VCS Tool

VT0011

ELECTRICITY SYSTEM EMISSION FACTORS

Version 1.0

13 February 2025

The original CDM *TOOL07 Tool to Calculate the Emission Factor for an Electricity System, v1.0* was adopted on 19 October 2007. It has been further revised over time. *TOOL07, v7.0* was adopted on 31 August 2018.

Version 1.0 of this tool revision was developed by Verra. This tool revision must be used with the most recent version of *TOOL07* available on the CDM website.

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1   SUMMARY DESCRIPTION

This tool is applied to calculate the CO_2 emission factor of an electricity system whose dispatch and generation are affected by a project activity. It provides the procedures and requirements for calculating the operating margin (OM), build margin (BM), and combined margin (CM) emission factors of an electricity system.

This tool must be used in conjunction with the most recent version of CDM *TOOL07 Tool to Calculate the Emission Factor for an Electricity System*.

This tool must be used as indicated in the applied methodology. Methodologies may have their own procedures, use only parts of this tool, or require a different tool.

Projects using a methodology that uses CDM *TOOL07* may apply this new tool until a revision of the underlying methodology is published.

2   SOURCES

This methodology revision applies to CDM *TOOL07 Tool to Calculate* the *Emission Factor* for an *Electricity System*.

3   DEFINITIONS

In addition to the definitions set out in *TOOL07* and the *VCS Program Definitions*, the following definitions apply to this tool.

Build margin (BM) emission factor
The emission factor representing likely future power plants in the electricity system whose construction and subsequent dispatch and generation would be displaced or affected by the project activity

Combined margin (CM) emission factor
The weighted average of the operating margin and build margin emission factors which represents the overall impact of the project activity on the emissions of the electricity system, where both the operating and build margin are affected

Operating margin (OM) emission factor
The emission factor representing existing power plants in the electricity system whose dispatch and generation would be displaced or affected by the project activity

4 APPLICABILITY CONDITIONS

This tool is applied to calculate the CO_2 emission factor of an electricity system whose dispatch and generation are affected by a project activity. It is globally applicable.

All applicability conditions of the most recent version of *TOOL07* must be met, except for Applicability Condition 5, which is removed under this revision:

In case of CDM projects the tool is not applicable if the project electricity system is located partially or totally in an Annex I country.

This tool must be used in conjunction with the most recent version of *TOOL07*. All the procedures and requirements of *TOOL07* must be applied unless this tool indicates otherwise.

5 PROCEDURES

When *TOOL07* refers to CDM projects, it must be read as "projects in the VCS Program and other GHG programs, including the CDM."

The following paragraphs replace the corresponding paragraphs from TOOL07:

Step 1: Identify the relevant electricity systems

16. Similarly, the project proponent must identify any connected electricity systems. If a connected electricity system is located partially or totally in Annex I countries, then the emission factor of that connected electricity system should be considered zero.

25. For the purpose of determining the operating margin emission factor, use one of the following options to determine the CO_2 emission factor(s) for net electricity imports from a connected electricity system:

   a1) 0 t CO_2/MWh for projects that supply electricity to the grid or projects that reduce electricity consumption from the grid

   a2) 1.3 t CO_2/MWh for projects increasing the consumption of electricity from the grid

   (b), (c), and (d) as per *TOOL07*

26. For imports from connected electricity systems located in Annex I country(ies), the emission factor is 0 tons CO_2 per MWh. (paragraph removed)

39. Clarification: Any of the OM methods may be selected, with consideration of the restrictions mentioned in paragraphs 40 (simple OM) and 41 (dispatch data analysis).

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

45. Power plants registered under the VCS Program or any other GHG program must be included in the sample group used to calculate the operating margin, where the criteria for including the power source in the sample group apply.[1]

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

50. Where several fuel types are used in the power unit,

- Option A.2.i: For projects that supply electricity to the grid or projects that reduce electricity consumption from the grid, use the fuel type with the lowest CO_2 emission factor for $EFCO_{2,m,l,y}$.

- Option A.2.ii: For projects increasing the consumption of electricity from the grid, use the fuel type with the highest CO_2 emission factor for $EFCO_{2,m,l,y}$.

- Option A3: Where for a power unit m only data on electricity generation is available:

  - Option A.3.i: An emission factor of 0 t CO_2/MWh may be applied for projects that supply electricity to the grid or projects that reduce electricity consumption from the grid.

  - Option A.3.ii: An emission factor of 1.3 t CO_2/MWh may be applied for projects increasing the consumption of electricity from the grid.

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

72. In terms of vintage data, project proponents must choose between one of the following two options:

    a) **Option 1 Ex-ante:** As per *TOOL07*.

    b) **Option 2 Annual Update:** The build margin emission factor must be updated annually, including those units built up to the most recent year for which information is available at each update. The same is applicable for the second and third crediting periods.

