Appendix B[1] of the simplified modalities and procedures for small-scale CDM project activities

INDICATIVE SIMPLIFIED BASELINE AND MONITORING METHODOLOGIES FOR SELECTED SMALL-SCALE CDM PROJECT ACTIVITY CATEGORIES

A. General guidance

1. This appendix contains indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories, including recommendations for determining the project boundary, leakage, baseline and monitoring.

2. In accordance with paragraphs 15 and 16 of the simplified modalities and procedures for small-scale CDM project activities (annex II to decision 21/CP.8 contained in document FCCC/CP/2002/7/Add.3), project participants involved in small-scale CDM project activities may propose changes to the simplified baseline and monitoring methodologies specified in this appendix or propose additional project categories for consideration by the Executive Board. Project participants willing to submit a new small-scale project activity category or revisions to a methodology shall make a request in writing to the Board providing information about the technology/activity and proposals on how a simplified baseline and monitoring methodology would be applied to this category. The Board may draw on expertise, as appropriate, in considering new project activity categories and/or revisions of and amendments to simplified methodologies. The Executive Board shall expeditiously, if possible at its next meeting, review the proposed methodology. Once approved, the Executive Board shall amend appendix B.

3. In accordance with paragraph 28 of the simplified modalities and procedures for small-scale CDM project activities, a simplified baseline and monitoring methodology listed in this appendix may be used for a small-scale CDM project activity if project participants are able to demonstrate to a designated operational entity that the project activity would otherwise not be implemented due to the existence of one or more barrier(s) listed in attachment A of this appendix.

4. The appendix reflects the following guidance regarding equipment performance, project boundary, biomass projects, leakage and use of Intergovernmental Panel on Climate Change (IPCC) default values for emission coefficients.

5. Equipment performance: To determine equipment performance, project participants shall use:

(a) The appropriate value specified in appendix B;

(b) If the value specified in sub-paragraph (a) is not available, the national standard for the performance of the equipment type (project participants shall identify the standard used);

(c) If the value specified in sub-paragraph (b) is not available, an international standard for the performance of the equipment type, such as International Organization for Standardization (ISO) and International Electrotechnical Commission (IEC) standards (project participants shall identify the standard used);

(d) If a value specified in sub-paragraph (c) is not available, the manufacturer's specifications provided that they are tested and certified by national or international certifiers.

[1] This appendix has been developed in accordance with the simplified modalities and procedures for small-scale CDM project activities (contained in annex II to decision 21/CP.8, see document FCCC/CP/2002/7/Add.3) and it constitutes appendix B to that document. For the full text of the annex II to decision 21/CP.8 please see reference/documents section on UNFCCC CDM web site http://unfccc.int/cdm).

6. Project participants have the option of using performance data from test results conducted by an independent entity for equipment installed under the project activity.

7. Project boundary: The project boundary shall be limited to the physical project activity. Project activities that displace energy supplied by external sources shall earn certified emission reductions (CERs) for the emission reductions associated with the reduced supply of energy by those external sources.

8. Biomass projects: In the case of project activities using biomass, emission reductions may only be accounted for the combustion of "renewable biomass*" (Note: need to include reference after to the definition of renewable biomass after its adoption by the Board)*. Combustion of any non-renewable biomass shall be accounted in the same way as combustion of fossil fuels. Emissions reductions due to the displacement of non-renewable biomass shall not be accounted.[2] Leakage shall be considered. *(Note: The SSC WG will develop in collaboration with the ARWG additional guidance on how and in which cases leakage should be checked and considered)*.

9. In the cases where leakage is to be considered, it shall be considered only within the boundaries of non-Annex I Parties.

10. In the case of project participants using IPCC default values for emission coefficients, these shall be the most up-to-date values available in the "IPCC Good Practice and Guidance and Uncertainty Management in National Greenhouse Gas Inventories" and the "Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories". A link providing more updated information on IPCC default values for emission coefficients is available on the page for small-scale CDM project activities on the UNFCCC CDM web site: http://unfccc.int/cdm

[2] See general guidance in Annex 8 of the EB20 meeting report.

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

Revision History of this document

This appendix has been developed in accordance with the simplified modalities and procedures for small-scale CDM project activities (contained in annex II to decision 21/CP.8, see document FCCC/CP/2002/7/Add.3) and it constitutes appendix B to that document. For the full text of the annex II to decision 21/CP.8 please see http://unfccc.int/cdm.htm). The first version was adopted by the Executive Board (EB) at its seventh meeting. This revision history was introduced with the second version of this document.

Version Number	Date	Description and reason of revision
02	2 December 2003	*- Incorporate amendments agreed by EB at its twelfth meeting* *- Layout changes in order to facilitate web publication and distribution: Each category of project types is presented in way that it may stand on its own with references to general guidance etc..*
03	30 June 2004	*- Incorporate amendments agreed by EB at its fourteenth meeting. Please see annex 2 of the report of EB14.*
04	22 October 2004	*- Incorporate amendments agreed by EB at its sixteenth meeting. Please see annex 2 of the report of EB16.*
05	25 February 2005	*- Incorporate amendments agreed by EB at its eighteenth meeting. Please see annex 6 of the report of EB18.*
06	20 September 20005	*- Incorporate amendments agreed by EB at its twenty first meeting. Please see annex 22 of the report of EB21.*

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

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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.

