

CERT

Certified Emissions Reduction Technologies Foundation

ELECTRICITY SYSTEM EMISSION FACTORS

CERT Methodological Tool · Version 1.0

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1. Summary Description

This tool provides the procedure to calculate the CO₂ emission factor of an electricity system (grid emission factor) for use in CERT methodologies, as the combined margin (CM) of an operating margin (OM) reflecting existing generation affected by the project and a build margin (BM) reflecting the new capacity whose construction is affected by the project.

2. Sources

This tool draws on internationally recognised grid emission factor practice, including concepts from the UNFCCC Clean Development Mechanism tool for calculating the emission factor of an electricity system, adapted to the CERT Standard.

3. Definitions

Term	Definition
Project electricity system	The system delineated by the dispatch area within which power plants can be dispatched without significant transmission constraint, defined by the national grid operator's published delineation or, absent one, the national grid.
Connected electricity system	A system exchanging electricity with the project electricity system across a transmission constraint.
Operating margin (OM)	Emission factor reflecting the generation mix whose output is affected by the project in the short run.
Build margin (BM)	Emission factor reflecting the cohort of recently built power units whose construction would be affected by projects of the type concerned.
Low-cost/must-run resources	Hydro, geothermal, wind, solar, nuclear, low-cost biomass, and other plants dispatched irrespective of load.

4. Applicability Conditions

4.1 This tool applies where a CERT methodology requires a grid emission factor. Electricity supplied under purpose-built wheeling arrangements (CERT-TOOL-003 Scenario B) is excluded from the grid emission factor calculation where the settlement information is available.

5. Procedures

5.1 Step 1: Identify the Relevant Electricity System(s)

5.1.1 Delineate the project electricity system and any connected systems. Where a connected system is located partially or wholly in an industrialised (Annex I) country, its emission factor is taken as zero.

5.1.2 Emission factor for net imports from a connected system — select conservatively by project direction: (a1) 0 t CO₂/MWh for projects that supply electricity to the grid or reduce grid consumption; (a2) 1.3 t CO₂/MWh for projects that increase grid consumption; or, where data permit, (b) the OM of the exporting system, or (c) plant-specific factors of exporting units.

5.2 Step 2: Data Vintage and Sources

5.2.1 Use the most recent three years of generation and fuel data available at validation (ex-ante fixed for the crediting period) or update annually ex post, selecting one approach and applying it consistently. Data sources: grid operator statistics, regulator publications, national energy balances, or plant-level disclosures, in that order of preference, fully referenced.

5.3 Step 3: Select the Operating Margin Method

5.3.1 Select one: (a) simple OM; (b) simple adjusted OM; (c) dispatch data analysis OM; or (d) average OM. The simple OM may be used only where low-cost/must-run resources constitute less than 50% of total grid generation (on a five-year average or long-run trend). Dispatch data analysis may be used only ex post with hourly dispatch data. The average OM must be used where low-cost/must-run generation is 50% or more, unless dispatch data analysis is applied.

5.3.2 Power plants registered under any GHG crediting programme are included in the OM sample group where the inclusion criteria otherwise apply.

5.4 Step 4: Calculate the Operating Margin

$$EF_{grid,OM,y} = \sum m (EG_{m,y} \times EF_{EL,m,y}) / \sum m EG_{m,y} \quad (1)$$

Where:

$EG_{m,y}$ = Net electricity generated and delivered to the grid by power unit m in year y (MWh), excluding low-cost/must-run units for the simple OM

$EF_{EL,m,y}$ = CO₂ emission factor of power unit m in year y (t CO₂/MWh), from unit fuel consumption and net generation

5.4.1 Where several fuel types are used in a unit, apply: for projects supplying the grid or reducing consumption, the lowest-carbon fuel factor; for projects increasing consumption, the highest-carbon fuel factor. Where only generation data exist for a unit: 0 t CO₂/MWh may be applied (grid-supplying/reducing projects) or 1.3 t CO₂/MWh (consumption-increasing projects).

5.5 Step 5: Calculate the Build Margin

5.5.1 Vintage options — select one: (a) ex-ante fixed for the crediting period; or (b) annual update, including units built up to the most recent year with available information at each update (applicable equally in renewed crediting periods).

5.5.2 The BM sample group is the greater (by annual generation) of: the five power units most recently connected to the system, or the units most recently connected comprising 20% of system

generation, determined consistently with the vintage option. Units registered under GHG crediting programmes are excluded from the BM sample where their inclusion would lower the BM; capacity additions to existing plants are treated as separate units.

$$EF_{grid,BM,y} = \sum m (EG_{m,y} \times EF_{EL,m,y}) / \sum m EG_{m,y} \quad (\text{over the BM sample group}) \quad (2)$$

5.6 Step 6: Calculate the Combined Margin

$$EF_{grid,CM,y} = w_{OM} \times EF_{grid,OM,y} + w_{BM} \times EF_{grid,BM,y} \quad (3)$$

Project type	wOM	wBM
Wind and solar (intermittent, non-dispatchable)	0.75	0.25
All other project types	0.50	0.50

5.6.1 Methodologies may fix alternative weights with justification. Weights apply for the crediting period and are re-assessed at renewal.

6. Data and Parameters

Parameter	Unit	Source	Monitoring
EG _{m,y}	MWh	Grid operator / regulator statistics; plant disclosures	Per vintage option (ex-ante fixed or annual ex-post update)
Fuel consumption per unit m	mass/volume/energy	Same sources; national energy balance	Per vintage option
Fuel CO ₂ emission factors and NCVs	t CO ₂ /GJ; GJ/unit	National published values, else IPCC defaults (lower bound for baseline-side conservativeness)	Fixed at validation; revisited at renewal
System delineation	—	Grid operator publication	Fixed at validation

References

- CERT Registry Rulebook (CERT-REG-001); CERT-TOOL-003; applied CERT methodology.
- UNFCCC CDM grid emission factor tool (conceptual antecedent); IPCC Guidelines for National Greenhouse Gas Inventories.