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.C. Thermal energy for the user with or without electricity

Technology/measure

1. This category comprises renewable energy technologies that supply individual households or users with thermal energy that displaces fossil fuels. Examples include solar thermal water heaters and dryers, solar cookers, energy derived from renewable biomass for water heating, space heating, or drying, and other technologies that provide thermal energy that displaces fossil fuel. Biomass-based co-generating systems that produce heat and electricity ~~for use on-site~~ are included in this category.

2. Where thermal generation capacity is specified by the manufacturer, it shall be less than 45~~15~~MW.

3. For ~~co-generation systems and/or~~ co-fired[1] systems the aggregate installed capacity (specified for fossil fuel use) of all systems affected by the project activity shall not exceed 45 MW_{th}. ~~to qualify under this category, the energy output shall not exceed 45 $MW_{thermal}$ e.g. for a biomass based co-generating system the capacity for all the boilers affected by the project activity combined shall not exceed 45 $MW_{thermal}$. In the case of the co-fired system the installed capacity (specified for fossil fuel use) for each boiler affected by the project activity combined shall not exceed 45 $MW_{thermal}$.~~

4. Cogeneration projects that displace/ avoid fossil fuel consumption in the production of thermal energy (e.g. steam or process heat) and/or electricity shall use this methodology. The capacity of the project in this case shall be the thermal energy production capacity i.e. 45 MW_{th}

5. ~~4.~~ In the case of project activities that involve the addition of renewable energy units at an existing renewable energy facility, the ~~ad~~total ~~ded~~ capacity of the units added by the project should be lower than 45 $MW_{th\text{~~ermal~~}}$ and should be physically distinct[2] from the existing units.

---

[1] C~~e~~o-fired system uses both fossil and renewable fuels

[2] Physically distinct units are those that are capable of producing thermal energy 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".

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

I.C. Thermal Energy for the User (cont)

Boundary

6. ~~5.~~ The physical, geographical site of the renewable energy generation delineates the project boundary.

Baseline

7. ~~6.~~ For renewable energy technologies that displace technologies using fossil fuels, the simplified baseline is the fuel consumption of the technologies that would have been used in the absence of the project activity times an emission coefficient for the fossil fuel displaced. IPCC default values for emission coefficients may be used. ~~For renewable energy technologies that displace electricity the simplified baseline is the electricity consumption times the relevant emission factor calculated as described in category I.D.~~

8. Cogeneration projects shall use one of the four following options for baseline emission calculations depending on the technology that would have been used to produce the thermal energy and electricity in the absence of the project activity:

(a) Electricity is supplied from the grid and steam/heat is produced using fossil fuel;

(b) Electricity is produced in an onsite power plant (with a possibility of export to the grid) and steam/heat is produced using fossil fuel;

(c) A combination of (a) and (b);

(d) Electricity and steam/heat are produced in a cogeneration unit, using fossil fuel.

9. Baseline emissions for electricity produced in captive plants shall be calculated as the amount of electricity produced with the renewable technology (GWh) multiplied by the CO_2 emission factor per unit of energy of the fuel that would have been used in the baseline plant in ($tCO2$ / TJ) divided by the efficiency of the captive plant.

10. Baseline emissions for electricity supplied from the grid shall be calculated as the amount of electricity produced with the renewable technology (GWh) multiplied by the CO_2 emission factor of that grid. The emission factor for grid electricity shall be calculated as per the procedures detailed in AMS I.D.

11. For steam/heat produced using fossil fuels the baseline emissions are calculated as follows:

$$BEy = HGy * EF\ CO_2 / \eta_{th}$$

Where:

BEy the baseline emissions from steam/heat displaced by the project activity during the year y in tCO2e.

HGy the net quantity of steam/heat supplied by the project activity during the year y in TJ.

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

I.C. Thermal Energy for the User (cont)

$EFCO_2$	the CO_2 emission factor per unit of energy of the fuel that would have been used in the baseline plant in (tCO_2 / TJ), obtained from reliable local or national data if available, otherwise, IPCC default emission factors are used.
η_{th}	the efficiency of the plant using fossil fuel that would have been used in the absence of the project activity.