Follow the link for Full version of appendix B (http://cdm.unfccc.int/Projects/pac/ssclistmeth.pdf) to find General guidance / Abbreviations

I.A. Electricity generation by the user

Technology/measure

1. This category comprises renewable energy generation units that supply individual households or users with a small amount of electricity. Upgrading of existing equipment is not allowed. These units include technologies such as solar power, hydropower, wind power, and other technologies that produce electricity all of which is used on-site by the user, such as solar home systems, and wind battery chargers. The renewable generating units may be new or replace existing fossil fuel fired generation. The capacity of these renewable energy generators shall not exceed 15 MW.

2. Combined heat and power (co-generation) systems are eligible under categories I.C and I.D.

3. 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 [non-] renewable biomass and fossil fuel, the capacity of the entire unit shall not exceed the limit of 15MW.

Boundary

4. The physical, geographical site of the renewable energy generating unit and the equipment that uses the electricity produced delineates the project boundary.

Baseline

5. The energy baseline is the fuel consumption of the technology in use or that would have been used in the absence of the project activity. The project participants may use one of the following energy baseline formulae:

(a) Option 1:

$$E_B = \Sigma_i (n_i \, . \, c_i)/(1 - l)$$

Where

E_B = annual energy baseline in kWh per year.
Σ_i = the sum over the group of "i" renewable energy technologies (e.g. residential, rural health center, rural school, mills, water pump for irrigation, etc.) implemented as part of the project.
n_i = number of consumers supplied by installations of the renewable energy technology belonging to the roup of "i" renewable energy technologies during the year.
c_i = estimate of average annual individual consumption (in kWh per year) observed in closest grid electricity systems among rural grid connected consumers belonging to the same group of "i" renewable

energy technologies. If energy consumption is metered, c_i is the average energy consumed[3] by consumers belonging to the group of "i" renewable energy technologies.
l = average technical distribution losses that would have been observed in diesel powered mini-grids installed by public programmes or distribution companies in isolated areas, expressed as a fraction.[4]

OR

(b) Option 2:

$$E_B = \Sigma_i O_i / (1 - l)$$

Where

E_B = annual energy baseline in kWh per year
Σ_i = the sum over the group of "i" renewable energy technologies (e.g. solar home systems, solar pumps) implemented as part of the project.
Oi = the estimated annual output of the renewable energy technologies of the group of "i" renewable energy technologies installed (in kWh per year)
l = average technical distribution losses that would have been observed in diesel powered mini-grids installed by public programmes or distribution companies in isolated areas, expressed as a fraction.

OR

(c) Option 3: A trend adjusted projection of historic fuel consumption is acceptable in situations where an existing technology is replaced.

6. If the project participants wish to use a different formula to determine E_B, the proposal needs to be accepted in accordance with the modalities for new methodologies for small-scale project activities (see paragraph 2 of the general guidance (section A) above).

7. The emissions baseline is the energy baseline calculated in accordance with paragraph 4 above times the CO_2 emission coefficient for the fuel displaced. IPCC default values for emission coefficients may be used. A default value 0.9 kg CO_2equ/kWh, which is derived from diesel generation units, may be used. A small-scale project proponent may, with adequate justification use a higher emissions factor from Table I.D.1

Leakage

8. 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.

[3] Potential oversizing of the power capacity installed or energy generated by the CDM project activity shall not be reflected in the baseline and emissions reduction calculation. For this reason, the energy value taken into account shall be the energy consumed. It cannot be the electricity output, except if the project participant justifies that it represent a reasonable estimate of the energy that would have been generated by a diesel generator larger than 35 kW and operating with a load factor of at least 50% to provide similar electricity services.

[4] A reasonable default value for distribution losses on low voltage rural distribution grid could be 20%.

I.A. Electricity generation by the user (cont.)

Monitoring

9. Monitoring shall consist of:

(a) An annual check of all systems or a sample thereof to ensure that they are still operating (other evidence of continuing operation, such as on-going rental/lease payments could be a substitute).

OR

(b) Metering the electricity generated by all systems of a sample thereof.

10. In the case of co-fired and hybrid systems, the amount of fossil fuel input shall be monitored.

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.

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I.B. Mechanical energy for the user

Technology/measure

1. This category comprises renewable energy generation units that supply individual households or users with a small amount of mechanical energy. Upgrading of existing equipment is not allowed. These units include technologies such as hydropower, wind power, and other technologies that provide mechanical energy, all of which is used on-site by the household or user, such as wind-powered pumps, solar water pumps, water mills and wind mills.

2. Where generation capacity is specified, it shall be less than 15MW. If the generation capacity is not specified, the estimated diesel-based electricity generating capacity that would be required to provide the same service or mechanical energy shall be less than 15 MW. In the case of irrigation where diesel-fuelled pumps are used directly, the cumulative rating of diesel-fuelled pumps shall not exceed 15 MW. The size of a diesel-based generator or a diesel pump that would be required shall be justified.

3. 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 [non-] renewable biomass and fossil fuel, the capacity of the entire unit shall not exceed the limit of 15MW.

