Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories

TYPE I - RENEWABLE ENERGY PROJECTS

Note: Categories I.A, I.B and I.C involve renewable energy technologies that supply electricity, mechanical and thermal energy, respectively, to the user directly. Renewable energy technologies that supply electricity to a grid fall into category I.D.

Project participants shall take into account the general guidance to the methodologies, information on additionality, abbreviations and general guidance on leakage provided at http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html.

I.D. 'Grid connected renewable electricity generation'

Technology/measure

1. This category comprises renewable energy generation units, such as photovoltaics, hydro, tidal/wave, wind, geothermal and renewable biomass, that supply electricity to and/or displace electricity from an electricity distribution system that is or would have been supplied by at least one fossil fuel fired generating unit.

2. If the unit added has both renewable and non-renewable components (e.g. a wind/diesel unit), the eligibility limit of 15MW for a small-scale CDM project activity applies only to the renewable component. If the unit added co-fires fossil fuel[1], the capacity of the entire unit shall not exceed the limit of 15MW.

3. Combined heat and power (co-generation) systems are not eligible under this category.

4. In the case of project activities that involve the addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct[2] from the existing units.

5. Project activities that seek to retrofit or modify an existing facility for renewable energy generation are included in this category. To qualify as a small scale project, the total output of the modified or retrofitted unit shall not exceed the limit of 15 MW.

Boundary

6. The project boundary encompasses the physical, geographical site of the renewable generation source.

[1] Co-fired system uses both fossil and renewable fuels.

[2] Physically distinct units are those that are capable of generating electricity without the operation of existing units, and that do not directly affect the mechanical, thermal, or electrical characteristics of the existing facility. For example, the addition of a steam turbine to an existing combustion turbine to create a combined cycle unit would not be considered "physically distinct".

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I.D. Grid connected renewable electricity generation (cont)

Baseline

7. In the case of landfill gas, waste gas, wastewater treatment and agro-industries projects, recovered methane emissions are eligible under a relevant type III category. If the recovered methane is used for electricity generation the baseline shall be calculated in accordance with paragraphs below. If the recovered methane is used for heat generation it is eligible under category I.C.

8. For a system where all generators use exclusively fuel oil and/or diesel fuel, the baseline is the annual kWh generated by the renewable unit times an emission coefficient for a modern diesel generating unit of the relevant capacity operating at optimal load as given in Table I.D.1.

Table I.D.1

Emission factors for diesel generator systems (in kg CO_2e/kWh*) for three different levels of load factors**

Cases:	Mini-grid with 24 hour service	i) Mini-grid with temporary service (4-6 hr/day) ii)Productive applications iii) Water pumps	Mini-grid with storage
Load factors [%]	25%	50%	100%
<15 kW	2.4	1.4	1.2
>=15 <35 kW	1.9	1.3	1.1
>=35 <135 kW	1.3	1.0	1.0
>=135<200 kW	0.9	0.8	0.8
> 200 kW***	0.8	0.8	0.8

*) A conversion factor of 3.2 kg CO_2 per kg of diesel has been used (following revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories)
**) Figures are derived from fuel curves in the online manual of RETScreen lnternational's PV 2000 model, downloadable from http://retscreen.net/
***) default values

9. For all other systems, the baseline is the kWh produced by the renewable generating unit multiplied by an emission coefficient (measured in kg CO_2e/kWh) calculated in a transparent and conservative manner as:

(a) A combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the approved methodology ACM0002. Any of the four procedures to calculate the operating margin can be chosen, but the restrictions to use the Simple OM and the Average OM calculations must be considered

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I.D. Grid connected renewable electricity generation (cont)

OR

(b) The weighted average emissions (in kg CO_2e/kWh) of the current generation mix. The data of the year in which project generation occurs must be used.

Calculations must be based on data from an official source (where available)[3] and made publicly available.

10. In the case of project activities that involve the addition of renewable energy generation units at an existing renewable power generation facility, where the existing and new units share the use of common and limited renewable resources (e.g. streamflow, reservoir capacity, biomass residues), the potential for the project activity to reduce the amount of renewable resource available to, and thus electricity generation by, existing units must be considered in the determination of baseline emissions, project emissions, and/or leakage, as relevant.

For project activities that involve the addition of new generation units (e.g. turbines) at an existing facility, the increase in electricity production associated with the project (EGy in MWh/ year) should be calculated as follows:

$$EGy = TEy - WTEy$$

Where:
TEy = the total electricity produced in year y by all units, existing and new project units;

WTEy = the estimated electricity that would have been produced by existing units (installed before the project activity) in year y in the absence of the project activity, where

$$WTEy = MAX(WTE_{actual,y}, WTE_{estimated,y})$$

[3] Plant emission factors used for the calculation of emission factors should be obtained in the following priority:

1. *Acquired directly* from the dispatch center or power producers, if available; or
2. *Calculated*, if data on fuel type, fuel emission factor, fuel input and power output can be obtained for each plant;
If confidential data available from the relevant host Party authority are used, the calculation carried out by the project participants shall be verified by the DOE and the CDM-PDD may only show the resultant carbon emission factor and the corresponding list of plants;
3. *Calculated*, as above, but using estimates such as: default IPCC values from the 2006 IPCC Guidelines for National GHG Inventories for net calorific values and carbon emission factors for fuels instead of plant-specific values technology provider's name plate power plant efficiency or the anticipated energy efficiency documented in official sources (instead of calculating it from fuel consumption and power output). This is likely to be a conservative estimate, because under actual operating conditions plants usually have lower efficiencies and higher emissions than name plate performance would imply; conservative estimates of power plant efficiencies, based on expert judgments on the basis of the plant's technology, size and commissioning date; or
4. *Calculated*, for the simple OM and the average OM, using aggregated generation and fuel consumption data, in cases where more disaggregated data is not available.

