat, and on-site fossil fuel consumption of auxiliary equipment and systems related to the generation of electric power and heat.
>
> Example - A project activity that utilizes fossil fuels purchased from the market as auxiliary fuel for the generation of electric power and heat.
>
> The quantities of fossil fuel purchased are monitored continuously using mass or volume meters and cross-checked with invoices that can be identified specifically for the proposed ICM project activity.

4.4.1.3. Determination of $PE_{GR1,y}$

184. If electricity is imported from the grid to the project site during year *y*, corresponding emissions should be accounted for as project emissions, as follows:

$$PE_{GR1,y} = EF_{EG,GR,y} \times EL_{PJ,imp,y}$$ Equation (46)

Where:

$PE_{GR1,y}$	=	Emissions during the year *y* due to grid electricity imports to the project site (t CO_2)
$EL_{PJ,imp,y}$	=	Project electricity imports from the grid in year *y* (MWh)
$EF_{EG,GR,y}$	=	Grid emission factor in year *y* (t CO_2/MWh)

4.4.1.4. Determination of $PE_{GR2,y}$

185. If $EL_{balance,PO,y} < EL_{BL,BR,PO,y}$ (Step 3.3.2) or $EL_{balance,FF,y} < EL_{BL,FF,y}$ (Step 4.2.2), the amount of electricity generated on-site in the baseline is higher than the amount of electricity generated in the project scenario. In such cases, it is assumed that an equivalent amount of electricity is generated during year *y* in order to offset this reduction in electricity generation at the project site. Corresponding emissions should be accounted as project emissions as follows:

$$PE_{GR2,y} = EF_{EG,GR,y} \times EL_{PJ,offset,y}$$ Equation (47)

Where:

$PE_{GR2,y}$	=	Emissions due to a reduction in electricity generation at the project site in year *y* (tCO_2)
$EF_{EG,GR,y}$	=	Grid emission factor in year *y* (tCO_2/MWh)
$EL_{PJ,offset,y}$	=	Electricity that would be generated in the baseline that exceeds the generation of electricity during year *y* (MWh)

4.4.1.5. Determination of $PE_{CBR,y}$

186. If non-obligated entities chose to include emissions due to uncontrolled burning or decay of biomass residues ($BE_{CBR,y}$) in the calculation of baseline emissions, then emissions from the combustion of this category of biomass residues have also to be included in the project scenario. Otherwise, this emission source may be excluded. Corresponding emissions are calculated as follows:

$$PE_{CBR,y} = GWP_{CH4} \times EF_{CH4,BR} \times \sum_{n} BR_{PJ,n,y} \times NCV_{BR,n,y}$$ Equation (48)

Where:

$PE_{CBR,y}$	=	Emissions from the combustion of biomass residues during the year *y* (tCO_2e)
GWP_{CH4}	=	Global Warming Potential of methane valid for the commitment period (tCO_2/tCH_4)
$EF_{CH4,BR}$	=	CH_4 emission factor for the combustion of biomass residues in the project plant (tCH_4/GJ)
$BR_{PJ,n,y}$	=	Quantity of biomass residues of category *n* used in the ICM project activity in year *y* (tonnes on dry-basis)
$NCV_{BR,n,y}$	=	Net calorific value of biomass residue of category *n* in year *y* (GJ/tonne on dry-basis)

187. To determine the CH_4 emission factor ($EF_{CH4,BR}$), non-obligated entities may conduct measurements at the plant site or use IPCC default values, as provided in Table 4 below. The uncertainty of the CH_4 emission factor is in many cases relatively high. In order to reflect this and for the purpose of providing conservative estimates of emission reductions, a conservativeness factor of 1.37 is applied to the CH_4 emission factor.

Table 4. Default CH_4 emission factors for combustion of biomass residues[32]

	Default emission factor (kg CH_4 / TJ)	Assumed uncertainty
Wood waste	30	300%
Sulphite lyes (Black Liquor)	3	300%
Other solid biomass residues	30	300%
Liquid biomass residues	3	300%

4.4.1.6. Determination of $PE_{BG2,y}$

188. In case the project includes biogas, the consideration of project emissions associated with the production of biogas depends on the selected baseline scenario for biogas and whether the biogas is sourced from a registered ICM project activity according to the following provisions:

a) In case the biogas is provided by a registered ICM project activity, the project emissions will be covered in the PDD of the registered ICM project activity;

[32] 2006 IPCC Guidelines, Volume 4, Table 2.5, default value for agricultural residues.

b) In case the biogas is not provided by a registered ICM project activity:

   i. If baseline scenario BG1 is selected, the project emissions should be included in this proposed ICM project activity. The emission source shall include project emissions from physical leakage of methane from the anaerobic digester, from treatment of wastewater effluent from the anaerobic digester (where applicable), and from land application of sludge (where applicable). The estimation of these emission sources shall follow the procedures for project emission of BM-T-008.

   ii. In case of baseline scenario BG2 and/or BG3, no project emissions need to be included.

4.4.2. If biomass is used to generate electricity in power-only plant

189. Project emissions are calculated as follows:

$$PE_y = PE_{Biomass,y} + PE_{FF,y} + PE_{CBR,y} + PE_{BG2,y} \quad \text{Equation (49)}$$

Where:

PE_y	=	Project emissions during year *y* (t CO_2e)
$PE_{Biomass,y}$	=	Project emissions associated with the biomass and biomass residues in year *y* (t CO_2)
$PE_{FF,y}$	=	Emissions during the year *y* due to fossil fuel consumption for the generation of electricity, including auxiliary equipment (t CO_2)
$PE_{CBR,y}$	=	Emissions from the combustion of biomass residues during the year *y* (t CO_2e)
$PE_{BG2,y}$	=	Emissions from the production of biogas in year *y* (t CO_2e)

4.4.2.1. Determination of $PE_{Biomass,y}$

190. $PE_{Biomass,y}$ shall be determined by following the step 4.4.1.1.

4.4.2.2. Determination of PE_{FFy}

191. $PE_{FF,y}$ shall be determined by following the step 4.4.1.2.

4.4.2.3. Determination of $PE_{CBR,y}$

192. $PE_{CBR,y}$ shall be determined by following the step 4.4.1.5.

4.4.2.4. Determination of $PE_{BG2,y}$

193. $PE_{BG2,y}$ shall be determined by following step 4.4.1.6.

4.4.3. If biomass is used in heat generation equipment

194. For the purpose of determining GHG emissions of the ICM project activity, non-obligated entites shall include the following emissions sources:

a) Emissions associated with biomass and biomass residues;

b) Emissions from fossil fuel consumption at the project site related to the generation of heat;

c) Emissions from grid-connected fossil fuel power plants in the electricity system for any electricity that is imported from the grid;

d) If applicable, CH_4 emissions from combustion of biomass residues for heat generation at the project site;

e) If applicable, emissions from anaerobic treatment of wastewater originating from the treatment of the biomass prior to combustion;

195. Project emissions are calculated as follows:

$$PE_y = PE_{Biomass,y} + PE_{FF,y} + PE_{EC,y} + PE_{CBR,y} + PE_{BG,y}$$ Equation (50)

PE_y	=	Project emissions during the year *y* (tCO_2/yr)
$PE_{Biomass,y}$	=	Emissions associated with the biomass and biomass residues in year *y* (t CO_2)
$PE_{FF,y}$	=	Emissions from on-site fossil fuel combustion at the project site in year *y* (tCO_2/yr)
$PE_{EC,y}$	=	Emissions from on-site electricity consumption at the project site in year *y* (tCO_2/yr)
$PE_{CBR,y}$	=	Emissions from combustion of biomass in the heat generation equipment in year *y* (tCO_2e/yr)
$PE_{BG,y}$	=	Emissions from the production of biogas in year *y* (tCO_2e/yr)

4.4.3.1. Emissions associated with the biomass and biomass residues ($PE_{Biomass,y}$)

196. $PE_{Biomass,y}$ shall be determined by following the step 4.4.1.1.

4.4.3.2. Emissions from on-site fossil fuel combustion ($PE_{FF,y}$)

197. $PE_{FF,y}$ shall be determined by following 4.4.1.2.

4.4.3.3. Emissions from on-site electricity consumption ($PE_{EC,y}$)

198. Emissions from on-site electricity consumption for auxiliary operation of the project plant are calculated as follows is determined based on the provisions of the BM-T-003.