Boundary

4. The physical, geographical site of the renewable energy technology and the equipment that uses the mechanical energy produced delineates the project boundary.

Baseline

5. The simplified baseline is the estimated emissions due to serving the same load with a diesel generator consumption saved times the emission coefficient for diesel. The diesel emissions displaced annually are calculated either as:

(a) The power requirements times hours of operation per year times the emission factor for diesel generator systems in Table I.D.

OR

(b) The diesel fuel consumption per hour times hours of operation per year times the default value for the emission coefficient for diesel fuel (3.2 kg CO_2 per kg of diesel fuel).

Leakage

I.B. Mechanical energy for the user (Cont.)

6. 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

7. Monitoring shall consist of:

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

(b) Estimating the annual hours of operation for the equipment that uses the mechanical energy produced, if necessary using sampling methods. Annual hours of operation can be estimated from total output (tonnes of grain milled) and output per hour if an accurate value of output per hour is available.

8. In the case of co-fired and hybrid systems, the amount of fossil fuel input shall be monitored.

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.

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I.C. Thermal energy for the user

Technology/measure

1. This category comprises renewable energy technologies that supply individual households or users with thermal energy that displaces fossil fuels ~~or non-renewable sources of biomass~~. Upgrading of existing equipment is not allowed. 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 generation capacity is specified by the manufacturer, it shall be less than 15MW.

3. For co-generation systems and/or co-fired systems to qualify under this category, the energy output shall not exceed 45 $MW_{thermal}$. E.g., for a biomass based co-generating system the ~~rating~~ 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 $MW_{thermal}$.

Boundary

4. The physical, geographical site of the renewable energy generation delineates the project boundary.

Baseline

5. 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.

6. ~~For renewable energy technologies that displace non-renewable sources of biomass, the simplified baseline is the non-renewable sources of biomass consumption of the technologies times an emission coefficient for the non-renewable sources of biomass displaced. IPCC default values for emission coefficients may be used~~.

7. 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, paragraphs 6 and 7.

I.C. Thermal energy for the user (Cont.)

Leakage

8. 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

9. 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

(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.

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.

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I.D. 'Grid connected renewable electricity generation' ~~Renewable electricity generation for a grid~~

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 ~~electricity to~~ an electricity distribution system that is or would have been supplied by at least one fossil fuel ~~or non-renewable biomass~~ 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 ~~[~~non-~~]~~renewable biomass ~~and~~ or fossil fuel, the capacity of the entire unit shall not exceed the limit of 15MW.

3. Biomass combined heat and power (co-generation) systems that supply electricity to and/or displace electricity from ~~electricity to~~ a grid are included in this category. To qualify under this category, the sum of all forms of energy output shall not exceed 45 $MW_{thermal}$. E.g., for a biomass based co-generating system the rating for all the boilers combined shall not exceed 45 $MW_{thermal}$.

Boundary

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

Baseline

5. In the case of landfill gas, waste gas, wastewater treatment and agro-industries projects, recovered methane emissions are eligible under category III.D. If the recovered methane is used for electricity generation the baseline shall be calculated in accordance with paragraphs 6 or 7 below. If the recovered methane is used for heat generation it is eligible under category I.C.

6. 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_2equ/kWh*) for three different levels of load factor**

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

7. For all other systems, the baseline is the kWh produced by the renewable generating unit multiplied by an emission coefficient (measured in kg CO_2equ/kWh) calculated in a transparent and conservative manner as:

(a) The average of the "approximate operating margin" and the "build margin", where:

(i) The "approximate operating margin" is the weighted average emissions (in kg CO_2equ/kWh) of all generating sources serving the system, excluding hydro, geothermal, wind, low-cost biomass, nuclear and solar generation;

(ii) The "build margin" is the weighted average emissions (in kg CO2equ/kWh) of recent capacity additions to the system, which capacity additions are defined as the greater (in MWh) of most recent[5] 20%[6] of existing plants or the 5 most recent plants.";

OR,

(b) The weighted average emissions (in kg CO_2equ/kWh) of the current generation mix.

[5] Generation data available for the most recent year.

[6] If 20% falls on part capacity of a plant, that plant is included in the calculation.

Leakage

8. 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

9. Monitoring shall consist of metering the electricity generated by the renewable technology. In the case of co-fired plants, the amount of biomass and fossil fuel input shall be monitored.

TYPE II - ENERGY EFFICIENCY IMPROVEMENT PROJECTS

Follow the link for Full version of appendix B (http://cdm.unfccc.int/Projects/pac/ssclistmeth.pdf) to find General guidance / Abbreviations

II.A. Supply side energy efficiency improvements – transmission and distribution

Technology/measure

1. This category comprises technologies or measures to improve the energy efficiency of an electricity or district heating transmission and distribution system by up to the equivalent of 15 GWh_e per year. Examples include upgrading the voltage on a transmission line, replacing a transformer, and increased insulation of the pipes in a district heating system. The technologies or measures may be applied to existing transmission or distribution systems or be part of an expansion of a transmission or distribution system. A total saving of 15 GWh_e per year is equivalent to a maximal saving of 45 GWh_{th} per year in fuel input.

