CLEAN DEVELOPMENT MECHANISM

CDM-MP62-A08

Draft Large-scale Consolidated Methodology

ACM0002: Grid-connected electricity generation from renewable sources

Version 15.0 - Draft

Sectoral scope(s): 01

COVER NOTE

1. Procedural background

1. The Executive Board (hereinafter referred to as the Board) of the clean development mechanism (CDM), at its seventy-fifth meeting, considered the proposal from the Meth Panel to revise the approved consolidated methodology "ACM0002: Grid-connected electricity generation from renewable sources" to improve and incorporate elements related to:

   (a) The quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year *y* ($EG_{P,J,y}$);

   (b) The annual average historical net electricity generation delivered to the grid by an existing renewable energy plant that was operated at the project site prior to the implementation of the project activity ($EG_{historical}$).

2. Purpose

2. The purpose of the draft revision is to improve and incorporate elements related to:

   (a) Definition of "rehabilitation/refurbishment" and provide a procedure to calculate 'Annual average historical net electricity generation ($EG_{historical}$)' for project activities which involve rehabilitation of power plant;

   (a) Estimation of the project emissions due to the operation of fossil fuel back up generator;

   (b) Monitoring of 'Quantity of net electricity generation supplied by project' ($EG_{facility,y}$);

   (c) Monitoring of reservoir area and installed capacity in case of hydro power plant;

   (d) Monitoring of mass fraction of CO_2 and CH_4 in the produced steam in case of Geothermal projects;

3. Key issues and proposed solutions

3. Not applicable.

4. Impacts

4. The revision of the methodology, if approved, will improve the consistency in terms of its applicability, definitions and calculation procedure for baseline emissions.

5. Subsequent work and timelines

5. The Meth Panel, at its sixty-second meeting, agreed on the draft revision of the methodology and further agreed to launch a call for public input. After receiving public inputs the Meth Panel will continue to work on the revision of the draft methodology, at its sixty-third meeting, for recommendation to the Board at a future meeting of the Board.

6. Recommendations to the Board

6. Not applicable (call for public input).

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1. Introduction

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

Table 1. Methodology key elements

Typical projects	Retrofit, rehabilitation (or refurbishment), replacement or capacity addition of an existing power plant or construction and operation of a new power plant that uses renewable energy sources and supplies electricity to the grid ~~(Greenfield power plant)~~
Type of GHG emissions mitigation action	Renewable energy: Displacement of electricity that would be provided to the grid by more-GHG-intensive means

2. Scope, applicability, and entry into force

2.1. Scope

2. This methodology applies to project activities that include retrofitting, rehabilitation (or refurbishment), replacement or capacity addition of an existing power plant or construction and operation of a ~~power plant that uses renewable energy sources and supplies electricity to the grid (~~Greenfield power plant~~)~~.

2.2. Applicability

3. This methodology is applicable to grid-connected renewable power generation project activities that:

(a) Install a ~~new power plant at a site where no renewable power plant was operated prior to the implementation of the project activity (~~Greenfield plant~~)~~;

(b) Involve a capacity addition of (an) existing plant(s);

(c) Involve a retrofit of (an) existing operating plant(s);

(d) Involve a rehabilitation of (an) existing plant(s); or

(e) Involve a replacement of (an) existing plant(s).

4. The methodology is applicable under the following conditions:

(a) The project activity is the installation, capacity addition, retrofit, rehabilitation or replacement of a power plant/unit of one of the following types: hydro power plant/unit (either ~~with~~ a run-of-river hydropower plant with/without reservoir or an accumulation reservoir hydropower plant), wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit;

(b) In the case of capacity additions, retrofits, rehabilitations or replacements (except for wind, solar, wave or tidal power capacity addition projects which use ~~Option 2: on page 16~~ equation (8) to calculate the parameter $EG_{PJ,y}$): the existing plant started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity expansion, or retrofit, or rehabilitation of the plant has been undertaken between the start of this minimum historical reference period and the implementation of the project activity.

5. In case of hydro power plants, One one of the following conditions shall must apply:

(a) The project activity is implemented in an existing single or multiple reservoirs, with no change in the volume of any of the reservoirs; or

(b) The project activity is implemented in an existing single or multiple reservoirs, where the volume of any of the reservoirs is increased and the power density of each reservoir, as per the definitions given in the project emissions section equation (3), is greater than 4 W/m^2; or

(c) The project activity results in new single or multiple reservoirs and the power density of each reservoir, as per the definitions given in the project emissions section equation (3), is greater than 4 W/m^2.

6. In case of hydro power plants using multiple reservoirs where the power density of any of the reservoirs is lower than or equal to 4 W/m^2 all of the following conditions must shall apply:

(a) The power density calculated for the entire project activity using equation (53) is greater than 4 W/m^2;

(b) Multiple reservoirs and hydro power plants are located at the same river and where are designed together to function as an integrated project[1] that collectively constitute the generation capacity of the combined power plant;

(c) Water flow between multiple reservoirs is not used by any other hydropower unit which is not a part of the project activity;

(d) Total installed capacity of the power units, which are driven using water from the reservoirs with power density lower than or equal to 4 W/m^2, is lower than 15 MW;

(e) Total installed capacity of the power units, which are driven using water from reservoirs with power density lower than or equal to 4 W/m^2, is less than 10

[1] This requirement can be met demonstrated, for example: (i) by demonstrating the fact that water flow from upstream power units spilling directly to the downstream reservoir; or (ii) through the analysis of the water balance. Water balance is the mass balance of water fed to power units, with all possible combinations of multiple reservoirs and without the construction of reservoirs. The purpose of such water balance is to demonstrate the requirement of specific combination of multiple reservoirs constructed under CDM project activity for the optimization of power output. This demonstration has to be carried out in the specific scenario of water availability in different seasons to optimize the water flow at the inlet of power units. Therefore this water balance will take into account seasonal flows from river, tributaries (if any), and rainfall for minimum three years prior to implementation of CDM project activity.

per cent of the total installed capacity of the project activity from multiple reservoirs.

7. The methodology is not applicable to the following:

(a) Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site;

(b) Biomass fired power plants;

(c) A hydro power plant[2] that results in the creation of a new single reservoir or in the increase in the capacity of an existing single reservoir where the power density of the power plant is less than or equal to 4 W/m^2.

8. In the case of retrofits, rehabilitations, replacements, or capacity additions, this methodology is only applicable if the most plausible baseline scenario, as a result of the identification of baseline scenario, is "the continuation of the current situation, that is to use the power generation equipment that was already in use prior to the implementation of the project activity and undertaking business as usual maintenance".