199. The Grid emission factor ($EF_{grid,y}$) shall be determined in accordance with the latest approved version of the CEA database.

200. Electricity required for the operation of equipment related to the on-site or off-site preparation, storage, processing and transportation of fuels and biomass or biomass residues

(e.g. for mechanical treatment of the biomass or biomass residues, conveyor belts, driers, pelletization, shredding, briquetting processes, etc.) shall be treated under PEBiomass,y.

4.4.3.4. Emissions from combustion of biomass residues in the heat generation equipment (*$PE_{CBR,y}$*)

201. $PE_{CBR,y}$ shall be determined by following 4.4.1.5.

Equation (51)

4.4.3.5. Emissions from the production of biogas in year y (*$PE_{BG,y}$*)

202. In case the project includes biogas the consideration of project emissions associated with the production of biogas depends on the selected baseline scenario for biogas and whether the biogas is sourced from a registered ICM project activity according to the following provisions:

(i) In case the biogas is provided by a registered ICM project activity, the project emissions will be covered in the PDD of the registered ICM project activity;

(j) In case the biogas is not provided by a registered ICM project activity:

  (i) If baseline scenario BG1 is selected, project emissions shall be included in this proposed ICM project activity. The emission source shall include project emissions from physical leakage of methane from the anaerobic digester, from treatment of wastewater effluent from the anaerobic digester (where applicable), and from land application of sludge (where applicable). The estimation of these emission sources shall follow the procedures for these sources as identified in the project emissions section of BM-T-008;

  (ii) In case of baseline scenario BG2 and/or BG3, no project emissions need to be included.

4.5. Leakage

4.5.1. If biomass is used to generate both heat and electricity

And

4.5.2. If biomass is used to generate electricity in power-only plant

203. Leakage emissions shall be calculated according to BM-T-010. When doing so, the non-obligated entities shall indicate in the PDD which emission sources are included. If emission sources are not included, the non-obligated entities shall provide proper justifications in the PDD.

204. In the case that negative overall emission reductions arise in a year through application of the leakage emissions, the carbon credit certificates (CCCs) are not issued to non-obligated entities for the year concerned and in subsequent years, until emission reductions from

subsequent years have compensated the quantity of negative emission reductions from the year concerned.[33]

4.5.3. If biomass is used in heat generation equipment

205. For project activities utilizing biomass and/or biomass residues, the BM-T-010 shall be applied to determine the leakage. Non-obligated entities shall indicate in the PDD which leakage sources are included. If emission sources are not considered, the non-obligated entities shall provide proper justification in the PDD.

206. In the case that negative overall emission reductions arise in a year through application of the leakage emissions, CCCs are not issued to non-obligated entities for the year concerned and in subsequent years, until emission reductions from subsequent years have compensated the quantity of negative emission reductions from the year concerned. For example, if negative emission reductions of 30 tCO_{2e} occur in the year t and positive emission reductions of 100 tCO_{2e} occur in the year t+1, only 70 CCCs are issued for the year t+1.

4.6. Emission reductions

207. Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y \quad \text{Equation (52)}$$

Where:

ER_y	=	Emissions reductions in year *y* (t CO_2)
BE_y	=	Baseline emissions in year *y* (t CO_2)
PE_y	=	Project emissions in year *y* (t CO_2)
LE_y	=	Leakage emissions in year *y* (t CO_2)

4.7. Data and Parameters not monitored

Data / Parameter table 1.

Data / Parameter:	Biomass categories and quantities used for the selection of the baseline scenario selection and assessment of additionality
Data unit:	– Category (i.e. bagasse, rice husks, empty fruit bunches, etc.); – Source (e.g. produced on-site, obtained from an identified biomass residues producer, obtained from a biomass residues market, from dedicated plantations etc.); – Fate in the absence of the ICM project activity (scenarios B); – Use in the project scenario (scenarios P); – Quantity (tonnes on dry-basis)

[33] For example, if negative emission reductions of 30 tCO_{2e} occur in the year t and positive emission reductions of 100 tCO_{2e} occur in the year t+1, only 70 CCCs are issued for the year t+1.

Description:	Explain and document transparently in the ICM-PDD, which quantities of which biomass categories are used in which installation(s) under the ICM project activity and what is their baseline scenario. Include the quantity of each category of biomass (tonnes). For the selection of the baseline scenario and demonstration of additionality, at the validation stage, an ex ante estimation of these quantities should be provided
Source of data:	On-site assessment of biomass categories and quantities
Measurement procedures (if any):	-
Any comment:	This parameter is related to the procedure for the selection of the baseline scenario selection and assessment of additionality

Data / Parameter table 2.

Data / Parameter:	$BR_{HIST,n,x}$
Data unit:	tonnes on dry-basis
Description:	Quantity of biomass residues of category n used for power or heat generation at the project site in year *x* prior the date of submission of the PDD for validation of the ICM project activity (tonnes on dry-basis) prior the time of submission of the PDD for validation of the ICM project activity
Source of data:	On-site measurements
Measurement procedures (if any):	Use weight or volume meters. Adjust for the moisture content in order to determine the quantity of dry biomass. The quantity shall be cross-checked with the quantity of heat generated and any fuel purchase receipts (if available). In case of volume meters use the fuel density to convert the measurement to mass basis
Any comment:	Biogas should be included as appropriate if applicable (in which case convenient units such as m^3 should be used)

Data / Parameter table 3.

Data / Parameter:	$BR_{n,h,x}$
Data unit:	tonnes on dry-basis
Description:	Quantity of biomass residues of category n used in heat generator *h* in year *x* (tonnes on dry-basis)
Source of data:	On-site measurements
Measurement procedures (if any):	Use weight or volume meters. Adjust for the moisture content in order to determine the quantity of dry biomass. The quantity shall be cross-checked with the quantity of heat generated and any fuel purchase receipts (if available)
Any comment:	Biogas should be included as appropriate if applicable (in which case convenient units such as m^3 should be used)

Data / Parameter table 4.

Data / Parameter:	$FF_{f,h,x}$
Data unit:	mass or volume unit/yr
Description:	Quantity of fossil fuel type *f* fired in heat generator *h* in year *x* (mass or volume unit/yr)
Source of data:	On-site measurements

Measurement procedures (if any):	Use weight or volume meters. Adjust for the moisture content in order to determine the quantity of dry biomass. The quantity shall be cross-checked with the quantity of heat generated and any fuel purchase receipts (if available). In case of volume meters use the fuel density to convert the measurement to mass basis
Any comment:	---

Data / Parameter table 5.

Data / Parameter:	$HG_{h,x}$
Data unit:	GJ
Description:	Net quantity of heat generated in heat generator *h* in year *x* (GJ/yr)
Source of data:	On-site measurements
Measurement procedures (if any):	This parameter should be determined as the difference of the enthalpy of the heat (steam or hot water) generated by the heat generators(s) [in the ICM project activity, monitored during year *y*,] minus the enthalpy of the feed-water, the boiler blow-down and any condensate return. The respective enthalpies should be determined based on the mass (or volume) flows, the temperatures and, in case of superheated steam, the pressure. Steam tables or appropriate thermodynamic equations may be used to calculate the enthalpy as a function of temperature and pressure
Any comment:	In absence of temperature and pressure records, use the default values from equipment as reference

Data / Parameter table 6.

Data / Parameter:	$HG_{BR,CG/PO,x,i,j}$
Data unit:	GJ
Description:	Quantity of heat used in heat engine *i/j* in year *x* (GJ)
Source of data:	On-site measurements
Measurement procedures (if any):	This parameter should be determined as the difference of the enthalpy of the process heat (steam or hot water) generated by the heat generators(s) [in the ICM project activity, monitored during year *y*,] minus the enthalpy of the feed-water, the boiler blow-down and any condensate return. The respective enthalpies should be determined based on the mass (or volume) flows, the temperatures and, in case of superheated steam, the pressure. Steam tables or appropriate thermodynamic equations may be used to calculate the enthalpy as a function of temperature and pressure
Any comment:	-

Data / Parameter table 7.

Data / Parameter:	$HG_{BR,CG/PO,x,i,j}$
Data unit:	GJ
Description:	Quantity of process heat extracted from the heat engine *i/j* in year *x* (GJ)
Source of data:	On-site measurements

Measurement procedures (if any):	This parameter should be determined as the difference of the enthalpy of the process heat (steam or hot water) supplied to process heat loads in the ICM project activity minus the enthalpy of the feed-water, the boiler blow-down and any condensate return to the heat generators. The respective enthalpies should be determined based on the mass (or volume) flows, the temperatures and, in case of superheated steam, the pressure. Steam tables or appropriate thermodynamic equations may be used to calculate the enthalpy as a function of temperature and pressure.
Any comment:	---

Data / Parameter table 8.