Where:
$\mathbf{WTE_{actual,y}}$ = the actual, measured electricity production of the existing units in year y;
$\mathbf{WTE_{estimated,y}}$ = the estimated electricity that would have been produced by the existing units under the observed availability of the renewable resource (e.g. hydrological conditions) for year y.

If the existing units shut down, are derated, or otherwise become limited in production, the project activity should not get credit for generating electricity from the same renewable resources that would have otherwise been used by the existing units (or their replacements). Therefore, the equation for WTE still holds, and the value for $WTE_{estimated,y}$ should continue to be estimated assuming the capacity and operating parameters same as that at the time of the start of the project activity.

If the existing units are subject to modifications or retrofits that increase production, then WTEy can be estimated using the procedures described for $EG_{baseline}$ below.

11. For project activities that seek to retrofit or modify an existing facility for renewable energy generation the baseline scenario is the following:

In the absence of the CDM project activity, the existing facility would continue to provide electricity to the grid (EGbaseline, in MWh/year) at historical average levels (EGhistorical, in MWh/year), until the time at which the generation facility would be likely to be replaced or retrofitted in the absence of the CDM project activity (DATEBaselineRetrofit). From that point of time onwards, the baseline scenario is assumed to correspond to the project activity, and baseline electricity production (EGbaseline) is assumed to equal project electricity production (EGy, in MWh/year), and no emission reductions are assumed to occur.

EGbaseline = MAX(EGhistorical, EGestimated,y) until DATEBaselineRetrofit
EGbaseline = EGy on/after DATEBaselineRetrofit

Baseline emissions (BE_y in tCO_2) are then, the product of the baseline emissions factor (EF_y in tCO_2/MWh) times the electricity supplied by the project activity to the grid (EG_y in MWh) minus the baseline electricity supplied to the grid in the case of modified or retrofit facilities ($EG_{baseline}$ in MWh), as follows:

$$BE_y = (EG_y - EG_{baseline}) \cdot EF_y$$

EGhistorical is the average of historical electricity delivered by the existing facility to the grid, spanning all data from the most recent available year (or month, week or other time period) to the time at which the facility was constructed, retrofit, or modified in a manner that significantly affected output (i.e., by 5% or more), expressed in MWh per year. A minimum of 5 years (60 months) (excluding abnormal years) of historical generation data is required in the case of hydro facilities. For other facilities, a minimum of 3 years data is required. In the case that 5 years of historical data (or three years in the case of non hydro project activities) are not available - e.g., due to recent retrofits or exceptional circumstances as described in footnote[4] - a new methodology

[4] Data for periods affected by unusual circumstances such as natural disasters, conflicts, and transmission constraints shall be excluded

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or methodology revision must be proposed.

EGestimated,y is the estimated electricity that would have been produced by the existing units under the observed availability of renewable resource (e.g. hydrological conditions) for year y.

All project electricity generation above baseline levels (EGbaseline) 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 order to estimate the point in time when the existing equipment would need to be replaced in the absence of the project activity (DATEBaselineRetrofit), project participants may take the following approaches into account:

(a) The typical average technical lifetime of the equipment type may be determined and documented, taking into account common practices in the sector and country, e.g. based on industry surveys, statistics, technical literature, etc.

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

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

Leakage

12. If the energy generating equipment is transferred from another activity or if the existing equipment is transferred to another activity, leakage is to be considered.

Monitoring

13. Monitoring shall consist of metering the electricity generated by the renewable technology.

14. For projects where only biomass or biomass and fossil fuel are used the amount of biomass and fossil fuel input shall be monitored.

15. For projects consuming biomass a specific fuel consumption[5] of each type of fuel (biomass or fossil) to be used should be specified ex-ante. The consumption of each type of fuel shall be monitored.

16. If fossil fuel is used the electricity generation metered should be adjusted to deduct electricity generation from fossil fuels using the specific fuel consumption and the quantity of fossil fuel consumed.

[5] Specific fuel consumption is the fuel consumption per unit of electricity generated (e.g. tonnes of bagasse per MWh).

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I.D. Grid connected renewable electricity generation (cont)

17. If more than one type of biomass fuel is consumed each shall be monitored separately.

18. The amount of electricity generated using biomass fuels calculated as per paragraph 16 shall be compared with the amount of electricity generated calculated using specific fuel consumption and amount of each type of biomass fuel used. The lower of the two values should be used to calculate emission reductions.