Boundary

2. The project boundary is the physical, geographical boundary of the portion of the transmission and/or distribution system where the energy efficiency measures are implemented.

Baseline

3. For retrofit projects, the energy baseline is the technical losses of energy within the project boundary calculated as either:

(a) The measured performance of the existing equipment;

OR

(b) The performance of the existing equipment as determined using a standard selected in accordance with paragraphs 5 and 6 of the general guidance (section A) above.

4. In the case of new facilities the energy baseline is the technical losses of energy within the project boundary calculated using a performance standard for the equipment that would otherwise have been installed selected in accordance with paragraphs 5 and 6 of the general guidance (section A) above.

5. The emissions baseline is the energy baseline multiplied by an emission coefficient. If the energy displaced is electricity, the emissions coefficient (in kg CO_2equ/kWh) shall be calculated as described in paragraphs 6 or 7 for category I.D. For measures implemented to improve the efficiency of a district heating system, the emissions coefficient is that of the fossil fuel used by the system. IPCC default values for emission coefficients can be used.

Leakage

6. 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

7. The energy performance of the project activity shall be the measured technical energy losses of the equipment installed unless such losses cannot be metered.[7] If the technical energy losses cannot be determined from metered data, they shall be calculated using the test results when the installed equipment is commissioned, and if these are not available use the value determined in paragraphs 3 or 4 as appropriate.

[7] When non-technical energy losses are small relative to technical energy losses, technical energy losses after implementation of the efficiency measures can be determined from metered data if available. The electricity or steam delivered to the portion of the system affected by the efficiency improvements as well as the electricity or steam received at the end of the portion of the system affected by the improvements are metered. If the portion of the transmission/distribution system affected by the energy efficiency improvements is not already separately metered, the reduced technical energy losses could be expressed as a percentage of the losses on a portion of the system that is already metered.

TYPE II - ENERGY EFFICIENCY IMPROVEMENT PROJECTS

Follow the link for Full version of appendix B (http://cdm.unfccc.int/Projects/pac/ssclistmeth.pdf) to find General guidance / Abbreviations

II. B. Supply side energy efficiency improvements – generation

Technology/measure

1. This category comprises technologies or measures to improve the efficiency of fossil fuel generating units that supply an electricity or thermal system by reducing energy or fuel consumption by up to the equivalent of 15 GWh_e per year.[8] Examples include efficiency improvements at power stations and district heating plants and co-generation.[9] The technologies or measures may be applied to existing stations or be part of a new facility. A total saving of 15 GWh_e is equivalent to maximal saving of 45 GWh_{th} in the fuel input to the generation unit.

Boundary

2. The project boundary is the physical, geographical site of the fossil fuel fired power station unit affected by the efficiency measures.

Baseline

3. The energy baseline is the technical losses of energy within the project boundary. In the case of retrofit measures, the energy baseline is calculated as the monitored performance of the existing generating unit. In the case of new facilities, the energy baseline is calculated using a standard for the equipment that would otherwise have been installed selected in accordance with paragraphs 5 and 6 of the general guidance (section A) above.

4. The emissions baseline is the energy baseline multiplied by an emission coefficient for the fuel used by the generating unit. IPCC default values for emission coefficients may be used.

Leakage

5. 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.

[8] Efficiency improvements to non-fossil fuel generating units, such as turbine replacement for hydro projects, shall be treated in the same way as renewable energy projects. The efficiency improvement is calculated or measured, this improvement, expressed as a percentage, is applied to the measured output of the unit and multiplied by the emission factor calculated in accordance with category I.D projects.

[9] Biomass co-generation projects shall be considered as category I.C or I.D activities.

Monitoring

6. Energy savings shall be measured after implementation of the efficiency measures, by calculating the energy content of the fuel used by the generating unit and the energy content of the electricity or steam produced by the unit. Thus both fuel use and output need to be metered.

7. A standard emission coefficient for the fuel used by the generating unit is also needed. IPCC default values for emission coefficients may be used. In the case of coal, the emission coefficient shall be based on test results for samples of the coal purchased if such tests are part of the normal practice for coal purchases.

TYPE II - ENERGY EFFICIENCY IMPROVEMENT PROJECTS

Follow the link for Full version of appendix B (http://cdm.unfccc.int/Projects/pac/ssclistmeth.pdf) to find General guidance / Abbreviations

II.C. Demand-side energy efficiency programmes for specific technologies

Technology/measure

1. This category comprises programmes 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. The aggregate energy savings by a single project may not exceed the equivalent of 15 GWh per year.

Boundary

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

Baseline

3. If the energy displaced is a fossil fuel, the energy baseline is the existing 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 coefficient for the fossil fuel displaced. IPCC default values for emission coefficients may be used.

4. If the energy displaced is electricity, the energy baseline is calculated as follows:

$$E_B = \Sigma_i (n_i . p_i . o_i)/(1 - l)$$

Where

E_B = annual energy baseline in kWh per year
Σ_i = the sum over the group of "i" devices replaced (e.g. 40 W incandescent bulb, 5hp motor), for which the replacement is operating during the year, implemented as part of the project.
n_i = the number of devices of the group of "i" devices replaced (e.g. 40 W incandescent bulb, 5hp motor) for which the replacement is operating during the year.
p_i = the power of the devices of the group of "i" devices replaced (e.g. 40 W, 5 hp). In the case of a retrofit programme, "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 = the average annual operating hours of the devices of the group of "i" devices replaced.
l = average technical distribution losses for the grid serving the locations where the devices are installed, expressed as a fraction.