Data / Parameter:	$EL_{BR,CG/PO,x,i/j}$
Data unit:	MWh
Description:	Quantity of electricity generated in heat engine *i/j* in year *x* (MWh)
Source of data:	On-site measurements
Measurement procedures (if any):	Electricity meters
Any comment:	---

Data / Parameter table 9.

Data / Parameter:	P_x
Data unit:	Use suitable units, as appropriate
Description:	Quantity of the main product of the production process (e.g. sugar cane, rice) produced in year *x* from plants operated at the project site
Source of data:	On-site measurements
Measurement procedures (if any):	---
Any comment:	---

Data / Parameter table 10.

Data / Parameter:	$CAP_{HG,h}$
Data unit:	GJ/h
Description:	Baseline capacity of heat generator *h* (GJ/h)
Source of data:	On-site measurements or reference plant design parameters
Measurement procedures (if any):	This parameter should reflect the design maximum heat generation capacity (in GJ/h) of the baseline heat generator *h*. It should be based on the installed capacity of the heat generator. Non-obligated entities should document transparently and justify in the ICM-PDD how this parameter was determined
Any comment:	---

Data / Parameter table 11.

Data / Parameter:	$CAP_{EG,CG,i}$
Data unit:	MW
Description:	Baseline electricity generation capacity in on-site and off-site plants in year y of cogeneration-type heat engine *i*.

Source of data:	On-site measurements or reference plant design parameters
Measurement procedures (if any):	This parameter should reflect the design maximum electricity generation capacity (in MW) of the baseline heat engines *i* and *j*. It should be based on the installed capacity of the heat engines. Non-obligated entities should document transparently and justify in the ICM-PDD how this parameter was determined
Any comment:	---

Data / Parameter table 12.

Data / Parameter:	$CAP_{EG,PO,j}$
Data unit:	MW
Description:	Baseline electricity generation capacity of power-only-type heat engine *j*
Source of data:	On-site measurements or reference plant design parameters
Measurement procedures (if any):	This parameter should reflect the design maximum electricity generation capacity (in MW) of the baseline heat engines *i* and *j*. It should be based on the installed capacity of the heat engines. Non-obligated entities should document transparently and justify in the ICM-PDD how this parameter was determined.
Any comment:	---

Data / Parameter table 13.

Data / Parameter:	$LFC_{HG,h}$
Data unit:	Ratio
Description:	Baseline load factor of heat generator *h* (ratio)
Source of data:	On-site measurements or reference plant design parameters
Measurement procedures (if any):	This parameter should reflect the maximum load factor (i.e. the ratio between the ‘actual heat generation’ of the heat generator and its ‘design maximum heat generation’ along one year of operation) of the baseline heat generator *h*, taking into account downtime due to maintenance, seasonal operational patterns, and any other technical constraints. Non-obligated entities should document transparently and justify in the ICM-PDD how this parameter was determined (e.g. using historical records)
Any comment:	---

Data / Parameter table 14.

Data / Parameter:	$HPR_{BL,i}$
Data unit:	Ratio
Description:	Baseline heat-to-power ratio of the heat engine *i* (ratio)
Source of data:	On-site measurements or reference plant design parameters
Measurement procedures (if any):	---
Any comment:	---

Data / Parameter table 15.

Data / Parameter:	$LFC_{EG,CG,i}$
Data unit:	Ratio
Description:	Baseline load factor of cogeneration-type heat engine *i*
Source of data:	On-site measurements or reference plant design parameters
Measurement procedures (if any):	This parameter should reflect the maximum load factor (i.e. the ratio between the ‘actual electricity generation’ of the heat engine and its ‘design maximum electricity generation’ along one year of operation) of the baseline heat engine *i* or *j*. The actual electricity generation of the heat engine should be determined taking into account downtime due to maintenance, seasonal operational patterns, and any other technical constraints. Non-obligated entities should document transparently and justify in the ICM-PDD how this parameter was determined
Any comment:	---

Data / Parameter table 16.

Data / Parameter:	$LFC_{EG,CG,j}$
Data unit:	Ratio
Description:	Baseline load factor of power-only-type heat engine *j*
Source of data:	On-site measurements or reference plant design parameters
Measurement procedures (if any):	This parameter should reflect the maximum load factor (i.e. the ratio between the ‘actual electricity generation’ of the heat engine and its ‘design maximum electricity generation’ along one year of operation) of the baseline heat engine *i* or *j*. The actual electricity generation of the heat engine should be determined taking into account downtime due to maintenance, seasonal operational patterns, and any other technical constraints. Non-obligated entities should document transparently and justify in the ICM-PDD how this parameter was determined
Any comment:	---

Data / Parameter table 17.

Data / Parameter:	$EF_{BL,CO2,FF}$
Data unit:	tCO_2/GJ
Description:	CO_2 emission factor of the fossil fuel type that would be used for power generation at the project site in the baseline (t CO_2/GJ)
Source of data:	Either conduct measurements or use accurate and reliable local or national data where available. Where such data is not available, use IPCC default emission factors (country-specific, if available) if they are deemed to reasonably represent local circumstances. Choose the value in a conservative manner and justify the choice
Measurement procedures (if any):	Measurements shall be carried out at reputed laboratories and according to relevant international standards
Any comment:	In case of plants existing before project implementation, the lowest CO_2 emission factor should be used in case of multi fuel plants

Data / Parameter table 18.

Data / Parameter:	$\eta_{BL,FF}$
Data unit:	ratio

Description:	Efficiency of the fossil fuel power plant(s) at the project site in the baseline
Source of data:	Either use the higher value among (a) the measured efficiency and (b) manufacturer's information on the efficiency;
Measurement procedures (if any):	If measurements are conducted, use recognized standards for the measurement of the heat generator 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 ICM-PDD.
Any comment:	---

Data / Parameter table 19.

Data / Parameter:	$NCV_{BR,n,x}$
Data unit:	GJ/tonnes on dry-basis
Description:	Net calorific value of biomass residues of category n in year *x*
Source of data:	Either conduct measurements or use accurate and reliable local or national data where available. Where such data is not available, use IPCC default net calorific values (country-specific, if available) if they are deemed to reasonably represent local circumstances. Choose the values in a conservative manner and justify the choice.
Measurement procedures (if any):	Measurements shall be carried out at reputed laboratories and according to relevant international standards.
Any comment:	The NCV is to be calculated for wet biomass as used in the heat generator (i.e. deducting the energy used for the evaporation of the water contained in the biomass residues). Biogas should be included as appropriate if applicable (in which case convenient units such as GJ/m^3 should be used).

Data / Parameter table 20.

Data / Parameter:	$NCV_{FF,f,x}$
Data unit:	GJ/mass or volume unit
Description:	Net calorific value of fossil fuel type *f* in year *x* (GJ/mass or volume unit)
Source of data:	Either conduct measurements or use accurate and reliable local or national data where available. Where such data is not available, use IPCC default net calorific values (country-specific, if available) if they are deemed to reasonably represent local circumstances. Choose the values in a conservative manner and justify the choice
Measurement procedures (if any):	Measurements shall be carried out at reputed laboratories and according to relevant international standards
Any comment:	---

Data / Parameter table 21.

Data / Parameter:	***GWP_{CH4}***
Data unit:	tCO_2e/tCH_4
Description:	Global Warming Potential of methane valid for the commitment period (tCO_2/tCH_4)
Source of data:	IPCC
Measurement procedures (if any):	Shall be updated according to any future COP/MOP decisions
Any comment:	---

Data / Parameter table 22.

Data / Parameter:	**Amount of fuel used in the heat generation equipment, if any**
Data unit:	GJ
Description:	If any heat which is used for purposes other than power generation (e.g. heat which is produced in boilers or extracted from the header to feed thermal loads in the process) is generated during the crediting period or was generated prior to the implementation of the project activity, by any on-site or off-site heat generation equipment connected to the project site, the amount of fuel used in the heat generation equipment should be monitored and clearly differentiated from any fuel used in the project activity. The following conditions should be checked using this data: • The implementation of the project activity does not influence directly or indirectly the operation of the heat generation equipment, i.e. the heat generation equipment would operate in the same manner in the absence of the project activity; and • The heat generation equipment does not influence directly or indirectly the operation of the project plant, e.g. no fuels are diverted from the heat generation equipment to the project plant
Source of data:	On-site measurements
Measurement procedures (if any):	Use weight or volume meters. The quantity shall be cross-checked with the quantity of electricity generated and any fuel purchase receipts (if available)
Any comment:	This parameter is related to an applicability condition

Data / Parameter table 23.