9. In addition, the applicability conditions included in the tools referred to below apply.[3]

2.3. Entry into force

10. Not applicable (call for public input).

3. Normative references

11. This consolidated baseline and monitoring methodology is based on elements from the following proposed new methodologies:

(a) "NM0001-rev: Vale do Rosario Bagasse Cogeneration (VRBC)" project in Brazil whose Baseline study, Monitoring and Verification Plan and Project Design Document were prepared by Econergy International Corporation;

(b) "NM0012-rev: Wigton Wind Farm" project in Jamaica whose Baseline study, Monitoring and Verification Plan and Project Design Document were prepared by Ecosecurities ltd;

(c) "NM0023: El Gallo Hydroelectric" project, Mexico whose Baseline study, Monitoring and Verification Plan and Project Design Document were prepared by Prototype Carbon Fund (approved by the CDM Executive Board on 14 April 2004);

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[2] Project participants wishing to undertake a hydroelectric project activity that result in a new reservoir or an increase in the capacity of an existing reservoir, in particular where reservoirs have no significant vegetative biomass in the catchments area, may request a revision to the approved consolidated methodology.

[3] The condition in the "Combined tool to identify the baseline scenario and demonstrate additionality" that all potential alternative scenarios to the proposed project activity must be available options to project participants; does not apply to this methodology, as this methodology only refers to some steps of this tool.

(d) “NM0024-rev: Colombia: Jepirachi Windpower” project whose Baseline study, Monitoring and Verification Plan and Project Design Document were prepared by Prototype Carbon Fund”;

(e) “NM0030-rev: Haidergarh Bagasse Based Co-generation Power” project in India whose Baseline study, Monitoring and Verification Plan and Project Design Document was submitted by Haidergarh Chini Mills, a unit of Balrampur Chini Mills Limited;

(f) “NM0036: Zafarana Wind Power Plant” project in the Arab Republic of Egypt whose Baseline study, Monitoring and Verification Plan and Project Design Document were prepared by Mitsubishi Securities;

(g) “NM0043: Bayano Hydroelectric Expansion and Upgrade” project in Panama whose Baseline study, Monitoring and Verification Plan and Project Design Document were prepared by Econergy International Corporation;

(h) “NM0055: Darajat Unit III Geothermal” project in Indonesia whose Baseline study, Monitoring and Verification Plan and Project Design Document were prepared by URS Corporation and Amoseas Indonesia Inc.

12. This methodology also refers to the latest approved versions of the following tools:[4]

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

(b) "Tool for the demonstration and assessment of additionality";

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

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

(e) “Tool to determine the remaining lifetime of equipment”;

(f) “Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period”.

13. For more information regarding the proposed new methodologies and the tools as well as their consideration by the Executive Board (hereinafter referred to as the Board) of clean development mechanism (CDM) please refer to <http://cdm.unfccc.int/goto/MPappmeth>.

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

14. “Existing actual or historical emissions, as applicable”; or

~~or~~

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

[4] Available on the UNFCCC CDM website.

4. Definitions

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

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

(a) **Installed power generation capacity (or installed capacity or nameplate capacity)** - the installed power generation capacity of a power unit is the capacity, expressed in Watts or one of its multiples, for which the power unit has been designed to operate at nominal conditions. The installed power generation capacity of a power plant is the sum of the installed power generation capacities of its power units;

(b) **Capacity addition** - a capacity addition is an increase in the installed power generation capacity of an existing power plant through: (i) the installation of a new power plant besides the existing power plant/units; or (ii) the installation of new power units, additional to the existing power plant/units. The existing power plant/units continue to operate after the implementation of the project activity;

(c) **Retrofit** ~~(or Rehabilitation or Refurbishment)~~ - ~~a retrofit~~ is an investment to repair or modify an existing operating power plant/unit, with the purpose to increase the efficiency, performance or power generation capacity of the plant, without adding new power plants or units~~, or to resume the operation of closed (mothballed) power plants~~. A retrofit restores the installed power generation capacity to or above its original level. Retrofits shall only include measures that involve capital investments and not regular maintenance or housekeeping measures;

(d) **Rehabilitation (or Refurbishment)** - is an investment to restore the existing power plant/unit that was severely damaged or destroyed due to foundation failure, excessive seepage, earthquake, liquefaction, or flood. The primary objective of rehabilitation or refurbishment is to restore the performances of the facilities. Rehabilitation may also lead to increase in efficiency, performance or power generation capacity of the power plant with/without adding new power plants or units;

(e) **Replacement** - is an investment in a new power plant or unit that replaces one or several existing unit(s) at the existing power plant. The new power plant or unit has the same or a higher power generation capacity than the plant or unit that was replaced;

(f) **Reservoir** - a reservoir is a water body created in valleys to store water generally made by the construction of a dam;

(g) **Existing reservoir** - a reservoir is to be considered as an "existing reservoir" if it has been in operation for at least three years before the implementation of the project activity;

(h) **Backup generator** - a generator that is used in the event of an emergency, such as power supply outage due to either main generator failure or grid failure or tripping of generator units, to meet electricity demand of the equipment at power plant(s)/unit(s) site during emergency;

(i) **Power plant/unit** - a power plant/unit is a facility that generates electric power. Several power units at one site comprise one power plant, whereas a power unit is characterized by the fact that it can operate independently from other power units at the same site. Where several identical power units (i.e. with the same capacity, age and efficiency) are installed at one site, they may be considered as one single power unit;

(j) **Greenfield power plant** - a new power plant or unit that is constructed and operated at a site where no renewable power plant was operated prior to the implementation of the project activity.

18. In addition, the definitions in the latest approved version of the "Tool to calculate the emission factor for an electricity system" apply.

5. Baseline methodology

5.1. Project boundary

19. The spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system[5] that the CDM project power plant is connected to.

20. The greenhouse gases and emission sources included in or excluded from the project boundary are shown in Table 2.

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

Source		Gas	Included	Justification/Explanation
Baseline	CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity	CO_2	Yes	Main emission source
		CH_4	No	Minor emission source
		N_2O	No	Minor emission source
Project activity	For geothermal power plants, fugitive emissions of CH_4 and CO_2 from non-condensable gases contained in geothermal steam	CO_2	Yes	Main emission source
		CH_4	Yes	Main emission source
		N_2O	No	Minor emission source
	CO_2 emissions from combustion of fossil fuels for electricity generation in solar thermal power plants and geothermal power plants	CO_2	Yes	Main emission source
		CH_4	No	Minor emission source
		N_2O	No	Minor emission source

[5] Refer to the latest approved version of the "Tool to calculate the emission factor for an electricity system" for definition of an electricity system.