5. The energy baseline is multiplied by an emission coefficient (measured in kg CO_2equ/kWh) for the electricity displaced calculated in accordance with provisions of paragraphs 6 or 7 for category I.D projects.

Leakage

6. 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

7. If the devices installed replace existing devices, the number and "power" of the replaced devices shall be recorded and monitored.[10]

8. Monitoring shall consist of monitoring either the "power" and "operating hours" or the "energy use" of the devices installed using an appropriate methodology. Possible methodologies 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.

9. 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).

10. Published values for technical transmission and distribution losses may be used. Alternatively, technical transmission and distribution losses for the grid that supplies energy to the equipment installed may be monitored.

[10] This shall be monitored while replacement is underway to avoid, e.g., that 40W lamps are recorded as 100W lamps, greatly inflating the baseline.

TYPE II - ENERGY EFFICIENCY IMPROVEMENT PROJECTS

Follow the link for Full version of appendix B (http://cdm.unfccc.int/Projects/pac/ssclistmeth.pdf) to find General guidance / Abbreviations

II.D. Energy efficiency and fuel switching measures for industrial facilities

Technology/measure

1. This category comprises any energy efficiency and fuel switching measure implemented at a single industrial facility. This category covers project activities aimed primarily at energy efficiency; a project activity that involves primarily fuel switching falls into category III.B.[11] Examples include energy efficiency measures (such as efficient motors), fuel switching measures (such as switching from steam or compressed air to electricity) and efficiency measures for specific industrial processes (such as steel furnaces, paper drying, tobacco curing, etc.). The measures may replace existing equipment or be installed in a new facility. The aggregate energy savings of a single project may not exceed the equivalent of 15 GWh_e per year. A total saving of 15 GWh_e per year is equivalent to a maximal saving of 45 GWh_{th} per year in fuel input.

Boundary

2. The project boundary is the physical, geographical site of the industrial facility, processes or equipment that are affected by the project activity.

Baseline

3. The energy baseline consists of the energy use of the existing equipment that is replaced in the case of retrofit measures and of the facility that would otherwise be built in the case of a new facility. In both cases, the electricity component of the energy baseline is adjusted for technical transmission and distribution losses for the electrical grid serving the industrial facility.

4. Each energy form in the emission baseline is multiplied by an emission coefficient (in kg CO_2equ/kWh). For the electricity displaced, the emission coefficient is calculated in accordance with provisions or paragraphs 6 or 7 for category I.D projects. For fossil fuels, the IPCC default values for emission coefficients may be used.

Leakage

5. 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

6. In the case of retrofit measures, monitoring shall consist of:

   (a) Documenting the specifications of the equipment replaced;

[11] Thus, fuel switching measures that are part of a package of energy efficiency measures at a single location may be part of a project activity included in this project category.

(b) Metering the energy use of the industrial facility, processes or the equipment affected by the project activity;

(c) Calculating the energy savings using the metered energy obtained from sub-paragraph (b).

7. In the case of a new facility, monitoring shall consist of:

(a) Metering the energy use of the equipment installed;

(b) Calculating the energy savings due to the equipment installed.

8. Published values for technical transmission and distribution losses may be used. Alternatively, technical transmission and distribution losses for the grid that supplies the industrial facility may be monitored.

TYPE II - ENERGY EFFICIENCY IMPROVEMENT PROJECTS

Follow the link for Full version of appendix B (http://cdm.unfccc.int/Projects/pac/ssclistmeth.pdf) to find General guidance / Abbreviations

II.E. Energy efficiency and fuel switching measures for buildings

Technology/measure

1. This category comprises any energy efficiency and fuel switching measure implemented at a single building, such as a commercial, institutional or residential building, or group of similar buildings, such as a school, district or university. This category covers project activities aimed primarily at energy efficiency; a project activity that involves primarily fuel switching falls into category III.B.[12] Examples include technical energy efficiency measures (such as efficient appliances, better insulation and optimal arrangement of equipment) and fuel switching measures (such as switching from oil to gas). The technologies may replace existing equipment or be installed in new facilities. The aggregate energy savings of a single project may not exceed the equivalent of 15 GWh per year.

Boundary

2. The project boundary is the physical, geographical site of the building(s).

Baseline

3. The energy baseline consists of the energy use of the existing equipment that is replaced in the case of retrofit measures and of the facility that would otherwise be built in the case of a new facility. In both cases, the electricity component of the energy baseline is adjusted for technical transmission and distribution losses for the electrical grid serving the building(s).

4. Each energy form in the emission baseline is multiplied by an emission coefficient. For the electricity displaced, the emission coefficient is calculated in accordance with provisions of paragraphs 6 or 7 for category I.D projects. For fossil fuels, the IPCC default values for emission coefficients may be used.

Leakage

5. 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

6. In the case of retrofit measures, monitoring shall consist of:

   (a) Documenting the specifications of the equipment replaced;

   (b) Calculating the energy savings due to the measures installed.