Data / Parameter:	***$BR_{n,power\text{-}only,x}$***
Data unit:	tonnes on dry-basis
Description:	Quantity of biomass residues of category *n* used in year *x* in power-only plants which were used at the project site prior to the implementation of the project activity
Source of data:	On-site measurements
Measurement procedures (if any):	Use weight meters. Adjust for the moisture content in order to determine the quantity of dry biomass. The quantity shall be cross-checked with the quantity of heat generated and any fuel purchase receipts (if available)

Any comment:	-

Data / Parameter table 24.

Data / Parameter:	$BR_{n,p,x}$
Data unit:	tonnes on dry-basis
Description:	Quantity of biomass residues of category *n* used in year *x* in power plant *p*
Source of data:	On-site measurements
Measurement procedures (if any):	Use weight meters. Adjust for the moisture content in order to determine the quantity of dry biomass. The quantity shall be cross-checked with the quantity of heat generated and any fuel purchase receipts (if available)
Any comment:	-

Data / Parameter table 25.

Data / Parameter:	$FF_{m,p,x}$
Data unit:	mass or volume unit/yr
Description:	Quantity of fossil fuel type *m* fired in power plant *p* in year *x*
Source of data:	On-site measurements
Measurement procedures (if any):	Use weight meters. Adjust for the moisture content in order to determine the quantity of dry biomass. The quantity shall be cross-checked with the quantity of heat generated and any fuel purchase receipts (if available)
Any comment:	-

Data / Parameter table 26.

Data / Parameter:	$EG_{p,x}$
Data unit:	MWh/yr
Description:	Net quantity of electricity generated in power plant *p* in year *x*
Source of data:	On-site measurements
Measurement procedures (if any):	Use calibrated electricity meters
Any comment:	-

Data / Parameter table 27.

Data / Parameter:	$EG_{FF,x,}$
Data unit:	MWh/yr
Description:	Electricity generation with fossil fuels in power plant(s) included in the project boundary, operated respectively in years *x*, *x*-1 and *x*-2 at the project site
Source of data:	On-site measurements
Measurement procedures (if any):	Use calibrated electricity meters
Any comment:	-

Data / Parameter table 28.

Data / Parameter:	***$NCV_{n,x}$***
Data unit:	GJ/tons on a dry basis
Description:	Net calorific value of biomass residue category *n* in year *x*
Source of data:	Either conduct measurements or use accurate and reliable local or national data where available. Where such data is not available, use IPCC default net calorific values (country-specific, if available) if they are deemed to reasonably represent local circumstances. Choose the values in a conservative manner and justify the choice
Measurement procedures (if any):	Measurements shall be carried out at certified laboratories and according to relevant international standards
Any comment:	-

Data / Parameter table 29.

Data / Parameter:	***$NCV_{m,x}$***
Data unit:	GJ/mass or volume unit
Description:	Net calorific value of fossil fuel type *m* in year *x*
Source of data:	Either conduct measurements or use accurate and reliable local or national data where available. Where such data is not available, use IPCC default net calorific values (country-specific, if available) if they are deemed to reasonably represent local circumstances. Choose the values in a conservative manner and justify the choice
Measurement procedures (if any):	Measurements shall be carried out at certified laboratories and according to relevant international standards
Any comment:	-

Data / Parameter table 30.

Data / Parameter:	***$EF_{BL,CO2,FF,d}$***
Data unit:	t CO_2/GJ
Description:	CO_2 emission factor of the fossil fuel type that would be used for power generation at the project site in the baseline
Source of data:	Either conduct measurements or use accurate and reliable local or national data where available. Where such data is not available, use IPCC default emission factors (country-specific, if available) if they are deemed to reasonably represent local circumstances. Choose the value in a conservative manner and justify the choice
Measurement procedures (if any):	Measurements shall be carried out at certified laboratories and according to relevant international standards
Any comment:	In case of plants existing before project implementation, the lowest CO_2 emission factor should be used in case of multi fuel plants

Data / Parameter table 31.

Data / Parameter:	***$\eta_{BL,BR,p}$***
Data unit:	ratio
Description:	Efficiency of electricity generation of baseline power plant *p* if fired only with biomass residues and not with fossil fuels

Source of data:	In accordance with “BM-T-006: Determining the baseline efficiency of thermal or electric energy generation systems”.
Measurement procedures (if any):	In accordance with “BM-T-006: Determining the baseline efficiency of thermal or electric energy generation systems”
Any comment:	-

Data / Parameter table 32.

Data / Parameter:	$\eta_{p,FF}$
Data unit:	Ratio
Description:	Efficiency of electricity generation of power plant *p* if fired only with fossil fuels and not with biomass residues
Source of data:	Either use the higher value among: (a) the measured efficiency and (b) manufacturer’s information on the efficiency
Measurement procedures (if any):	If measurements are conducted, use recognized standards for the measurement of the heat generator 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 ICM-PDD
Any comment:	-

Data / Parameter table 33.

Data / Parameter:	$CAP_{FF,p}$
Data unit:	MW
Description:	Maximum electricity generation capacity of baseline power plant *p* if fired only with fossil fuels
Source of data:	On-site measurements or manufacturer’s data
Measurement procedures (if any):	-
Any comment:	-

Data / Parameter table 34.

Data / Parameter:	$\eta_{heat,FF}$
Data unit:	Ratio
Description:	Average net efficiency of the heat generation equipment if fired with fossil fuels in the baseline
Source of data:	Determined using the latest approved version of “BM-T-006: Determining the baseline efficiency of thermal or electric energy generation systems”.
Measurement procedures (if any):	Document measurement procedures and results and manufacturer’s information transparently in the ICM-PDD
Any comment:	-

Data / Parameter table 35.

Data / Parameter:	$HG_{biomass,historic,n}/HG_{biomass,historic,n-1}/HG_{biomass,historic,n-2}$
Data unit:	GJ/yr
Description:	Historical annual heat generation from firing biomass at the project site during the year *n*, *n-1* or *n-2*, where *n* corresponds to the year prior to the implementation of the project activity
Source of data:	Onsite measurements
Measurement procedures (if any):	Heat generation can be determined as per section 4.3.3.1.2.2 (Case B) or as the difference of the enthalpy of the steam or hot fluid and/or gases generated by the heat generation equipment and the sum of the enthalpies of the feed-fluid and/or gases, blow-down and any condensate returns. The respective enthalpies should be determined based on the mass (or volume) flows, the temperatures and, in case of superheated steam, the pressure. Steam tables or appropriate thermodynamic equations may be used to calculate the enthalpy as a function of temperature and pressure. In case of equipment that produces hot water/oil this is expressed as difference in the enthalpy between the hot water/oil supplied to and returned by the plant. In case of equipment that produces hot gases or combustion gases, this is expressed as difference in the enthalpy between the hot gas produced and all streams supplied to the plant. The enthalpy of all relevant streams shall be determined based on the mass flow, temperature, pressure, density and specific heat of the gas
Any comment:	If the three most recent historical years prior to the implementation of the project activity are not representative for the situation at the project site (e.g. a drought in one year, an equipment or plant not operating during a certain year for technical reasons, etc.), non-obligated entities may alternatively select the five most recent historical years from which one year may be excluded if deviating significantly from other years. The selection by non-obligated entities should be documented in the ICM-PDD and be applied to all relevant provisions and equations throughout this methodology in a consistent manner, including the applicability condition

Data / Parameter table 36.

Data / Parameter:	$BR_{k,n}/BR_{k,n-1}/BR_{k,n-2}$
Data unit:	Tons of dry matter or liter[28]
Description:	Quantity of biomass types *k* fired in all heat generation equipment at the project site during the historical year *n*, *n-1* or *n-2*, where *n* corresponds to the year prior to implementation of the project activity
Source of data:	On-site measurements
Measurement procedures (if any):	Use weight or volume meters. Adjust for the moisture content in order to determine the quantity of dry biomass. The quantity shall be cross-checked with the quantity of heat generated and any fuel purchase receipts (if available)

Any comment:	If the three most recent historical years prior to the implementation of the project activity are not representative for the situation at the project site (e.g. a drought in one year, equipment not operating during a certain year for technical reasons, etc.), non-obligated entities may alternatively select the five most recent historical years from which one year may be excluded if deviating significantly from other years. The selection by non-obligated entities should be documented in the ICM-PDD and be applied to all relevant provisions and equations throughout this methodology in a consistent manner, including the applicability condition

Data / Parameter table 37.