Source		Gas	Included	Justification/Explanation
	For hydro power plants, emissions of CH_4 from the reservoir	CO_2	No	Minor emission source
		CH_4	Yes	Main emission source
		N_2O	No	Minor emission source

5.2. Identification of the baseline scenario

21. If the project activity is the installation of a ~~new grid-connected renewable power plant/unit~~ Greenfield power plant, the baseline scenario is the following:

22. Electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the “Tool to calculate the emission factor for an electricity system”.

23. If the project activity is a capacity addition to existing grid-connected renewable power plant/unit, the baseline scenario is the following:

24. In the absence of the CDM project activity, the existing facility would continue to supply electricity to the grid at historical levels, until the time at which the generation facility would likely be replaced or retrofitted ($DATE_{BaselineRetrofit}$). From that point of time onwards, the baseline scenario is assumed to correspond to the project activity, and no emission reductions are assumed to occur.

25. If the project activity is the retrofit, rehabilitation, or replacement of existing grid-connected renewable power plant/unit(s) at the project site, the following step-wise procedure to identify the baseline scenario shall be applied:

5.2.1. Step 1: Identify realistic and credible alternative baseline scenarios for power generation

26. Apply Step 1 of the “Combined tool to identify the baseline scenario and demonstrate additionality”. The options considered should include:

    (a) P1: The project activity not implemented as a CDM project;

    (b) P2: The continuation of the current situation, that is to use all power generation equipment that was already in use prior to the implementation of the project activity and undertaking business as usual maintenance. The additional power generated under the project would be generated in existing and new grid-connected power plants in the electricity system; and

    (c) P3: All other plausible and credible alternatives to the project activity that provide an increase in the power generated at the site, which are technically feasible to implement. This includes, inter alia, different levels of replacement, ~~and/or~~ retrofit and/or rehabilitation at the power plant/unit(s). Only alternatives available to project participants should be taken into account.

5.2.2. Step 2: Barrier analysis

27. Apply Step 2 of the “Combined tool to identify the baseline scenario and demonstrate additionality”.

5.2.3. Step 3: Investment analysis

28. If this option is used, apply the following:

   (a) Apply an investment comparison analysis, as per Step 3 of the “Combined tool to identify the baseline scenario and demonstrate additionality”, if more than one alternative is remaining after Step 2 and if the remaining alternatives include scenarios P1 and P3;

   (b) Apply a benchmark analysis, as per Step 2b of the “Tool for the demonstration and assessment of additionality”, if more than one alternative is remaining after Step 2 and if the remaining alternatives include scenarios P1 and P2.

5.3. Additionality

29. The additionality of the project activity shall be demonstrated and assessed using the latest version of the “Tool for the demonstration and assessment of additionality” ~~agreed by the Board, which is available on the UNFCCC CDM website~~.

5.4. Project emissions

30. For most renewable power generation project activities, PE_y = 0. However, some project activities may involve project emissions that can be significant. These emissions shall be accounted for as project emissions by using the following equation:

$$PE_y = PE_{FF,y} + PE_{GP,y} + PE_{HP,y}$$ Equation (1)

Where:

PE_y	=	Project emissions in year *y* (t CO_2e/yr)
$PE_{FF,y}$	=	Project emissions from fossil fuel consumption in year *y* (t CO_2/yr)
$PE_{GP,y}$	=	Project emissions from the operation of geothermal power plants due to the release of non-condensable gases in year *y* (t CO_2e/yr)
$PE_{HP,y}$	=	Project emissions from water reservoirs of hydro power plants in year *y* (t CO_2e/yr)

~~39. The procedure to calculate the project emissions from each of these sources is presented next.~~

5.4.1. Emissions from ~~Fossil~~ fossil fuel combustion ($PE_{FF,y}$)

31. For geothermal and solar thermal projects, which also use fossil fuels for electricity generation, CO_2 emissions from the combustion of fossil fuels shall be accounted for as project emissions ($PE_{FF,y}$).

32. For all renewable energy power generation project activities, emissions due to ~~T~~the use of fossil fuels for the backup generator ~~or emergency purposes (e.g. diesel generators)~~ can be neglected.

33. $PE_{FF,y}$ shall be calculated as per the latest version of the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion".

5.4.2. Emissions of non-condensable gases from the operation of geothermal power plants ($PE_{GP,y}$)

34. For geothermal project activities, project participants shall account fugitive emissions of CO_2~~carbon dioxide~~ and CH_4 ~~methane~~ due to release of non-condensable gases from produced steam.[6] Non-condensable gases in geothermal reservoirs usually consist mainly of CO_2 and H_2S. They also contain a small quantity of hydrocarbons, including predominantly CH_4. In geothermal power projects, non-condensable gases flow with the steam into the power plant. A small proportion of the CO_2 is converted to carbonate/bicarbonate in the cooling water circuit. In addition, parts of the non-condensable gases are re-injected into the geothermal reservoir. However, as a conservative approach, this methodology assumes that all non-condensable gases entering the power plant are discharged to atmosphere via the cooling tower. Fugitive CO_2~~carbon dioxide~~ and CH_4 ~~methane~~ emissions due to well testing and well bleeding are not considered, as they are negligible.

35. $PE_{GP,y}$ is calculated as follows:

$$PE_{GP,y} = \left(w_{steam,CO2,y} + w_{steam,CH4,y} \times GWP_{CH4}\right) \times M_{steam,y}$$ Equation (2)

Where:

$PE_{GP,y}$	=	Project emissions from the operation of geothermal power plants due to the release of non-condensable gases in year *y* (t CO_2e/yr)
$w_{steam,CO2,y}$	=	Average mass fraction of CO_2~~carbon dioxide~~ in the produced steam in year *y* (t CO_2/t steam)
$w_{steam,CH4,y}$	=	Average mass fraction of CH_4 ~~methane~~ in the produced steam in year *y* (t CH_4/t steam)
GWP_{CH4}	=	Global warming potential of CH_4 ~~methane~~ valid for the relevant commitment period (t CO_2e/t CH_4)
$M_{steam,y}$	=	Quantity of steam produced in year *y* (t steam/yr)