[12] Thus, fuel switching measures that are part of a package of energy efficiency measures at a single location, may be part of a project activity included in this project category.

II.E. Energy efficiency and fuel switching measures for buildings (Cont.)

7. In the case of a new facility, monitoring shall consist of:

(a) Metering the energy use of the building(s);

(b) Calculating the energy savings of the new building(s).

8. Published values for technical transmission and distribution losses may be used. Alternatively technical transmission and distribution losses for the grid that supplies the building(s) may be monitored.

TYPE II - ENERGY EFFICIENCY IMPROVEMENT PROJECTS

Follow the link for Full version of appendix B (http://cdm.unfccc.int/Projects/pac/ssclistmeth.pdf) to find General guidance / Abbreviations

II.F. Energy efficiency and fuel switching measures for agricultural facilities and activities

Technology/Measure

1. This category comprises any energy efficiency and/or fuel switching measure implemented in agricultural activities of facilities or processes. This category covers project activities that encourage energy efficiency or involves fuel switching. Examples of energy-efficient practices include efficiency measures for specific agricultural processes (such as less irrigation, etc.), and measures leading to a reduced requirement of farm power per unit area of land, reflected in less and smaller tractors, longer lifetime of tractors and less farm equipment. Further energy efficient measures would be reducing fuel use in agriculture, such as reduced machinery use through, e.g. the elimination of tillage operations, reduction of irrigation, use of lighter machinery, etc. ~~Examples of fuel switching measures include switching from diesel to ethanol or biodiesel.~~

2. The measures may be a replacement on existing equipment or equipment being installed in a new facility. The aggregate energy savings of a single project may not exceed the equivalent of 15 GWh per year.

Boundary

3. The physical, geographical location of the farming operations or measure (each agricultural practice) being implemented. Project activities might apply to single facilities (farms), or activities using similar processes on different farms may be bundled together, as long as the combined total energy savings do not exceed the equivalent of 15 GWh per year.

Baseline

4. The energy baseline consists of the energy use of:

   (a) the existing activity that is reduced in the case of retrofit measures; or

   (b) the facility that would otherwise be installed in the case of a new facility.

5. In both cases, the electricity component of the energy baseline is adjusted for technical transmission and distribution losses for the electrical grid serving the agricultural facility.

6. If the energy displaced is a fossil fuel, the energy baseline is the existing fuel consumption or the amount of fuel that would be used by the practice that would have been implemented otherwise, i.e. total fuel consumption in the project area per year for field operations and average fuel consumption per unit area (ha), crop yield and year.

7. Project participants are to demonstrate the baseline and project scenarios of fuel consumption against reference agricultural activities, including cultivated acreage and crop yield from the project land.

8. The demonstration of additionality is necessary especially with respect to some financial indicators. Project participants shall demonstrate that reduced energy consumption is not prompted by financial constraints leading to downscaled operations, but rather CDM-driven.

9. Each energy form in the emission baseline is multiplied by an emission coefficient (in kg CO_2equ/kWh). For the electricity displaced, the emission coefficient is calculated in accordance with provisions or paragraphs 6 or 7 for category I.D projects. For fossil fuels, the IPCC default values for emission coefficients may be used.

Leakage

10. If the energy-efficiency technology is equipment transferred to another activity or if the existing equipment is transferred to another activity, leakage calculation is required.

Monitoring

11. In the case of retrofit measures (includes fuel switch measures), monitoring shall consist of:

(a) Documenting the specifications of the equipment replaced;

(b) Metering the energy use of the agricultural facility, processes or the equipment affected by the project activity;

(c) Calculating the energy savings using the metered energy obtained from subparagraph (b).

12. In the case of a new facility, monitoring shall consist of:

(a) Metering the energy use of the equipment installed;

(b) Calculating the energy savings due to the equipment installed.

13. Monitoring will also involve the scale (e.g. number of ha cultivated, crop yield) of agricultural activities, in order to ensure that reduced energy consumption is not due to downscaling of activities. Energy use must be for equivalent services.

14. Published values for technical transmission and distribution losses may be used. Alternatively, technical transmission and distribution losses for the grid that supplies the industrial facility may be monitored.

TYPE III - OTHER PROJECT ACTIVITIES

Follow the link for Full version of appendix B (http://cdm.unfccc.int/Projects/pac/ssclistmeth.pdf) to find General guidance / Abbreviations

III. A. Agriculture

Note: The Executive Board recognizes that activities under this category are possible; however it considers that more work is needed on this category before proposing simplified baseline and monitoring methodologies.

Technology/measure

Boundary

Baseline

Leakage

Monitoring

TYPE III - OTHER PROJECT ACTIVITIES

Follow the link for Full version of appendix B (http://cdm.unfccc.int/Projects/pac/ssclistmeth.pdf) to find General guidance / Abbreviations

III. B. Switching fossil fuels

Technology/Measure

1. This category comprises fossil fuel switching in existing[13] industrial, residential, commercial, institutional or electricity generation applications. Fuel switching may change efficiency as well. If the project activity primarily aims at reducing emissions through fuel switching, it falls into this category. If fuel switching is part of a project activity focussed primarily on energy efficiency, the project activity falls in category II.D or II.E. Measures shall both reduce anthropogenic emissions by sources and directly emit less than 15 kilotonnes of carbon dioxide equivalent annually.