Data / Parameter:	$FC_{i,n}/FC_{i,n-1}/FC_{i,n-2}$
Data unit:	Mass or volume unit[29]
Description:	Quantity of fossil fuel types *i* fired in all heat generation equipment at the project site during the historical year *n*, *n-1* or *n-2*, where *n* corresponds to the year prior to implementation of the project activity
Source of data:	On-site measurements
Measurement procedures (if any):	Use weight or volume meters. The quantity shall be cross-checked with the quantity of heat generated and any fuel purchase receipts (if available)
Any comment:	If the three most recent historical years prior to the implementation of the project activity are not representative for the situation at the project site (e.g. a drought in one year, an equipment not operating during a certain year for technical reasons, etc.), non-obligated entities may alternatively select the five most recent historical years from which one year may be excluded if deviating significantly from other years. The selection by non-obligated entities should be documented in the ICM-PDD and be applied to all relevant provisions and equations throughout this methodology in a consistent manner, including the applicability condition

Data / Parameter table 38.

Data / Parameter:	EG_{hist}
Data unit:	MWh
Description:	Highest historical electricity generation at the project site during the most recent three years prior to the implementation of the project activity
Source of data:	On-site measurements
Measurement procedures (if any):	-
Any comment:	Required to assess the applicability condition referring to power generation at the project site

5. Methodology: Monitoring Component

5.1. Monitoring procedures

208. Describe and specify in the ICM-PDD all monitoring procedures, including the type of measurement instrumentation used, the responsibilities for monitoring and QA/QC procedures that will be applied. Where the methodology provides different options (e.g. use

of default values or on-site measurements), specify which option will be used. All meters and instruments should be calibrated regularly as per industry practices.

209. In addition to the parameters and procedures described herein, all monitoring provisions contained in the tools referred to in this methodology also apply.

5.2. Data and Parameters monitored

Data / Parameter table 39.

Data / Parameter:	Biomass categories and quantities used in the ICM project activity
Data unit:	– Category (i.e. bagasse, rice husks, empty fruit bunches, tree bark etc.); – Source (e.g. produced on-site, obtained from an identified biomass residues producer, obtained from a biomass residues market, dedicated plantations etc.); – Fate in the absence of the ICM project activity (scenarios B); – Use in the project scenario (scenarios P and H); – Quantity (tonnes on dry-basis)
Description:	Explain and document transparently in the ICM-PDD which quantities of which biomass categories are used in which installation(s) under the ICM project activity and what is their baseline scenario. Include the quantity of each category of biomass (tonnes on dry-basis). These quantities should be updated every year of the crediting period as part of the monitoring plan so as to reflect the actual use of biomass in the project scenario. These updated values should be used for emissions reductions calculations. Along the crediting period, new categories of biomass (i.e. new types, new sources, with different fate) can be used in the ICM project activity. In this case, a new line should be added to the table. If those new categories are of the type B1, B2 or B3, the baseline scenario for those categories of biomass residues should be assessed using the procedures outlined in the guidance provided in the procedure for the selection of the baseline scenario and demonstration of additionality.
Source of data:	On-site measurements
Measurement procedures (if any):	Use calibrated weight meters. Adjust for the moisture content in order to determine the quantity of dry biomass
Monitoring frequency	Data monitored continuously and aggregated as appropriate, to calculate emissions reductions
QA/QC Procedure	Crosscheck the measurements with an annual energy balance that is based on purchased quantities and stock changes
Any comment:	-

Data / Parameter table 40.

Data / Parameter:	For biomass residues categories for which scenarios B1, B2 or B3 is deemed a plausible baseline alternative, non-obligated entities shall demonstrate that this is a realistic and credible alternative scenario
Data unit:	Tonnes

Description:	– Quantity of available biomass residues of category *n* in the region – Quantity of biomass residues of category *n* that are utilized (e.g. for energy generation or as feedstock) in the defined geographical region – Availability of a surplus of biomass residues category n (which cannot be sold or utilized) at the ultimate supplier to the project and a representative sample of other suppliers in the defined geographical region
Source of data:	Surveys or statistics
Measurement procedures (if any):	-
Monitoring frequency	At the validation stage for biomass residues categories identified ex ante, and always that new biomass residues categories are included during the crediting period
QA/QC Procedure	-
Any comment:	-

Data / Parameter table 41.

Data / Parameter:	$BR_{PJ,n,y}$
Data unit:	tonnes on dry-basis
Description:	Quantity of biomass of category n used in the ICM project activity in year *y* (tonnes on dry-basis)
Source of data:	On-site measurements
Measurement procedures (if any):	Use calibrated weight meters. Adjust for the moisture content in order to determine the quantity of dry biomass
Monitoring frequency	Data monitored continuously and aggregated as appropriate, to calculate emissions reductions
QA/QC Procedure	Crosscheck the measurements with an annual energy balance that is based on purchased quantities and stock changes
Any comment:	The biomass residue quantities used should be monitored separately for (a) each category of biomass residue (e.g.) and each source (e.g. produced on-site, obtained from biomass residues suppliers, obtained from a biomass residues market, obtained from an identified biomass residues producer, etc.). Biogas should be included as appropriate if applicable (in which case convenient units such as m^3 should be used).

Data / Parameter table 42.

Data / Parameter:	$BR_{B1/B3,n,y}$
Data unit:	tonnes on dry-basis
Description:	Quantity of biomass residues of category n used in the ICM project activity in year *y* for which the baseline scenario is B1or B3 (tonnes on dry-basis)
Source of data:	On-site measurements
Measurement procedures (if any):	Use calibrated weight meters. Adjust for the moisture content in order to determine the quantity of dry biomass
Monitoring frequency	Data monitored continuously and aggregated as appropriate, to calculate emissions reductions
QA/QC Procedure	Crosscheck the measurements with an annual energy balance that is based on purchased quantities and stock changes

Any comment:	Biogas should be included as appropriate if applicable (in which case convenient units such as m^3 should be used)

Data / Parameter table 43.

Data / Parameter:	$BR_{B4,n,y}$
Data unit:	tonnes of dry matter
Description:	Quantity of biomass residues of category n used in the ICM project activity in year *y,* for which the baseline scenario is B4 (tonnes on dry-basis)
Source of data:	On-site measurements
Measurement procedures (if any):	Use calibrated weight meters. Adjust for the moisture content in order to determine the quantity of dry biomass
Monitoring frequency	Data monitored continuously and aggregated as appropriate, to calculate emissions reductions
QA/QC Procedure	Crosscheck the measurements with an annual energy balance that is based on purchased quantities and stock changes
Any comment:	Biogas should be included as appropriate if applicable (in which case convenient units such as m^3 should be used)

Data / Parameter table 44.

Data / Parameter:	$BR_{B5,n,y}$
Data unit:	tonnes on dry-basis
Description:	Quantity of biomass residues of category n used in the ICM project activity in year *y* for which the baseline scenario is B5 (tonne on dry-basis)
Source of data:	On-site measurements
Measurement procedures (if any):	Use calibrated weight meters. Adjust for the moisture content in order to determine the quantity of dry biomass
Monitoring frequency	Data monitored continuously and aggregated as appropriate, to calculate emissions reductions
QA/QC Procedure	Crosscheck the measurements with an annual energy balance that is based on purchased quantities and stock changes
Any comment:	The procedures in Step 1.4 should also be followed

Data / Parameter table 45.

Data / Parameter:	$EF_{BR,n,y}$
Data unit:	tCH_4/GJ
Description:	CH_4 emission factor for uncontrolled burning of the biomass residues category n during the year *y* (tCH_4/GJ)
Source of data:	Conduct measurements or use reference default values
Measurement procedures (if any):	To determine the CH_4 emission factor, non-obligated entities may undertake measurements or use referenced default values. In the absence of more accurate information, it is recommended to use 0.0027 t CH_4 per ton of biomass as default value for the product of NCV_k and $EF_{burning,CH4,k,y}$
Monitoring frequency	-

QA/QC Procedure	-
Any comment:	-

Data / Parameter table 46.