5.4.3. Emissions from water reservoirs of hydro power plants ($PE_{HP,y}$)

36. The power density (*PD*) of the project activity is calculated as follows:

[6] In the case of retrofit, rehabilitation or replacement projects at geothermal plants, this methodology does not account for baseline emissions from release of non-condensable gases from produced steam or fossil fuel combustion. Project proponents are welcome to propose revisions to this methodology to account for these baseline emissions.

$$PD = \frac{Cap_{PJ} - Cap_{BL}}{A_{PJ} - A_{BL}}$$ Equation (3)

Where:

PD	=	Power density of the project activity (W/m^2)
Cap_{PJ}	=	Installed capacity of the hydro power plant after the implementation of the project activity (W)
Cap_{BL}	=	Installed capacity of the hydro power plant before the implementation of the project activity (W). For new hydro power plants, this value is zero
A_{PJ}	=	Area of the single or multiple reservoirs measured in the surface of the water, after the implementation of the project activity, when the reservoir is full (m^2)
A_{BL}	=	Area of the single or multiple reservoirs measured in the surface of the water, before the implementation of the project activity, when the reservoir is full (m^2). For new reservoirs, this value is zero

37. For hydro power project activities that result in new single or multiple reservoirs and hydro power project activities that result in the increase of single or multiple existing reservoirs, project proponents shall account for CH_4 and CO_2 emissions from the reservoirs, estimated as follows:

38. If the power density of the single or multiple reservoirs ~~(*PD*)~~ is greater than 4 W/m^2 and less than or equal to 10 W/m^2:

$$PE_{HP,y} = \frac{EF_{Res} \times TEG_y}{1000}$$ Equation (4)

Where:

$PE_{HP,y}$	=	Project emissions from water reservoirs (t CO_2e/yr)
EF_{Res}	=	Default emission factor for emissions from reservoirs of hydro power plants ~~in year *y*~~ (kg CO_2e/MWh)
TEG_y	=	Total electricity produced by the project activity, including the electricity supplied to the grid and the electricity supplied to internal loads, in year *y* (MWh)

39. If the power density of the project activity ~~(*PD*)~~ is greater than 10 W/m^2:

$$PE_{HP,y} = 0$$ Equation (5)

~~42. The power density of the project activity (*PD*) is calculated as follows:~~

~~$$PD = \frac{Cap_{PJ} - Cap_{BL}}{A_{PJ} - A_{BL}}$$~~ ~~Equation (6)~~

~~Where:~~

~~PD~~	~~=~~	~~Power density of the project activity (W/m^2)~~
~~Cap_{PJ}~~	~~=~~	~~Installed capacity of the hydro power plant after the implementation of the project activity (W)~~
~~Cap_{BL}~~	~~=~~	~~Installed capacity of the hydro power plant before the implementation of the project activity (W). For new hydro power plants, this value is zero~~
~~A_{PJ}~~	~~=~~	~~Area of the single or multiple reservoirs measured in the surface of the water, after the implementation of the project activity, when the reservoir is full (m^2)~~
~~A_{BL}~~	~~=~~	~~Area of the single or multiple reservoirs measured in the surface of the water, before the implementation of the project activity, when the reservoir is full (m^2). For new reservoirs, this value is zero~~

5.5. Baseline emissions

40. Baseline emissions include only CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity. The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants. The baseline emissions are to be calculated as follows:

$$BE_y = EG_{PJ,y} \times EF_{grid,CM,y}$$ Equation (7)

Where:

BE_y	=	Baseline emissions in year *y* (t CO_2/yr)
$EG_{PJ,y}$	=	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year *y* (MWh/yr)
$EF_{grid,CM,y}$	=	Combined margin CO_2 emission factor for grid connected power generation in year *y* calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (t CO_2/MWh)

5.5.1. Calculation of $EG_{PJ,y}$

41. The calculation of $EG_{PJ,y}$ is different for: Greenfield plants, capacity additions, retrofits, rehabilitations, and replacements~~; and capacity additions~~. These cases are described as follows:

5.5.1.1. Greenfield renewable energy power plants

42. If the project activity is the ~~a~~ installation of a Greenfield power plant ~~the installation of a new grid-connected renewable power plant/unit at a site where no renewable power plant was operated prior to the implementation of the project activity~~, then:

$$EG_{PJ,y} = EG_{facility,y} \quad \text{Equation (8)}$$

Where:

$EG_{PJ,y}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year *y* (MWh/yr)

$EG_{facility,y}$ = Quantity of net electricity generation supplied by the project plant/unit to the grid in year *y* (MWh/yr)

5.5.1.2. Capacity addition to hydro or geothermal power plant

43. In the case of hydro or geothermal power plants, the addition of a new power plant or unit may significantly affect the electricity generated by the existing plant(s)/unit(s). For example, a new hydro turbine installed at an existing dam may affect the power generation by the existing turbines. Therefore, the approach as in section 5.5.1.4 below for retrofit or rehabilitation or replacement projects shall be used for hydro power plants and geothermal power plants. $EG_{facility,y}$ corresponds to the total electricity generation of the existing plant(s)/unit(s) and the added plant(s)/unit(s). A separate metering of electricity fed into the grid by the added plant(s)/unit(s) is not necessary under this option. This option may be applied to all renewable power projects.

5.5.1.3. Capacity addition to wind, solar, wave or tidal plant

44. In the case of wind, solar, wave or tidal power plant(s)/unit(s), it is assumed that the addition of new capacity does not significantly affect the electricity generated by existing plant(s)/unit(s).[7] In this case, the electricity fed into the grid by the added power plant(s)/unit(s) shall be directly metered and used to determine $EG_{PJ,y}$.

$$EG_{PJ,y} = EG_{PJ\_Add,y} \quad \text{Equation (9)}$$

Where:

$EG_{PJ,y}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year *y* (MWh/yr)

$EG_{PJ\_Add,y}$ = Quantity of net electricity generation supplied to the grid in year *y* by the project plant/unit that has been added under the project activity (MWh/yr)

[7] In this case of wind power capacity additions, some shadow effects can occur, but are not accounted under this methodology.

5.5.1.4. Retrofit or rehabilitation or replacement of an existing renewable energy power plant

45. If the project activity is the retrofit or rehabilitation or replacement of an existing grid-connected renewable power plant, the baseline scenario is the continuation of the operation of the existing plant. The methodology uses historical electricity generation data to determine the electricity generation by the existing plant in the baseline scenario, assuming that the historical situation observed prior to the implementation of the project activity would continue.