75. The sample group of power units m used to calculate the BM must be determined as per the following procedure, consistent with the data vintage selected above:

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[1] When calculating the grid emission factor, the project proponent should exclude the electricity supplied to the grid through a purpose-built wheeling agreement (PBWA, as described in VCS tool *VT0010 Emissions from Electricity Consumption and Generation*) from the grid emission factor calculation, where the information is available.

a) Identify the set of five power units that started to supply electricity to the grid most recently ($SET_{5\ units}$) and determine their annual electricity generation ($AEG_{SET\text{-}5\ units}$ in MWh). Include all units connected to the electricity system, including those registered under the VCS Program and other GHG programs.

b) Identify the set of power units that started to supply electricity to the grid most recently and that comprise 20% of the total annual electricity generation of the electricity system (AEG_{total}). Include all units connected to the electricity system, including those registered under the VCS Program and other GHG programs. Where the 20% falls on part of the generation of a unit, the generation of that unit is fully included in the calculation ($SET_{\geq 20\ percent}$). Determine their annual electricity generation ($AEG_{SET\geq 20\ percent}$ in MWh).

c) From $SET_{5\ units}$ and $SET_{\geq 20\ percent}$, select the set of power units that comprises the larger annual electricity generation (SET_{sample}).

~~Otherwise:~~

~~(d) Exclude from SET_{sample} the power units which started to supply electricity to the grid more than 10 years ago. Include in that set the power units registered as CDM project activities, starting with power units that started to supply electricity to the grid most recently, until the electricity generation of the new set comprises 20 per cent of the annual electricity generation of the project electricity system (if 20 per cent falls on part of the generation of a unit, the generation of that unit is fully included in the calculation) to the extent is possible. Determine for the resulting set ($SET_{sample\text{-}CDM}$) the annual electricity generation ($AEG_{SET\text{-}sample\text{-}CDM}$, in MWh);~~

~~If the annual electricity generation of that set is comprises at least 20 per cent of the annual electricity generation of the project electricity system (i.e. $AEG_{SETsample\text{-}CDM} \geq 0.2 \times AEG_{total}$), then use the sample group $SET_{sample\text{-}CDM}$ to calculate the build margin. Ignore Steps (e) and (f).~~

~~Otherwise:~~

~~(e) Include in the sample group $SET_{sample\ CDM}$ the power units that started to supply electricity to the grid more than 10 years ago until the electricity generation of the new set comprises 20 per cent of the annual electricity generation of the project electricity system (if 20 per cent falls on part of the generation of a unit, the generation of that unit is fully included in the calculation);~~

~~(f) The sample group of power units m used to calculate the build margin is the resulting set ($SET_{sample\ CDM\ >10yrs}$).~~

(Conditions (d), (e), (f) removed).

76. Figure 4 removed.

79. If the power units included in the build margin sample are older than 10 years, then as a conservative approach, only Option A2 from guidance in Step 4 section 6.4.1 may be used and the default values provided in Table 2, Appendix of *TOOL09 Determining the Baseline Efficiency of Thermal or Electric Energy Generation Systems* must be used to determine the parameter $\eta_{m,y}$ for the power units that started to supply electricity to the grid more than 10 years ago.

Step 6: Calculate the combined margin emissions factor

86. **Case 1**: The following values must be used for w_{OM} and w_{BM} for projects that supply electricity to the grid or projects that reduce electricity consumption from the grid:

   a) Wind and solar power generation project activities:

   i) For the first crediting period: w_{OM} = 0.50 and w_{BM} = 0.50

   ii) For the second crediting period: w_{OM} = 0.40 and w_{BM} = 0.60

   iii) For the third crediting period: w_{OM} = 0.30 and w_{BM} = 0.70

   b) All other Case 1 projects, unless otherwise specified in the approved methodology that refers to this tool:

   i) For the first crediting period: w_{OM} = 0.40 and w_{BM} = 0.60

   ii) For subsequent crediting periods: w_{OM} = 0.25 and w_{BM} = 0.75

   Case 2: The following values must be used for w_{OM} and w_{BM} for projects increasing the consumption of electricity from the grid:

   a) For all crediting periods: w_{OM} = 1.0 and w_{BM} = 0.0

Paragraphs 87, 88, and 89 of *TOOL07* are removed when applying this tool.

90. If the project activity is located in a Least Developed Country (LDC), the combined margin may be calculated with w_{OM} = 1 and w_{BM} = 0. (Conditions 90(ii) and 90(iii) of *TOOL07* are removed.)

91. If the project activity is located in a non-LDC, the combined margin may be calculated using equation (16) above with the following provisions:

   a) **Case 1:** If the share of renewable energy in total installed capacity in a grid/project electricity system is less than or equal to 20 percent, a default value of $EF_{grid,BM,y}$ = 0.326 t CO_2/MWh may be applied (NG-fired CCGT, based on best available technology).

   The emission factor for oil-fired CCGT is not applicable.

   b) **Case 2:** As per *TOOL07*.

6 DATA AND PARAMETERS

6.1 Data and Parameters Available at Validation

Parameters available at validation remain the same as in *TOOL07*.

6.2 Data and Parameters Monitored

103. Some parameters listed under "data and parameters" will have different monitoring frequencies depending on the data vintage chosen, following the provisions in the baseline procedure and the guidance on "monitoring frequency" for the parameter.

106. Data/parameter tables 1, 2, 3, and 4 Monitoring Frequency:

    a) As per *TOOL07*

    b) As per *TOOL07*

    c) BM: Either once ex-ante for each crediting period or annually ex-post, following the guidance included in Step 5

7 REFERENCES

Clean Development Mechanism (CDM) *TOOL07 Tool To Calculate The Emission Factor For An Electricity System*. CDM. Available at:
https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v2.pdf/history_view

DOCUMENT HISTORY

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v1.0	13 Feb 2025	Initial version