Data / Parameter:	$\boldsymbol{EF_{FF,y,f}}$
Data unit:	T CO_2/GJ
Description:	CO_2 emission factor for fossil fuel type *f* in year *y* (t CO_2/GJ)
Source of data:	Either conduct measurements or use accurate and reliable local or national data where available. Where such data is not available, use IPCC default emission factors (country-specific, if available) if they are deemed to reasonably represent local circumstances. Choose the value in a conservative manner and justify the choice
Measurement procedures (if any):	Measurements shall be carried out at reputed laboratories and according to relevant international standards
Monitoring frequency	In case of measurements: At least every six months, taking at least three samples for each measurement. In case of other data sources: Review the appropriateness of the data annually
QA/QC Procedure	Check consistency of measurements and local/national data with default values by the IPCC. If the values differ significantly from IPCC default values, possibly collect additional information or conduct measurements
Any comment:	-

Data / Parameter table 47.

Data / Parameter:	$EF_{CH4,BR}$
Data unit:	T CH_4/GJ
Description:	CH_4 emission factor for the combustion of biomass residues in the project plant (tCH_4/GJ)
Source of data:	On-site measurements or default values, as provided in Table 4.
Measurement procedures (if any):	The CH_4 emission factor may be determined based on a stack gas analysis using calibrated analyzers
Monitoring frequency	At least quarterly, taking at least three samples per measurement
QA/QC Procedure	Check the consistency of the measurements by comparing the measurement results with measurements from previous years, relevant data sources (e.g. values in the literature, values used in the national GHG inventory) and default values by the IPCC. If the measurement results differ significantly from previous measurements or other relevant data sources, conduct additional measurements
Any comment:	Monitoring of this parameter for project emissions is only required if CH_4 emissions from biomass combustion are included in the project boundary. Note that a conservative factor shall be applied, as specified in the baseline methodology

Data / Parameter table 48.

Data / Parameter:	$\boldsymbol{EF_{CO2,LE}}$
Data unit:	tCO_2/GJ

Description:	CO_2 emission factor of the most carbon intensive fossil fuel used in the country (tCO_2/GJ)
Source of data:	Identify the most carbon intensive fuel type from the national communication, other literature sources (e.g. IEA). Possibly consult with the national agency responsible for the national communication/GHG inventory. If available, use national default values for the CO_2 emission factor. Otherwise, IPCC default values may be used
Measurement procedures (if any):	-
Monitoring frequency	Annually
QA/QC Procedure	-
Any comment:	-

Data / Parameter table 49.

Data / Parameter:	$HC_{BL,y}$
Data unit:	GJ
Description:	Baseline process heat generation in year *y* (GJ)
Source of data:	On-site measurements
Measurement procedures (if any):	This parameter should be determined as the difference of the enthalpy of the process heat (steam or hot water) supplied to process heat loads in the ICM project activity minus the enthalpy of the feed-water, the boiler blow-down and any condensate return to the heat generators. The respective enthalpies should be determined based on the mass (or volume) flows, the temperatures and, in case of superheated steam, the pressure. Steam tables or appropriate thermodynamic equations may be used to calculate the enthalpy as a function of temperature and pressure
Monitoring frequency	Calculated based on continuously monitored data and aggregated as appropriate, to calculate emissions reductions
QA/QC Procedure	-
Any comment:	-

Data / Parameter table 50.

Data / Parameter:	$EL_{PJ,gross,y}$
Data unit:	MWh
Description:	Gross quantity of electricity generated in all power plants which are located at the project site and included in the project boundary in year *y* (MWh)
Source of data:	On-site measurements
Measurement procedures (if any):	Use calibrated electricity meters
Monitoring frequency	Data monitored continuously and aggregated as appropriate, to calculate emissions reductions

QA/QC Procedure	The consistency of metered electricity generation should be cross-checked with receipts from electricity sales (if available) and the quantity of fuels fired (e.g. check whether the electricity generation divided by the quantity of fuels fired results in a reasonable efficiency that is comparable to previous years)
Any comment:	-

Data / Parameter table 51.

Data / Parameter:	$EL_{PJ,imp,y}$
Data unit:	MWh
Description:	Project electricity imports from the grid in year *y* (MWh)
Source of data:	On-site measurements
Measurement procedures (if any):	Use calibrated electricity meters
Monitoring frequency	Data monitored continuously and aggregated as appropriate, to calculate emissions reductions
QA/QC Procedure	The consistency of metered electricity generation should be cross-checked with receipts from electricity purchases
Any comment:	-

Data / Parameter table 52.

Data / Parameter:	$EL_{PJ,aux,y}$
Data unit:	MWh
Description:	Total auxiliary electricity consumption required for the operation of the power plants at the project site in year *y* (MWh)
Source of data:	On-site measurements
Measurement procedures (if any):	Use calibrated electricity meters
Monitoring frequency	Data monitored continuously and aggregated as appropriate, to calculate emissions reductions
QA/QC Procedure	The consistency of metered electricity generation should be cross-checked with receipts from electricity sales (if available) and the quantity of fuels fired (e.g. check whether the electricity generation divided by the quantity of fuels fired results in a reasonable efficiency that is comparable to previous years).
Any comment:	$EG_{PJ,aux,y}$ shall include all electricity required for the operation of equipment related to the preparation, storage and transport of biomass (e.g. for mechanical treatment of the biomass, conveyor belts, driers, etc.) and electricity required for the operation of all power plants which are located at the project site and included in the project boundary (e.g. for pumps, fans, cooling towers, instrumentation and control, etc.). In case steam turbines are used for mechanical power in the baseline situation and electric motors for the same purpose in the project situation, the electricity used to run these electric motors shall be included in $EL_{PJ,aux,y}$

Data / Parameter table 53.

Data / Parameter:	$NCV_{BR,n,y}$
Data unit:	GJ/tonnes of dry matter
Description:	Net calorific value of biomass residue of category n in year *y* (GJ/tonne on dry-basis)
Source of data:	On-site measurements
Measurement procedures (if any):	Measurements shall be carried out at reputed laboratories and according to relevant international standards. Measure the NCV on dry-basis
Monitoring frequency	At least every six months, taking at least three samples for each measurement.
QA/QC Procedure	Check the consistency of the measurements by comparing the measurement results with measurements from previous years, relevant data sources (e.g. values in the literature, values used in the national GHG inventory) and default values by the IPCC. If the measurement results differ significantly from previous measurements or other relevant data sources, conduct additional measurements. Ensure that the NCV is determined on the basis of dry biomass
Any comment:	Biogas should be included as appropriate if applicable (in which case convenient units such as GJ/m^3 should be used)

Data / Parameter table 54.

Data / Parameter:	$h_{LOW,y}$
Data unit:	GJ/tonnes
Description:	Specific enthalpy of the heat carrier at the process heat demand side
Source of data:	On-site measurements
Measurement procedures (if any):	The specific enthalpies should be determined based on the temperatures and, in case of superheated steam, the pressure. Steam tables or appropriate thermodynamic equations may be used to calculate the enthalpy as a function of temperature and pressure.
Monitoring frequency	Data monitored continuously and aggregated as appropriate, to calculate emissions reductions
QA/QC Procedure	-
Any comment:	The process heat demand side refers to where heat is finally used for heating purposes by end-users and the heat generator side refers to where heat is generated

Data / Parameter table 55.

Data / Parameter:	$h_{HIGH,y}$
Data unit:	GJ/tonnes
Description:	Specific enthalpy of the heat carrier at the heat generator side
Source of data:	On-site measurements
Measurement procedures (if any):	The specific enthalpies should be determined based on the temperatures and, in case of superheated steam, the pressure. Steam tables or appropriate thermodynamic equations may be used to calculate the enthalpy as a function of temperature and pressure.
Monitoring frequency	Data monitored continuously and aggregated as appropriate, to calculate emissions reductions

QA/QC Procedure	-
Any comment:	The process heat demand side refers to where heat is finally used for heating purposes by end-users and the heat generator side refers to where heat is generated

Data / Parameter table 56.

Data / Parameter:	P_y
Data unit:	Use suitable units, as appropriate
Description:	Quantity of the main product of the production process (e.g. sugar cane, rice) produced in year *y* from plants operated at the project site
Source of data:	On-site measurements
Measurement procedures (if any):	-
Monitoring frequency	Data aggregated as appropriate, to calculate emissions reductions
QA/QC Procedure	-
Any comment:	-

Data / Parameter table 57.