46. The power generation ~~of~~ from renewable energy power projects can vary significantly from year to year, due to natural variations in the availability of the renewable source (e.g. varying rainfall, wind speed or solar radiation). The use of few historical years to establish the baseline electricity generation can therefore involve a significant uncertainty. The methodology addresses this uncertainty by adjusting the historical electricity generation by its standard deviation. This ensures that the baseline electricity generation is established in a conservative manner and that the calculated emission reductions are attributable to the project activity. Without this adjustment, the calculated emission reductions could mainly depend on the natural variability observed during the historical period rather than the effects of the project activity.[8]

47. $EG_{PJ,y}$ is calculated as follows:

$$EG_{PJ,y} = EG_{facility,y} - (EG_{historical} + \sigma_{historical}); until\ DATE_{BaselineRetrofit}$$ Equation (10)

and

$$EG_{PJ,y} = 0; on/after\ DATE_{BaselineRetrofit}$$ Equation (11)

Where:

$EG_{PJ,y}$	=	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year *y* (MWh/yr)
$EG_{facility,y}$	=	Quantity of net electricity generation supplied by the project plant/unit to the grid in year *y* (MWh/yr)
$EG_{historical}$	=	Annual average historical net electricity generation delivered to the grid by the existing renewable energy power plant that was operated at the project site prior to the implementation of the project activity (MWh/yr)

[8] As an alternative approach for hydropower plants, the baseline electricity generation could be established as a function of the water availability. In this case, the baseline electricity generation would be established ex post based on the water availability monitored during the crediting period. Project participants are encouraged to consider such approaches and submit the related request for a revision to this methodology.

$\sigma_{historical}$	=	Standard deviation of the annual average historical net electricity generation delivered to the grid by the existing renewable energy power plant that was operated at the project site prior to the implementation of the project activity (MWh/yr)
$DATE_{BaselineRetrofit}$	=	Point in time when the existing equipment would need to be replaced in the absence of the project activity (date). This only applies to retrofit or replacement projects

~~44. $EG_{facility,y}$ is the quantity of net electricity generation supplied by the project plant/unit to the grid. It shall be determined as a difference between (i) quantity of electricity supplied by the project plant/unit to the grid and quantity of electricity delivered to the project plant/unit from the grid.~~

48. In case $EG_{facility,y} < (EG_{historical} + \sigma_{historical})$ in a year *y* then:

$$EG_{PJ,y} = 0; \quad \text{Equation (12)}$$

49. ~~$EG_{historical}$ is the annual average of historical net electricity generation, delivered to the grid by the existing renewable energy plant that was operated at the project site prior to the implementation of the project activity.~~ To determine $EG_{historical}$, project participants may choose between two historical periods. This allows some flexibility: the use of the longer time period may result in a lower standard deviation and the use of the shorter period may allow a better reflection of the (technical) circumstances observed during the more recent years.

50. Project participants may choose among the following two time spans of historical data to determine $EG_{historical}$:

    (a) The five last calendar years prior to the implementation of the project activity; or

    (b) The time period from the calendar year following $DATE_{hist}$, up to the last calendar year prior to the implementation of the project, as long as this time span includes at least five calendar years, where $DATE_{hist}$ is latest point in time between:

        (i) The ~~commercial~~ commissioning of the plant/unit;

        (ii) If applicable: the last capacity addition to the plant/unit; or

        (iii) If applicable: the last retrofit or rehabilitation of the plant/unit.

51. In case of rehabilitation where the power plant/unit did not operate for last five calendar years before the rehabilitation starts, $EG_{historical}$ is equal to zero.

~~**5.5.1.5 Capacity addition to an existing renewable energy power plant**~~

~~47. In the case of hydro or geothermal power plants, the addition of a new power plant or unit may significantly affect the electricity generated by the existing plant(s) or unit(s). For example, a new hydro turbine installed at an existing dam may affect the power generation by the existing turbines. Therefore, the same approach as for retrofits and replacements is used for hydro power plants and geothermal power plants.~~

48. In the case of wind, solar, wave or tidal power plants, it is assumed that the addition of new capacity does not significantly affect the electricity generated by existing plant(s) or unit(s).[9] In this case, the electricity fed into the grid by the added power plant(s) or unit(s) could be directly metered and used to determine $EG_{PJ,y}$.

49. If the project activity is a capacity addition, project participants may use one of the following two options to determine $EG_{PJ,y}$:

(a) **Option 1:** use the approach applied to retrofits and replacements above. $EG_{facility,y}$ corresponds to the total electricity generation of the existing plant(s) or unit(s) and the added plant(s) or unit(s). A separate metering of electricity fed into the grid by the added plant(s) or unit(s) is not necessary under this option. This option may be applied to all renewable power projects;

(b) **Option 2:** for wind, solar, wave or tidal power plant(s) or unit(s), the following approach can be used provided that the electricity fed into the grid by the added power plant(s) or unit(s) addition is separately metered.

$$EG_{PJ,y} = EG_{PJ\_Add,y} \qquad \text{Equation 13}$$

Where:

$EG_{PJ,y}$	=	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year *y* (MWh/yr)
$EG_{PJ\_Add,y}$	=	Quantity of net electricity generation supplied to the grid in year *y* by the project plant/unit that has been added under the project activity (MWh/yr)

50. Project participants should document in the CDM-PDD which option is applied.

5.5.2. Calculation of $DATE_{BaselineRetrofit}$

52. In order to estimate the point in time when the existing equipment would need to be replaced/retrofitted in the absence of the project activity ($DATE_{BaselineRetrofit}$), project participants may take the following approaches into account The the typical average technical lifetime of the type equipment, which may be determined and documented as per the “Tool to determine the remaining lifetime of equipment”.

(a), taking into account common practices in the sector and country, for example based on industry surveys, statistics, technical literature, etc.;

(b) The common practices of the responsible company regarding replacement/retrofitting schedules may be evaluated and documented, for example based on historical replacement/retrofitting records for similar equipment.

[9] In this case of wind power capacity additions, some shadow effects can occur, but are not accounted under this methodology.

53. The point in time when the existing equipment would need to be replaced/retrofitted in the absence of the project activity should be chosen in a conservative manner~~,~~ that is, if a range is identified, the earliest date should be chosen.

5.6. Leakage

54. No leakage emissions are considered. The ~~main~~ emissions potentially ~~giving rise to leakage in the context of electric sector projects are emissions~~ arising due to activities such as power plant construction and upstream emissions from fossil fuel use (e.g. extraction, processing, transport)~~. These emissions sources~~ are neglected.

