



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

## TYPE II - ENERGY EFFICIENCY IMPROVEMENT PROJECTS

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>.

### II.C. Demand-side energy efficiency activities for specific technologies

#### Technology/measure

1. This category methodology comprises activities that encourage the adoption of energy-efficient equipment, lamps, ballasts, refrigerators, motors, fans, air conditioners, appliances, etc. at many sites. These technologies may replace existing equipment or be installed at new sites. In the case of new facilities, the determination of baseline scenario shall be as per the procedures described in the general guidance to SSC methodologies under the section 'type II and III Greenfield projects (new facilities)'. The aggregate energy savings by a single project may not exceed the equivalent of 60 GWh per year for electrical end use energy efficiency technologies. For fossil fuel end use energy efficient technologies, the limit is 180 GWh thermal per year in fuel input.
2. For each replaced appliance/equipment the capacity or output or level of service (e.g., light output, room temperature and comfort, the rated output capacity of air-conditioners etc.) is not significantly larger or smaller (maximum  $\pm 10\%$ ) than the baseline.
3. If the energy efficient equipment contains refrigerants, then it is ensured that the refrigerant used in the project case has lower GWP than the refrigerant used in the baseline equipment; the shift to the new refrigerant must be voluntary and not mandated by laws or regulations. This methodology credits emission reductions only due to the reduction in electricity consumption from use of more efficient equipment/appliances.

#### Boundary

4. The project boundary is the physical, geographical location of each measure (each piece of equipment) installed.

#### Baseline

5. If the energy displaced is fossil fuel based, the energy baseline is the existing level of fuel consumption or the amount of fuel that would be used by the technology that would have been implemented otherwise. The emissions baseline is the energy baseline multiplied by an emission factor for the fossil fuel displaced. Reliable local or national data for the emission factor shall be used; IPCC default values should be used only when country or project specific data are not available or difficult to obtain. IPCC default values for emission coefficients may be used.
6. If the energy displaced is electricity, the emission baseline is determined as the product of the baseline energy consumption of equipment/appliances and the emission factor for the electricity displaced: the baseline is calculated as follows:



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$$E_B = \sum_i (n_i \cdot p_i \cdot o_i)$$

$$BE_y = E_{BL,y} * EF_{CO_2,ELEC,y} \quad (1)$$

$$E_{BL,y} = \sum_i (n_i * p_i * o_i) / (1 - l_y) \quad (2)$$

Where:

$BE_y$	Baseline emissions in year $y$ (tCO <sub>2e</sub> )
$E_{BL,y}$	Energy consumption in the baseline in year $y$ (kWh)
$EF_{CO_2,ELEC,y}$	Emission factor in year $y$ calculated in accordance with the provisions in AMS I.D (tCO <sub>2</sub> /MWh)
$E_B$	annual energy baseline in kWh per year.
$\sum_i$	Sum over the group of “ $i$ ” devices (e.g. 40W incandescent bulb, 5hp motor) replaced, for which the project energy efficient equipment is operating during the year, implemented as part of the project activity
$n_i$	Number of devices of the group of “ $i$ ” devices (e.g. 40W incandescent bulb, 5hp motor) replaced, for which the project energy efficient equipment is operating during the year
$p_i$	Power of the devices of the group of “ $i$ ” baseline devices (e.g. 40W incandescent bulb, 5hp motor). In the case of a retrofit activity, “power” is the weighted average of the devices replaced. In the case of new installations, “power” is the weighted average of devices on the market
$o_i$	Average annual operating hours of the devices of the group of “ $i$ ” baseline devices
$l_y$	Average technical grid losses (transmission and distribution) during year $y$ for the grid serving the locations where the devices are installed, expressed as a fraction. The grid losses should not contain non-technical losses such as commercial losses (e.g., theft/pilferage). The grid losses should be estimated using recent, accurate and reliable data available within the Host country. It can be estimated either by a national utility or an official governmental body. Reliability of the data used (e.g. appropriateness, accuracy/uncertainty, especially exclusion of non technical grid losses) shall be established and documented by the project participant. A default value may be used for technical T&D losses, if no recent data is available or the data cannot be regarded accurate and reliable. Maximum value for T&D losses in any given year $y$ shall not exceed 0.1

7. The energy baseline is multiplied by an emission coefficient (measured in kg CO<sub>2e</sub>/kWh) for the electricity displaced calculated in accordance with provisions under category I.D

8. For project activities that seek to retrofit or modify an existing unit or equipment resulting in an increase in capacity, the determination of the baseline scenario for the incremental capacity



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shall be based on the procedures described in the general guidance to SSC methodologies under the sections ‘retrofit’ and ‘capacity increase’.