Data / Parameter:	LOC_y
Data unit:	Hour
Description:	Operation of the industrial facility using the process heat in year *y* (hour)
Source of data:	On-site measurements
Measurement procedures (if any):	Record and sum the hours of operation of the ICM project activity facilities during year *y*
Monitoring frequency	-
QA/QC Procedure	-
Any comment:	-

Data / Parameter table 58.

Data / Parameter:	**Amount of fuel used in the heat generation equipment, if any**
Data unit:	GJ
Description:	Amount of fuel used in the heat generation equipment, if any
Source of data:	On-site measurements
Measurement procedures (if any):	Use weight or volume meters. The quantity shall be cross-checked with the quantity of electricity generated and any fuel purchase receipts (if available)
Monitoring frequency	Data monitored continuously and aggregated as appropriate, to calculate emissions reductions
QA/QC Procedure	-
Any comment:	This parameter is related to an applicability condition

Data / Parameter table 59.

Data / Parameter:	$BR_{BL,BR\text{-}only,y}$
Data unit:	tonnes on dry-basis
Description:	Quantity of biomass residues that would be fired in biomass-residue-only heat generators (of power-only plants) in the baseline in year *y*
Source of data:	On-site measurements
Measurement procedures (if any):	Use calibrated weight meters. Adjust for the moisture content in order to determine the quantity of dry biomass. The quantity shall be cross-checked with the quantity of heat generated and any fuel purchase receipts (if available)
Monitoring frequency	Yearly
QA/QC Procedure	-
Any comment:	-

Data / Parameter table 60.

Data / Parameter:	$BR_{BL,co\text{-}fired,y}$
Data unit:	tonnes on dry-basis
Description:	Quantity of biomass residues that would be fired in co-fired heat generators (of power-only plants) in the baseline in year *y*
Source of data:	On-site measurements
Measurement procedures (if any):	Use calibrated weight meters. Adjust for the moisture content in order to determine the quantity of dry biomass. The quantity shall be cross-checked with the quantity of heat generated and any fuel purchase receipts (if available)
Monitoring frequency	Yearly
QA/QC Procedure	-
Any comment:	-

Data / Parameter table 61.

Data / Parameter:	$NCV_{n,y}$
Data unit:	GJ/tonnes on dry-basis
Description:	Net calorific value of biomass residues of category *n* in year *y*
Source of data:	On-site measurements
Measurement procedures (if any):	Measurements shall be carried out at certified laboratories and according to relevant international standards. Measure the NCV on dry-basis
Monitoring frequency	At least every six months, taking at least three samples for each measurement
QA/QC Procedure	Check the consistency of the measurements by comparing the measurement results with measurements from previous years, relevant data sources (e.g. values in the literature, values used in the national GHG inventory) and default values by the IPCC. If the measurement results differ significantly from previous measurements or other relevant data sources, conduct additional measurements. Ensure that the NCV is determined on the basis of dry biomass
Any comment:	The proposed sampling plan shall ensure that samples are randomly selected and are representative of the population

Data / Parameter table 62.

Data / Parameter:	**Moisture content**
Data unit:	% water content
Description:	Moisture content of each biomass type *k*
Source of data:	On-site measurements
Measurement procedures (if any):	-
Monitoring frequency	The moisture content should be monitored for each batch of biomass of homogeneous quality. The weighted average should be calculated for each monitoring period and used in the calculations
QA/QC Procedure	-
Any comment:	In case of dry biomass, monitoring of this parameter is not necessary

Data / Parameter table 63.

Data / Parameter:	$CAP_{FF/BR,p,y}$
Data unit:	MW
Description:	Maximum electricity generation capacity of baseline power plant *p* in year *y* if fossil-fuel-only heat generators and co-fired heat generators are used
Source of data:	On-site measurements
Measurement procedures (if any):	$CAP_{FF/BR,p,y}$ should be based on the maximum heat quantity that can be generated for use in heat engines if fossil-fuel-only heat generators and co-fired heat generators are used (but no biomass-residue-only heat generators). Note that $CAP_{FF/BR,p,y}$ depends on the amount of biomass residues co-fired in heat generators of the power plant. It is therefore determined based on the monitored amounts of biomass residues that would be co-fired in heat generators in year *y* ($BR_{BL,co\text{-}fired,y}$). Non-obligated entities should document transparently and justify in the ICM-PDD how they determine $CAP_{FF/BR,p,y}$ as a function of $BR_{BL,co\text{-}fired,y}$ for each calendar year
Monitoring frequency	Yearly
QA/QC Procedure	-
Any comment:	-

Data / Parameter table 64.

Data / Parameter:	$EF_{FF,CO2,y}$
Data unit:	tCO_2e/GJ
Description:	CO_2 emission factor of the fossil fuel type displaced by biomass for the year *y*
Source of data:	Either conduct measurements or use accurate and reliable local or national data where available. Where such data is not available, use IPCC default emission factors (country-specific, if available) if they are deemed to reasonably represent local circumstances. Choose the value in a conservative manner and justify the choice
Measurement procedures (if any):	Measurements shall be carried out at reputed laboratories and according to relevant international standards

Monitoring frequency	In case of measurements: At least every six months, taking at least three samples for each measurement. In case of other data sources: Review the appropriateness of the annual data
QA/QC Procedure	Check consistency of measurements and local/national data with default values by the IPCC. If the values differ significantly from IPCC default values, collect additional information or conduct additional measurements
Any comment:	For the purpose of determining $EF_{FF,CO2,y}$, as a conservative approach, the least carbon intensive fuel type should be used among the fossil fuels types used at the project site during the most recent 3 years prior to the implementation of the project activity and the fossil fuels used in the equipment at the project site due the year *y*

Data / Parameter table 65.

Data / Parameter:	$HG_{PJ,total,y}$
Data unit:	GJ/yr
Description:	Total heat generated in all heat generation equipment at the project site, using both biomass and fossil fuels, during the year *y*
Source of data:	On-site measurements
Measurement procedures (if any):	Heat generation is determined as the difference of the enthalpy of the steam or hot fluid and/or gases generated by the heat generation equipment and the sum of the enthalpies of the feed-fluid and/or gases blow-down and any condensate returns. The respective enthalpies should be determined based on the mass (or volume) flows, the temperatures and, in case of superheated steam, the pressure. Steam tables or appropriate thermodynamic equations may be used to calculate the enthalpy as a function of temperature and pressure. In case of equipment that produces hot water/oil this is expressed as difference in the enthalpy between the hot water/oil supplied to and returned by the plant. In case of equipment that produces hot gases or combustion gases, this is expressed as difference in the enthalpy between the hot gas produced and all streams supplied to the plant. The enthalpy of all relevant streams shall be determined based on the monitored mass flow, temperature, pressure, density and specific heat of the gas
Monitoring frequency	Continuously, aggregated annually
QA/QC Procedure	The consistency of metered net heat generation should be cross-checked with the quantity of biomass and/or fossil fuels fired (e.g. check whether the net heat generation divided by the quantity of fuel fired results in a reasonable thermal efficiency that is comparable to previous years)
Any comment:	The parameters mass flow, temperature, pressure, density and specific heat of the gas, shall be monitored

Data / Parameter table 66.

Data / Parameter:	$BR_{k,y}$
Data unit:	Tons of dry matter or litre

Description:	Quantity of biomass types *k* fired in all units of heat generation equipment at the project site during the year *y*
Source of data:	On-site measurements
Measurement procedures (if any):	Use weight or volume meters. Adjust for the moisture content in order to determine the quantity of dry biomass. The quantity shall be crosschecked with the quantity of heat generated and any fuel purchase receipts (if available)
Monitoring frequency	Continuously, aggregated at least annually
QA/QC Procedure	Crosscheck the measurements with an annual energy balance that is based on purchased quantities and stock changes
Any comment:	The quantity of biomass combusted should be collected separately for all types of biomass. For biogas the volume shall be referred to Normal Temperature and Pressure conditions (NTP)

Data / Parameter table 67.

Data / Parameter:	$FC_{i,y}$
Data unit:	Mass or volume unit
Description:	Quantity of fossil fuel types *i* fired in all heat generation equipment at the project site during the year *y*
Source of data:	On-site measurements
Measurement procedures (if any):	-
Monitoring frequency	Continuously, aggregated at least annually
QA/QC Procedure	Cross-check the measurements with an annual energy balance that is based on purchased quantities and stock changes
Any comment:	The quantity of fossil fuels combusted should be collected separately for all types of fossil fuels

Data / Parameter table 68.