5.7. Emission reductions

55. Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y \quad \text{Equation (13)}$$

Where:

ER_y	=	Emission reductions in year y (t CO_2e/yr)
BE_y	=	Baseline emissions in year y (t CO_2/yr)
PE_y	=	Project emissions in year y (t CO_2e/yr)

5.7.1. Estimation of emissions reductions prior to validation

56. Project participants ~~should~~ shall prepare as part of the CDM-PDD an estimate of likely emission reductions ~~for~~ from the proposed project activity during the crediting period. This estimate should, in principle, employ the same methodology as selected above. Where the grid emission factor ($EF_{CM,grid,y}$) is determined ex post during monitoring, project participants may use models or other tools to estimate the emission reductions prior to validation.

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

57. Project participants are requested to refer to the methodological tool “Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period”. ~~At the start of the second and third crediting period project proponents have to address two issues:~~

~~(a) Assess the continued validity of the baseline; and~~

~~(b) Update the baseline.~~

~~58. In assessing the continued validity of the baseline, a change in the relevant national and/or sectoral regulations between two crediting periods has to be examined at the start of the new crediting period. If at the start of the project activity, the project activity was not mandated by regulations, but at the start of the second or third crediting period regulations are in place that enforce the practice or norms or technologies that are used by the project activity, the new regulation (formulated after the registration of the project activity) has to be examined to determine if it applies to existing plants or not. If the new regulation applies to existing CDM project activities, the baseline has to be reviewed~~

and, if the regulation is binding, the baseline for the project activity should take this into account. This assessment will be undertaken by the verifying DOE.

59. For updating the baseline at the start of the second and third crediting period, new data available will be used to revise the baseline scenario and emissions. Project participants shall assess and incorporate the impact of new regulations on baseline emissions.

5.9. Project activity under a programme of activities

58. In addition to the requirements set out in the latest approved version of the "Standard for demonstration of additionality, development of eligibility criteria and application of multiple methodologies for programme of activities", the following shall be applied for the use of this methodology in a project activity under a programme of activities (PoAs).

59. The PoA may consist of one or several types of CPAs. CPAs are regarded to be of the same type if they are similar with regard to the demonstration of additionality, emission reduction calculations and monitoring. The CME shall describe in the CDM-PoA-DD for each type of CPAs separately:

60. Eligibility criteria for CPA inclusion used for each type of CPAs. In case of combinations of renewable technologies in one CPA, the eligibility criteria shall be defined for each technology separately;

    (a) Emission reduction calculations for each type of CPAs;

    (b) Monitoring provisions for each type of CPAs.

61. The CME shall describe transparently and justify in the CDM-PoA-DD which CPAs are regarded to be of the same type. CPAs shall not be regarded to be of the same type if one of the following conditions is different:

    (a) The project activity with regard to any of the following aspects:

        (i) Renewable power generation technology;

            a. Hydro-power plant/unit;

                i. Run-of-river reservoir hydropower plant;

                ii. Accumulation reservoir Hhydropower plant with a [storage];

            b. Wind power plant/unit;

            c. Geothermal power plant/unit;

            d. Solar power plant/unit;

                i. Photovoltaic;

                ii. Heat concentration;

            e. Wave power plant/unit;

            f. Tidal power plant/unit;

g. Combination of any of the above.

(ii) Project activity type:

a. Greenfield;

b. Capacity addition;

c. Retrofit of existing operating plants;

d. Rehabilitation of existing plants;

e. Replacement of existing plants.

(b) The legal and regulatory framework;

(i) Legal regulations;

(ii) Promotional policies.

62. When defining eligibility criteria for CPA inclusion for a distinct type of CPAs, the CME shall consider relevant technical and economic parameters, such as:

(a) Technical and economic parameters that are technology specific (e.g. ranges of load factors, sizes of installation, wind speed);

(b) Parameters reflecting the investment climate:

(i) Subsidies or other financial flows;

(ii) Tariffs;

(iii) Depreciation;

(iv) Power purchase agreements;

(v) Other parameters determining market circumstances;

(c) Ranges of costs (capital investment, operating and maintenance costs, etc.) and revenues (income from electricity sale, subsidies/fiscal incentives, ODA).

63. When Option (ii) in the latest approved version of the “Standard for demonstration of additionality, development of eligibility criteria and application of multiple methodologies for programmes of activities” is applied, that is related to defining technical and economic criteria as ranges of values for each input parameter required for the inclusion of the CPA in the PoA-DD, the eligibility criteria related to costs, revenues and investment climate shall be updated every two years in order to correctly reflect the technical and market circumstances of a CPA implementation.

5.10. Data and parameters not monitored

64. In addition to the parameters listed in the tables below, the provisions on data and parameters not monitored in the tools referred to in this methodology apply.

Data / Parameter table 1.

Data / Parameter:	**GWP_{CH4}**
Data unit:	t CO_2e/tCH_4
Description:	Global warming potential of methane-valid for the relevant commitment period
Source of data:	IPCC
Value to be applied:	For the first commitment period: 21 t CO_2e/t CH_4 For the second commitment period: 25 t CO_2e/t CH_4
Any comment:	-

Data / Parameter table 2.

Data / Parameter:	**$EG_{historical}$**
Data unit:	MWh/yr
Description:	Annual average historical net electricity generation delivered to the grid by the existing renewable energy power plant that was operated at the project site prior to the implementation of the project activity
Source of data:	Project activity site
Value to be applied:	Electricity meters
Any comment:	-

Data / Parameter table 3.

Data / Parameter:	**$\sigma_{historical}$**
Data unit:	MWh/yr
Description:	Standard deviation of the annual average historical net electricity generation delivered to the grid by the existing renewable energy power plant that was operated at the project site prior to the implementation of the project activity
Source of data:	Calculated from data used to establish $EG_{historical}$
Value to be applied:	Parameter to be calculated as the standard deviation of the annual generation data used to calculate $EG_{historical}$ for retrofit, or rehabilitation or replacement project activities
Any comment:	-

Data / Parameter table 4.

Data / Parameter:	**$DATE_{BaselineRetrofit}$**
Data unit:	date
Description:	Point in time when the existing equipment would need to be replaced in the absence of the project activity
Source of data:	Project activity site
Value to be applied:	As per provisions in the methodology above
Any comment:	-

Data / Parameter table 5.