### Project Activity Emissions

9. Project emissions consist of electricity and/or fossil fuel used in the project equipment, determined as follows.

$$PE_y = EP_{PJ,y} * EF_{CO_2,y} \quad (3)$$

Where:

$PE_y$  Project emissions in year  $y$  (tCO<sub>2</sub>e)

$EP_{PJ,y}$  Energy consumption in project activity in year  $y$ . This shall be determined *ex post* based on monitored values

$EF_{CO_2,y}$  Emission factor for electricity or thermal baseline energy. The emissions associated with grid electricity consumption should be calculated in accordance with the procedures of AMS I.D. For fossil fuel displaced reliable local or national data for the emission factor shall be used; IPCC default values should be used only when country or project specific data are not available or difficult to obtain.

Project energy consumption in case of project activities that displace grid electricity is determined as follows using the data of the project equipment:

$$E_{PJ,y} = \sum_i (n_i * p_i * o_i) / (1 - l_y) \quad (4)$$

### Leakage

10. If the energy efficiency technology is equipment transferred from another activity or if the existing equipment is transferred to another activity, leakage is to be considered.

### Monitoring

11. The emission reduction achieved by the project activity shall be determined as the difference between the baseline emissions and the project emissions and leakage.

$$ER_y = (BE_y - PE_y) \times BP - LE_y \quad (5)$$

Where:

$ER_y$  Emission reductions in year  $y$  (tCO<sub>2</sub>e)

$LE_y$  Leakage emissions in year  $y$  (tCO<sub>2</sub>e)



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**BP** Baseline penetration factor<sup>1</sup> For example: In the case of replacing incandescent lamp with CFL,  $BP = 1 - (\text{\# of pieces of screw-in or lock-in efficient lighting equipment} / \text{total \# of pieces of screw-in or lock-in lighting equipment})$ , based on *ex ante* representative sample survey; BP is applicable to ‘Project Activity under Programme of Activities (CPA of PoA)’ and in other cases set BP to ‘1.0’

12. If the devices installed replace existing devices, the number and “power” of a representative sample of the replaced devices shall be recorded in a way to allow for a physical verification by DOE<sup>2</sup>. and monitored

13. If the devices installed have a constant current (ampere) characteristics, monitoring shall consist of monitoring either the “power” and “operating hours” or the “energy use” of the devices installed using an appropriate method methodology. Appropriate Possible methods ologies include:

- (a) Recording the “power” of the device installed (e.g., lamp or refrigerator) using nameplate data or bench tests of a sample of the units installed and metering a sample of the units installed for their operating hours using run time meters;

OR

- (b) Metering the “energy use” of an appropriate sample of the devices installed. For technologies that represent fixed loads while operating, such as lamps, the sample can be small while for technologies that involve variable loads, such as air conditioners, the sample may need to be relatively large.

14. In either case, monitoring shall include annual checks of a sample of non-metered systems to ensure that they are still operating. (other evidence of continuing operation, such as on-going rental/lease payments could be a substitute).

15. If the devices have variable current (ampere) characteristics, monitoring shall consist of metering the “energy use” of an appropriate sample of the devices installed. Monitoring shall also include annual checks of a sample of non-metered systems to ensure that they are still operating.

#### Project activity under a programme of activities

16. The following conditions apply for use of this methodology in a project activity under a programme of activities:

- In case the project activity involves the replacement of equipment, and the leakage effect of the use of the replaced equipment in another activity is neglected, because the replaced equipment is scrapped, an independent monitoring of scrapping of replaced equipment needs to be implemented. The monitoring should include a check if the number of project

<sup>1</sup> This factor captures the penetration of the project technology in the baseline situation.

<sup>2</sup> This shall be monitored while replacement is underway to avoid, e.g., that 40W lamps are recorded as 100W lamps, greatly inflating the baseline.



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activity equipment distributed by the project and the number of scrapped equipment correspond with each other. For this purpose scrapped equipment should be stored until such correspondence has been checked. The scrapping of replaced equipment should be documented and independently verified.

17. An assessment of Baseline Penetration Factor (BP) shall be done for each of the CPA of PoA separately through *ex ante* baseline survey for use in emission reduction calculation as per Equation 5.

18. Leakage on account of cross effects (interactive effects, for example increased heating load due to introduction of efficient lighting technologies) shall be considered.<sup>3</sup>

For the case of increased heating load due to introduction of efficient lighting technologies, leakage should be considered unless it is demonstrated that any two of the following conditions are met:

- (a) Heating Degree Days (HDDs) to base 18<sup>0</sup>C in the geographic location of the project are equal to or less than 1000 in a year;
- (b) The *ex ante* survey determines that space heating in the project location is not done for more than two months in a year;
- (c) There is less than 10% penetration of space heating equipment in the location of the project activity.

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<sup>3</sup> Consideration of interactive effects may be proposed through the request for revision process