Data / Parameter:	NCV_i
Data unit:	GJ/mass or volume unit
Description:	Net calorific value of fossil fuel types *i*
Source of data:	Either conduct measurements or use accurate and reliable local or national data where available. Where such data is not available, use IPCC default net calorific values (country-specific, if available) if they are deemed to reasonably represent local circumstances. Choose the values in a conservative manner and justify the choice
Measurement procedures (if any):	Measurements shall be carried out at reputed laboratories and according to relevant international standards
Monitoring frequency	In case of measurements: At least every six months, taking at least three samples for each measurement. In case of other data sources: Review the appropriateness of the data annually
QA/QC Procedure	Check consistency of measurements and local / national data with default values by the IPCC. If the values differ significantly from IPCC default values, collect additional information or conduct additional measurements

Any comment:	-

Data / Parameter table 69.

Data / Parameter:	$\boldsymbol{NCV_k}$
Data unit:	GJ/ton of dry matter or GJ/litre
Description:	Net calorific value of biomass types *k*
Source of data:	Measurements/calculations
Measurement procedures (if any):	Measurements shall be carried out at reputed laboratories and according to relevant international standards. Measure/calculate the NCV based on dry biomass
Monitoring frequency	At least every six months, taking at least three samples for each measurement
QA/QC Procedure	Check the consistency of the measurements by comparing the measurement results with measurements from previous years, relevant data sources (e.g. values in the literature, values used in the national GHG inventory) and default values by the IPCC. If the measurement results differ significantly from previous measurements or other relevant data sources, conduct additional measurements. Ensure that the NCV is determined on the basis of dry biomass
Any comment:	Biogas should be included as appropriate if applicable (in which case convenient units such as GJ/m^3 should be used)

Data / Parameter table 70.

Data / Parameter:	$\boldsymbol{EF_{CH4,BF}}$
Data unit:	kg CH_4 / TJ
Description:	CH_4 emission factor for the combustion of the biomass residues in the heat generation equipment
Source of data:	On-site measurements or default values, as provided in Table 4
Measurement procedures (if any):	The CH_4 emission factor may be determined based on a stack gas analysis using calibrated analyzers
Monitoring frequency	At least quarterly, taking at least three samples per measurement
QA/QC Procedure	Check the consistency of the measurements by comparing the measurement results with measurements from previous years, relevant data sources (e.g. values in the literature, values used in the national GHG inventory) and default values by the IPCC. If the measurement results differ significantly from previous measurements or other relevant data sources, conduct additional measurements
Any comment:	Monitoring of this parameter for project emissions is only required if CH_4 emissions from biomass combustion are included in the project boundary. Note that a conservative factor shall be applied, as specified in the baseline methodology

Data / Parameter table 71.

Data / Parameter:	$\boldsymbol{EF_{burning,CH4,k,y}}$
Data unit:	tCH_4/GJ
Description:	CH_4 emission factor for uncontrolled burning of the biomass residue types *k* during the year *y*

Source of data:	Undertake measurements or use referenced and reliable default values (e.g. IPCC)
Measurement procedures (if any):	Non-obligated entities may undertake measurements or use referenced default values. In the absence of more accurate information, it is recommended to use 0.0027 t CH_4 per ton of biomass as default value for the product of NCV_k and $EF_{burning,CH4,k,y}$
Monitoring frequency	Review of default values: annually. Measurements: once at the start of the project activity
QA/QC Procedure	Cross-check the results of any measurements with IPCC default values. If there is a significant difference, check the measurement method and increase the number of measurements in order to verify the results
Any comment:	Monitoring of this parameter for project emissions is only required if CH_4 emissions from biomass combustion are included in the project boundary. Note that a conservative factor shall be applied, as specified in the baseline methodology

Data / Parameter table 72.

Data / Parameter:	EG_y
Data unit:	MWh
Description:	Electricity generation during the year *y* at the project site
Source of data:	On-site measurements
Measurement procedures (if any):	-
Monitoring frequency	Annual
QA/QC Procedure	-
Any comment:	Monitoring of this parameter is only required if power is generated at the project site. In this case, monitoring is needed to assess whether the applicability condition referring to power generation at the project site is met

- - - - -

6. Annexure 1: Validation Parameters

If biomass is used to generate both heat and electricity	If biomass is used to generate electricity in power-only plants	If biomass is used in heat generation equipment
Biomass categories and quantities used for the selection of the baseline scenario selection and assessment of additionality	GWP_{CH4}	GWP_{CH4}
$BR_{HIST,n,x}$	Amount of fuel used in the heat generation equipment, if any	$\eta_{heat,FF}$
$BR_{n,h,x}$	Biomass categories and quantities used for the selection of the baseline scenario selection and assessment of additionality	$HG_{biomass,historic,n}$/$HG_{biomass,historic,n-1}$/$HG_{biomass,historic,n-2}$
$FF_{f,h,x}$	$BR_{n,power-only,x}$	$BR_{k,n}$/$BR_{k,n-1}$/$BR_{k,n-2}$
$HG_{h,x}$	$BR_{n,p,x}$	$FC_{i,n}$/$FC_{i,n-1}$/$FC_{i,n-2}$
$HG_{BR,CG/PO,x,I,j}$	$FF_{m,p,x}$	EG_{hist}
$EL_{BR,CG/Pox,i/j}$	P_x	
P_x	$EG_{p,x}$	
$CAP_{HG,h}$	$EG_{FF,x}$	
$CAP_{EG,CG,i}$	$NCV_{n,x}$	
$CAP_{EG,PO,i}$	$NCV_{m,x}$	
$LFC_{HG,h}$	$EF_{BL,CO2,FF,d}$	
$HPR_{BL,j}$	$\eta_{BL,BR,p}$	
$LFC_{EG,CG,i}$	$\eta_{p,FF}$	
$LFC_{EG,CG,j}$	$\eta_{BL,FF}$	
$EF_{BL,CO2,FF}$	$CAP_{FF,p}$	
$\eta_{BL,FF}$		
$NCV_{BR,n,x}$		
$NCV_{FF,f,x}$		
GWP_{CH4}		

7. Annexure 2: Monitoring Parameters

If biomass is used to generate both heat and electricity	If biomass is used to generate electricity in power-only plants	If biomass is used in heat generation equipment
Biomass categories and quantities used in the ICM project activity	P_y	$EF_{FF,CO2,y}$
For biomass residues categories for which scenarios B1, B2 or B3 is deemed a plausible baseline alternative, non-obligated entities shall demonstrate that this is a realistic and credible alternative scenario	Amount of fuel used in the heat generation equipment, if any	$HG_{PJ,total,y}$
$BR_{PJ,n,y}$	Biomass categories and quantities used in the project activity	$BR_{k,y}$

$BR_{B1/B3,n,y}$	$BR_{PJ,n,y}$	Moisture content
$BR_{B4,n,y}$	$BR_{n,B1/B3,y}$	$FC_{i,y}$
$BR_{B5,n,y}$	$BR_{B4,n,y}$	NCV_i
$EF_{BR,n,y}$	$BR_{B5,n,y}$	NCV_k
$EF_{FF,y,f}$	For biomass residues categories for which scenarios B1, B2 or B3 is deemed a plausible baseline alternative, project participants shall demonstrate that this is a realistic and credible alternative scenario	$EF_{CH4,BF}$
$EF_{CH4,BR}$	$BR_{BL,BR\text{-}only,y}$	$EF_{burning,CH4,k,y}$
$EF_{CO2,LE}$	$BR_{BL,co\text{-}fired,y}$	$EF_{CO2,LE}$
$HC_{BL,y}$	$EG_{PJ,gross,y}$	EG_y
$EL_{PJ,gross,y}$	$EG_{PJ,aux,y}$	
$EL_{PJ,imp,y}$	$NCV_{n,y}$	
$EL_{PJ,aux,y}$	$EF_{BR,n,y}$	
$NCV_{BR,n,y}$	Moisture content of the biomass	
$h_{Low,y}$	$CAP_{FF/BR,p,y}$	
$h_{High,y}$	$EF_{CH4,BR}$	
P_y	$EF_{CO2,LE}$	
LOC_y		

Revision/Changes in the Document

Version	*Date*	*Description*
1.0	DD MM YYYY	Initial Adoption