Boundary

2. The project boundary is the physical, geographical site where the fuel combustion affected by the fuel-switching measure occurs.

Baseline

3. The emission baseline is the current emissions of the facility expressed as emissions per unit of output (e.g., kg CO_2equ/kWh). Emission coefficients for the fuel used by the generating unit before and after the fuel switch are also needed. IPCC default values for emission coefficients may be used.

Leakage

4. No leakage calculation is required.

Monitoring

5. Monitoring shall involve:

(a) Monitoring of the fuel use and output for an appropriate period (e.g., a few years, but records of fuel use may be used) prior to the fuel switch being implemented - e.g. coal use and heat output by a district heating plant, liquid fuel oil use and electricity generated by a generating unit (records of fuel used and output can be used *in lieu* of actual monitoring);

[13] This does not preclude project participants from proposing, in accordance with paragraphs 7 and 8 of the simplified modalities and procedures for small-scale CDM project activities, simplified baselines for switching of fossil fuels for new applications.

III. B . Switching fossil fuels (Cont.)

(b) Monitoring fuel use and output after the fuel switch has been implemented - e.g. gas use and heat output by a district heating plant, gas use and electricity generated by a generating unit.[14]

6. In the case of coal, the emission coefficient shall be based on test results for periodic samples of the coal purchased if such tests are part of the normal practice for coal purchases.

[14] The necessary data are probably readily available, but may need to be organized into appropriate records and be supported by receipts for fuel purchases.

TYPE III - OTHER PROJECT ACTIVITIES

Follow the link for Full version of appendix B (http://cdm.unfccc.int/Projects/pac/ssclistmeth.pdf) to find General guidance / Abbreviations

III. C. Emission reductions by low-greenhouse gas emitting vehicles

Technology/measure

1. This category comprises low-greenhouse gas emitting vehicles. A project activity in this category shall both reduce anthropogenic emissions by sources and directly emit less than 15 kilotonnes of carbon dioxide equivalent annually.

Boundary

2. The project boundary is the low-greenhouse gas emitting vehicles that are part of the project activity.

Baseline

3. The baseline is the energy use per unit of service for the vehicle that would otherwise have been used times the average annual units of service per vehicle times the number of vehicles affected times the emission coefficient for the fuel used by vehicle that would otherwise have been used. If electricity is used by the vehicles, the associated emissions shall be estimated in accordance with paragraphs 6 or 7 for category I.D project activities.

Leakage

4. No leakage calculation is required.

Monitoring

5. Monitoring shall track the number of low-emission vehicles operated under the small-scale CDM project activity and the annual units of service for a sample of the vehicles. Emissions from electricity generation shall be taken into account for electric vehicles.

TYPE III - OTHER PROJECT ACTIVITIES

Follow the link for Full version of appendix B (http://cdm.unfccc.int/Projects/pac/ssclistmeth.pdf) to find General guidance / Abbreviations

III. D. Methane recovery

Technology/measure

1. This project category comprises methane recovery from coalmines, agro-industries, landfills, wastewater treatment facilities and other sources. Measures shall both reduce anthropogenic emissions by sources and directly emit less than 15 kilotonnes of carbon dioxide equivalent annually.

2. CO_2 emissions from combustion of non-biogenic methane shall be accounted for in the project activity.

Boundary

3. The project boundary is the physical, geographical site of the methane recovery facility.

Baseline

4. The emission baseline is the amount of methane that would be emitted to the atmosphere during the crediting period in the absence of the project activity.

5. The baseline shall cover only the capture and flaring that would not have happened in the absence of the project activity.

6. In the case of landfill gas, waste gas, waste water treatment and agro-industries projects: If the recovered methane is used for heat or electricity generation it can apply to the corresponding category of type I project activities. ~~, the project activity is also eligible under category I.D. If the recovered methane is used for heat generation it is also eligible under category I.C.~~ In these cases project participants may submit one single project design document for all of the components of the project activity.

Leakage

7. No leakage calculation is required.

Monitoring

8. The amount of methane recovered and used as fuel or combusted shall be monitored, using flow meters and analysing the methane content of the combusted gases either online, or with samples taken at least quarterly, and more frequently if the results show significant deviations from previous values.

9. Regular maintenance should ensure optimal operation of flares. The flare efficiency, defined as the fraction of time in which the gas is combusted in the flare, multiplied by the efficiency of the flaring process, shall be monitored.

10. Flow meters, sampling devices and gas analysers shall be subject to regular maintenance, testing and calibration to ensure accuracy.

TYPE III - OTHER PROJECT ACTIVITIES

Follow the link for Full version of appendix B (http://cdm.unfccc.int/Projects/pac/ssclistmeth.pdf) to find General guidance / Abbreviations

III.E. Avoidance of methane production from biomass decay through controlled combustion

Technology/measure

1. This project category comprises measures that avoid the production of methane from biomass or other organic matter that would have otherwise been left to decay as a result of anthropogenic activity. Due to the project activity, decay is prevented through controlled combustion and less methane is produced and emitted to the atmosphere. The project activity does not recover or combust methane (unlike III D). Measures shall both reduce anthropogenic emissions by sources, and directly emit less than 15 kilotonnes of carbon dioxide equivalent annually.