12. For cases 8 (a), (b) and (c) baseline emissions must be calculated as the sum of emissions from the production of electricity and emissions from the production of steam/heat. For the case (c) the amount of electricity that would have been produced in the onsite power plant and the electricity that would have been exported or imported from the grid should be determined considering most recent historical records.

13. For electricity and steam produced in a cogeneration unit, using fossil fuel, the following formula shall be used:

$$BEy = (HGy + EGy*3.6) * EF\ CO_2 / \eta\ cogen$$

Where:

BEy	the baseline emissions from electricity and steam displaced by the project activity during the year y in tCO2e.
EGy	the amount of electricity supplied by the project activity during the year y in GWh
3.6	conversion factor, expressed as TJ/GWh.
HGy	the net quantity of steam/heat supplied by the project activity during the year y in TJ.
EFCO2	the CO_2 emission factor per unit of energy of the fuel that would have been used in the baseline cogeneration plant in (tCO_2 / TJ) obtained from reliable local or national data if available, otherwise IPCC default emission factors are used.
ηCogen	the total efficiency (thermal and electrical both included) of the cogeneration plant using fossil fuel that would have been used in the absence of the project activity. Efficiency should be calculated as total energy produced (electricity and steam/heat extracted) divided by thermal energy of the fuel used.

14. Efficiency of the baseline units shall be determined by adopting one of the following criteria:

(a) Highest measured efficiency of a unit with similar specifications,

(b) Highest of the efficiency values provided by two or more manufacturers for units with similar specifications,

(c) Maximum efficiency of 100%.

15. ~~8.~~ In the case of project activities that involves the addition of renewable energy units at an existing renewable energy production facility, where the existing and new units share the use of common and limited renewable resources (e.g. biomass residues), the potential for the project activity to reduce the amount of renewable resource available to, and thus thermal energy production by, existing units must be considered in the determination of baseline emissions, project emissions, and/or leakage, as relevant.

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

I.C. Thermal Energy for the User (cont)

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

EGy = TEy – WTEy

Where:
TEy = the total thermal energy produced in year y by all units, existing and new project units
WTEy = the estimated thermal energy 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(WTEactual,y ,WTEestimated,y)

Where:
WTEactual,y = the actual, measured thermal energy production of the existing units in year y
WTEestimated,y = the estimated thermal energy that would have been produced by the existing units under the observed availability of the renewable resource 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 thermal energy 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 WTEestimated,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 EGbaseline below.

16. ~~9.~~ 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 thermal energy (EGbaseline) at historical average levels (EGhistorical), until the time at which the thermal energy 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 thermal energy production (EGbaseline) is assumed to equal project thermal energy 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 (BEy in tCO_2) then correspond to the difference of the thermal energy supplied by the project activity minus the baseline thermal energy supplied in the case of modified or retrofit facilities (EGbaseline). EGhistorical is the average of historical thermal energy delivered by the existing facility, 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, retrofitted or modified in a manner that significantly affected output (i.e., by 5% or more). A minimum of 3 years (excluding abnormal years) of historical production data is required. In the case that 3 years of historical data are not available - e.g., due to recent retrofits or exceptional circumstances, a new methodology or methodology revision must be proposed. EGestimated,y is the estimated thermal energy that would have been produced by the existing units under the observed availability of renewable resource for year y.

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.

(c) 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

17. ~~10.~~ 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

18. ~~11.~~ Monitoring shall consist of:

(a) Metering the energy produced by a sample of the systems where the simplified baseline is based on the energy produced multiplied by an emission coefficient.

OR

(b) Metering the thermal and electrical energy generated for co-generation projects. In the case of co-fired plants, the amount of fossil fuel input shall be monitored;

OR

(c) If the emissions reduction per system is less than 5 tonnes of CO_2 a year:

(i) Recording annually the number of systems operating (evidence of continuing operation, such as on-going rental/lease payments could be a substitute); and

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

I.C. Thermal Energy for the User (cont)

(ii) Estimating the annual hours of operation of an average system, if necessary using survey methods. Annual hours of operation can be estimated from total output (e.g. tonnes of grain dried) and output per hour if an accurate value of output per hour is available.