Data / Parameter:	**$DATE_{hist}$**
Data unit:	date
Description:	Point in time from which the time span of historical data for retrofit, rehabilitation or replacement project activities may start
Source of data:	Project activity site
Value to be applied:	$DATE_{hist}$ is the latest point in time between: (a) The commercial commissioning of the plant/unit; (b) If applicable: the last capacity addition to the plant/unit; or (c) If applicable: the last retrofit or rehabilitation of the plant
Any comment:	-

Data / Parameter table 6.

Data / Parameter:	**EF_{Res}**
Data unit:	$kgCO_2e/MWh$
Description:	Default emission factor for emissions from reservoirs
Source of data:	Decision by EB 23
Value to be applied:	90 $kgCO_2e/MWh$
Any comment:	-

Data / Parameter table 7.

Data / Parameter:	**Cap_{BL}**
Data unit:	W
Description:	Installed capacity of the hydro power plant before the implementation of the project activity. For new hydro power plants, this value is zero
Source of data:	Project site
Value to be applied:	Determine the installed capacity based on manufacturer's specifications or recognized standards
Any comment:	-

Data / Parameter table 8.

Data / Parameter:	A_{BL}
Data unit:	m^2
Description:	Area of the single or multiple reservoirs measured in the surface of the water, before the implementation of the project activity, when the reservoir is full (m^2). For new reservoirs, this value is zero
Source of data:	Project site
Value to be applied:	Measured from topographical surveys, maps, satellite pictures, etc.
Any comment:	-

6. Monitoring methodology

65. All data collected as part of monitoring should be archived electronically and be kept at least for two years after the end of the last crediting period. One hundred per cent of the data should be monitored if not indicated otherwise in the tables below. All measurements should be conducted with calibrated measurement equipment according to relevant industry standards.

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

6.1. Data and parameters monitored

Data / Parameter table 9.

Data / Parameter:	$w_{steam,CO2,y}$
Data unit:	t CO_2/t steam
Description:	Average mass fraction of carbon dioxide in the produced steam in year *y*
Source of data:	Project activity site
Measurement procedures (if any):	Non-condensable gases sampling should be carried out in production wells and/or at the steam field-power plant interface using ASTM Standard Practice E1675 for Sampling 2-Phase Geothermal Fluid for Purposes of Chemical Analysis (as applicable to sampling single phase steam only). The CO_2 and CH_4 sampling and analysis procedure consists of collecting non-condensable gases samples from the main steam line with glass flasks, filled with sodium hydroxide solution and additional chemicals to prevent oxidation. ~~Hydrogen sulphide (~~H_2S~~)~~ and ~~carbon dioxide (~~CO_2~~)~~ dissolve in the solvent while the residual compounds remain in their gaseous phase. The gas portion is then analyzed using gas chromatography to determine the content of the residuals including CH_4. All alkanes concentrations are reported in terms of methane
Monitoring frequency:	At least every three months and more frequently, if necessary
QA/QC procedures:	-
Any comment:	Applicable to geothermal power projects

Data / Parameter table 10.

Data / Parameter:	$\mathbf{w_{steam,CH4,y}}$
Data unit:	t CH_4/t steam
Description:	Average mass fraction of methane in the produced steam in year *y*
Source of data:	Project activity site
Measurement procedures (if any):	As per the procedures outlined for $w_{steam,CO2,y}$
Monitoring frequency:	As per the procedures outlined for $w_{steam,CO2,y}$
QA/QC procedures:	-
Any comment:	Applicable to geothermal power projects

Data / Parameter table 11.

Data / Parameter:	$\mathbf{M_{steam,y}}$
Data unit:	t steam/yr
Description:	Quantity of steam produced in year *y*
Source of data:	Project activity site
Measurement procedures (if any):	The steam quantity discharged from the geothermal wells should be measured with a venture flow meter (or other equipment with at least the same accuracy). Measurement of temperature and pressure upstream of the venture meter is required to define the steam properties. The calculation of steam quantities should be conducted on a continuous basis and should be based on international standards. The measurement results should be summarized transparently in regular production reports
Monitoring frequency:	Daily
QA/QC procedures:	-
Any comment:	Applicable to geothermal power projects

Data / Parameter table 12.

Data / Parameter:	$\mathbf{EG_{facility,y}}$
Data unit:	MWh/yr
Description:	Quantity of net electricity generation supplied by the project plant/unit to the grid in year *y*
Source of data:	Electricity meter(s)
Measurement procedures (if any):	This parameter should be either monitored using bi-directional energy meter or calculated as difference between (a) the quantity of electricity supplied by the project plant/unit to the grid; and (b) the quantity of electricity the project plant/unit from the grid. In case it is calculated then~~The~~ following parameters shall be measured: (a) The quantity of electricity supplied by the project plant/unit to the grid; and (b) The quantity of electricity delivered to the project plant/unit from the grid

Monitoring frequency:	Continuous measurement and at least monthly recording
QA/QC procedures:	Cross check measurement results with records for sold electricity
Any comment:	-

Data / Parameter table 13.

Data / Parameter:	**$EG_{PJ\_Add,y}$**
Data unit:	MWh/yr
Description:	Quantity of net electricity generation supplied to the grid in year *y* by the project plant/unit that has been added under the project activity
Source of data:	Project activity site
Measurement procedures (if any):	-
Monitoring frequency:	Continuous measurement and at least monthly recording
QA/QC procedures:	-
Any comment:	Applicable to wind, solar, wave or tidal power plant(s)/ ~~or~~ unit(s), provided that Option 2 in the baseline methodology is applied

Data / Parameter table 14.

Data / Parameter:	**TEG_y**
Data unit:	MWh/yr
Description:	Total electricity produced by the project activity, including the electricity supplied to the grid and the electricity supplied to internal loads, in year *y*
Source of data:	Project activity site
Measurement procedures (if any):	Electricity meters
Monitoring frequency:	Continuous measurement and at least monthly recording
QA/QC procedures:	-
Any comment:	Applicable to hydro power project activities with a power density of the project activity ~~(PD)~~ greater than 4 W/m^2 and less than or equal to 10 W/m^2

Data / Parameter table 15.

Data / Parameter:	**$EF_{grid,CM,y}$**
Data unit:	t CO_2/MWh
Description:	Combined margin CO_2 emission factor for grid connected power generation in year *y* calculated using the latest version of the "Tool to calculate the emission factor for an electricity system"
Source of data:	As per the "Tool to calculate the emission factor for an electricity system"
Measurement procedures (if any):	As per the "Tool to calculate the emission factor for an electricity system"

Monitoring frequency:	As per the "Tool to calculate the emission factor for an electricity system"
QA/QC procedures:	As per the "Tool to calculate the emission factor for an electricity system"
Any comment:	-

Data / Parameter table 16.