Boundary

2. The project boundary is the physical, geographical site where the treatment of biomass takes place.

Baseline

3. The baseline scenario is the situation where, in the absence of the project activity, biomass and other organic matter is left to decay within the project boundary and methane is emitted to the atmosphere. The baseline emissions are the amount of methane from the decay of the biomass or organic waste treated in the project activity. IPCC default emissions factors are used.

$$CH_4\_IPCCdecay = (MCF * DOC * DOC_F * F * 16/12)$$

where,

$CH_4\_IPCC_{decay}$	IPCC CH_4 emission factor for decaying biomass in the region of the project activity (tonnes of CH_4/tonne of biomass or organic waste)
MCF	methane correction factor (fraction) (default is 0.4)[15]
DOC	degradable organic carbon (fraction, see equation below or default is 0.3)
DOC_F	fraction DOC dissimilated to landfill gas (default is 0.77)
F	fraction of CH_4 in landfill gas (default is 0.5)

For DOC, the following equation may be used instead of the default:

$$DOC = 0.4\ (A) + 0.17\ (B) + 0.15\ (C) + 0.30\ (D)$$

where,

A	per cent waste that is paper and textiles
B	per cent waste that is garden waste, park waste or other non-food organic putrescibles
C	per cent waste that is food waste
D	per cent waste that is wood or straw

$$BE_y = Q_{biomass} * CH_4\_IPCC_{decay} * GWP\_CH_4$$

where,

BE_y	Baseline methane emissions from biomass decay (tonnes of CO_2 equivalent)
$Q_{biomass}$	Quantity of biomass treated under the project activity (tonnes)

[15] IPCC default for unmanaged shallow waste sites under 5 meters.

CH_4_GWP GWP for CH_4 (tonnes of CO_2 equivalent/tonne of CH_4)

Baseline emissions shall exclude methane emissions that would have to be removed to comply with national or local safety requirement or legal regulations.

Leakage

4. No leakage calculation is required.

Monitoring

5. The amount of biomass and / or other organic matter combusted (Qbiomass) by the project activity in a year shall be monitored. Emissions of CH4 and N2O will be determined using the most recent IPCC default values.

$$PE_y = Q_{biomass} * E_{biomass} (CH_4bio\_comb * CH_4\_GWP + N_2Obio\_comb * N_2O\_GWP)/10\text{^}6$$

where,

PE_y	Project activity emissions (kilotonnes of CO_2 equivalent)
$Q_{biomass}$	Quantity of biomass treated under the project activity (tonnes)
$E_{biomass}$	Energy content of biomass (TJ/tonne)
CH_4bio_comb	CH_4 emission factor for biomass and waste (which includes dung and agricultural, municipal and industrial wastes) combustion (kg of CH_4/TJ, default value is 300)
CH_4_GWP	GWP for CH_4 (tonnes of CO_2 equivalent/tonne of CH_4)
N_2Obio_comb	N_2O emission factor for biomass and waste (which includes dung and agricultural, municipal and industrial wastes) combustion (kg/TJ, default value is 4)
N_2O_GWP	GWP for N_2O (tonnes of CO_2 equivalent/tonne of NO_2)

6. Total annual project activity related emissions will be monitored and should be less than or equal to 15 kt of CO2 equivalent. If at the renewal of the crediting period the project emissions are higher than the 15 Kt of CO2 equivalent the project ceases to be a small-scale CDM project activity and has to use an approved methodology.

Attachment A to Appendix B

1. Project participants shall provide an explanation to show that the project activity would not have occurred anyway due to at least one of the following barriers:

(a) Investment barrier: a financially more viable alternative to the project activity would have led to higher emissions;

(b) Technological barrier: a less technologically advanced alternative to the project activity involves lower risks due to the performance uncertainty or low market share of the new technology adopted for the project activity and so would have led to higher emissions;

(c) Barrier due to prevailing practice: prevailing practice or existing regulatory or policy requirements would have led to implementation of a technology with higher emissions;

(d) Other barriers: without the project activity, for another specific reason identified by the project participant, such as institutional barriers or limited information, managerial resources, organizational capacity, financial resources, or capacity to absorb new technologies, emissions would have been higher.

Attachment B to Appendix B

ACRONYMS, ABBREVIATIONS AND UNITS OF MEASURE

Acronyms and abbreviations	
EB	Executive Board
EE	Energy efficiency
CER	Certified emission reduction
CO_2	Carbon dioxide
BAU	Business as usual
ESCO	Energy service company
GHG	Greenhouse gas
IEC	International Electrotechnical Commission
IPCC	Intergovernmental Panel on Climate Change
ISO	International Organization for Standardization
PV	Photovoltaic
T&D	Transmission and distribution
Units of measure	
h	Hour
d	Day
y	Year
k	Kilo (10^3)
M	Mega (10^6)
G	Giga (10^9)
T	Tera (10^{12})
g	Gramme
W	Watt
m	Metre
J	Joule