Data / Parameter:	**$PE_{FF,y}$**
Data unit:	t CO_2/yr
Description:	Project emissions from fossil fuel consumption in year *y*
Source of data:	As per the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion"
Measurement procedures (if any):	As per the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion"
Monitoring frequency:	As per the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion"
QA/QC procedures:	As per the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion"
Any comment:	Applicable to geothermal and solar thermal projects, which also use fossil fuels for electricity generation

Data / Parameter table 17.

Data / Parameter:	**Cap_{PJ}**
Data unit:	W
Description:	Installed capacity of the hydro power plant after the implementation of the project activity
Source of data:	Project site
Measurement procedures (if any):	Determine the installed capacity based on manufacturer's specifications or recognized standards
Monitoring frequency:	Once at the beginning of each crediting period ~~Yearly~~
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 18.

Data / Parameter:	**A_{PJ}**
Data unit:	m^2
Description:	Area of the single or multiple reservoirs measured in the surface of the water, after the implementation of the project activity, when the reservoir is full
Source of data:	Project site
Measurement procedures (if any):	Measured from topographical surveys, maps, satellite pictures, etc.
Monitoring frequency:	~~Yearly~~ Once at the beginning of each crediting period
QA/QC procedures:	-
Any comment:	-

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Document information

Version	Date	Description
Draft 15.0	10 February 2014	MP 62, Annex 8 A call for public input will be issued on this draft revised methodology. Revision to: • Provide clarity on applicability of the methodology for rehabilitation projects; • Take into account the relevant comments from commenting system.
14.0	4 October 2013	EB 75, Annex 13 Revision to: • Remove requirements for specific case CPA-DDs and frequency of updating of eligibility criteria as these requirements are specified in the relevant standards • Change the title from “ACM0002: Consolidated baseline methodology for grid-connected electricity generation from renewable sources” to “ACM0002: Grid-connected electricity generation from renewable sources”.
13.0.0	11 May 2012	EB 67, Annex 13 Revision to: • Provide more clarity on how the quantity of net electricity generation supplied by the project plant/unit to the grid shall be monitored; • Introduce provisions for the use of this methodology in a project activity under a PoA.
12.2.0	25 November 2011	EB 65, Annex 16 The amendment incorporates applicability conditions on how the methodology shall be applied in cases where the project activity includes hydropower plant(s) with multiple reservoirs.
12.1.0	26 November 2010	EB 58, Annex 7 The revision includes a definition for reservoir.
12.0.0	17 September 2010	EB 56, Annex 5 The revision includes a definition for existing reservoir.
11	12 February 2010	EB 52, Annex 7 The revision clarifies the applicability condition requesting availability of five years of historical data for capacity addition, retrofit and rehabilitation projects is not required for wind, solar, wave or tidal power capacity addition projects which directly meter the electricity generated by the added capacities.

Version	Date	Description
10	28 May 2009	EB 47, Annex 7 The revision expands the applicability of the methodology to project activities that retrofit or replace renewable energy power generation units, to restore the installed power generation capacity to or above its original level. This revision includes the required provisions in the (i) definitions, (ii) baseline identification, and (iii) baseline emissions sections, in order to allow these types of project activities, as well as (iv) editorial changes in order to improve the overall clarity of the approved methodology.
09	13 February 2009	EB 45, Annex 10 Inclusion of project emissions for operation of solar power plant and backup power generation of all the renewable energy plants.
08	28 November 2008	EB 44, Annex 12 Incorporate changes in equation 9 of baseline emissions to account for the cases where the expansion of existing capacity of plant takes place as an additional energy generation unit is installed under CDM project activity.
07	30 November 2007	EB 36, Annex 11 • General editorial revision of the methodology to put it in the new format; • Inclusion of the “Tool to calculate the emission factor for an electricity system”; • Inclusion of the “Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion”; • Inclusion of the definitions for power plant/unit, installed power generation capacity, electricity capacity addition, modification and retrofit, net electricity generation and grid/project electricity system; Editorial revisions of the applicability conditions to clarify: (a) That the methodology is applicable only to electricity capacity additions; (b) The requirements for hydro power plants in terms of reservoir and power density; (c) The minimum vintage of baseline data that has to be available; (d) That the methodology is not applicable to biomass power plants and to hydro power plants with power density less than $4W/m^2$; • Inclusion of an equation to calculate the power density of hydro power plants; • Deletion of the parameters related to emissions associated with well testing in case of geothermal power plants, as those parameters were not necessary in the methodology.
06	12 May 2006	EB 24, Annex 7

Version	Date	Description
		• Revision of the applicability conditions to include hydro power plants with new reservoirs that have power density greater than 4 W/m^2 and inclusion of the equation to calculate the emissions from the reservoir in the emissions reductions section; • Revision of the baseline section to allow ex-ante calculation of the simple OM, simple-adjusted OM and average OM emission factors; • Inclusion of the clarification that the choice between ex-ante and ex-post vintage for calculation of the build margin and the operating margin should be specified in the PDD and cannot be changed during the crediting period; • Inclusion of guidance and clarifications on the selection of alternative weights for the calculation of the combined margin.
05	24 February 2006	EB 23, Annex 9 Inclusion of guidances in the baseline section stating that power plant capacity additions registered as CDM project activities should be excluded from the calculation of emission factors and that if 20 per cent falls on partial capacity of a plant in the determination of the group of power plants used for the calculation of the build margin, that plant should be fully included in the calculation.
04	25 November 2005	EB 22, Annex 6 Inclusion of a procedure in the project boundary section on how to deal with cases where the application of the methodology does not result in a clear grid boundary.
03	30 September 2005	EB 21, Annex 8 Revision of the baseline section in order to include project activities that modify or retrofit an existing electricity generation facility and the corresponding procedure to determine the baseline scenario in this case ($EG_{baseline}$).
02	03 December 2004	EB 17, Meeting Report Inclusion of the following paragraph in the Baseline section as per request by the Board: "Which of the plausible alternatives scenarios, as listed in step 1 of the additionality text, is the most likely baseline scenario? Please provide thorough explanation to justify your choice, based on the factors (investment or other barriers) described in the additionality methodology. This methodology is applicable only if the most likely baseline scenario is electricity production from other sources feeding into the grid".

Version	Date	Description
01	03 September 2004	EB 15, Annex 2 Initial adoption.

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