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

TYPE III - OTHER PROJECT ACTIVITIES

Project participants shall apply the general guidelines to SSC CDM methodologies and information on additionality (attachment A to Appendix B) provided at <http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html> *mutatis mutandis*.

III.AM. Fossil fuel switch in a cogeneration/trigeneration system

Technology/measure

1. This category comprises activities that involve fossil fuel switch in a cogeneration/tri-generation plant from a carbon intensive fossil fuel (e.g. fuel oil based system) to a low carbon intensive fossil fuel (e.g. natural gas based system).

2. This methodology is applicable for new facilities as well as for retrofit or replacement of existing installations.

3. If it is identified that the baseline situation is the continued use of existing system then the existing system must have been in operation for at least the immediately prior three years, to the start date of the project activity, in order to ensure that adequate baseline performance data are available.

Applicability

4. This methodology is only applicable if:

(a) The baseline scenario involves either: (i) Implementation of a cogeneration system when the project scenario is a cogeneration system; or (ii) Implementation of a tri-generation system when the project scenario is a tri-generation system;

(b) It can be demonstrated that the overall system energy output to fuel input efficiency of the project facility measured under the full range of operating conditions during the crediting period is higher or equal to the overall system energy output to fuel input efficiency of the selected baseline facility;

(c) It can be demonstrated that the specific energy consumption[1] of the fuel handling and other auxiliary systems of the project system is less than, or equal to, or not significantly higher than the baseline facility's specific energy consumption for fuel handling and other auxiliary systems (within the variation of 10% annual basis, i.e. project auxiliary energy consumption per project energy production is no more than 110% of baseline auxiliary energy consumption per baseline energy production);

(d) Regulations do not require the use of low carbon energy source (e.g. natural gas or any other fuel) or restrict the use of the baseline fuel in cogeneration or tri-generation system;

[1] Specific energy consumption is the energy input of the auxiliary system per unit energy (thermal and electricity) output of the cogeneration/tri-generation plant.

(e) For projects involving the installation of cooling equipment that use refrigerants, such refrigerants must have no or negligible global warming potential (GWP) and no or negligible ozone depleting potential (ODP);

(f) Applicable regulations do not restrict the refrigerants used in the project activity;

(g) The electricity, heat and/or cooling produced by the project activity is consumed for captive purpose and/or exported to a grid;

(h) It is possible to: (i) Directly measure fuel consumed in the project case; (ii) Document the system efficiency of project and baseline fuel consuming systems; and (iii) Document the energy consumption for auxiliary systems for the baseline case and the project case.

5. Multiple fossil fuels switching (e.g. switch from high carbon intensive fuel-mix to low carbon intensive fuel-mix ratio)[2] is not covered under this methodology.

6. In case electricity, heat and/or cooling produced by the project activity is delivered to another facility, or facilities a contract between the supplier and consumer(s) of the energy will have to be entered into specifying that only the facility generating the energy can claim emission reductions from the energy displacement.

7. The methodology is not applicable for projects involving process changes. The purpose is to exclude measures (other than fossil fuel switch) that affect other characteristics of the process that are supplied by the project activity.

8. This methodology is not applicable to project activities that propose switch from fossil fuel use in the baseline to renewable biomass, biofuel or renewable energy in the project scenario.

9. Fuel switching may also result in energy efficiency improvements. However, this methodology does not provide any emissions reduction credits for energy efficiency improvements.

10. The project activity does not increase the lifetime of the existing cogeneration or trigeneration plant (i.e. this methodology is applicable up to the end of the lifetime of existing system, if shorter than crediting period). The requirements concerning demonstration of the remaining lifetime of any baseline equipment that is replaced shall be as described in the "General Guidelines to SSC CDM methodologies". If the remaining lifetime of the element process increases due to the project activity, the crediting period shall be limited to the estimated remaining lifetime of the baseline equipment, i.e. the time when the affected element processes would have been replaced in the absence of the project activity.

11. Measures are limited to those that result in emission reductions of less than or equal to 60 kt CO_2 equivalent annually.

[2] For example substitution of heavy fuel oil (HFO) with a natural gas (NG) to shift to a low GHG intensive fuel mix ratio of 25:75 (HFO: NG) from a baseline fuel mix ratio of 70:30 (HFO: NG) on an annual basis.

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

III.AM. Fuel switch in a cogeneration/tri-generation system (cont)

Project Boundary

12. The physical, geographical site of the project equipment/facility delineates the project boundary. The boundary also extends to the facility or facilities, consuming energy generated by the system and the processes or equipment that is/are affected by the project activity.

Baseline

13. If during the crediting period, total annual production of energy (heat and electricity) for existing system does increase beyond 20% from the established baseline values then one of the following options shall be used for determining baseline scenario:

(a) If it can be demonstrated, using the related and relevant procedures prescribed in the "General Guidelines to SSC CDM Methodologies" that the most plausible baseline scenario for the supply of additional amounts of energy is the same as the existing applications then such applications can be continued to be used for determining baseline emissions;

(b) If it cannot be demonstrated that the most plausible baseline scenario for the supply of additional amounts of energy is the same as the existing applications then the baseline reference plant approach for the additional amount of energy, as defined below shall be used.

14. If, irrespective of total annual energy production of baseline or project scenarios, it is determined that new and more efficient systems (as compared to the existing systems) would have been installed in the absence of the project activity (for example, due to the baseline equipment reaching the end of its useful life at any point during the crediting period) then the baseline reference plant approach, as defined below, shall be used.

15. **For Greenfield facilities** consisting of the installation of a new cogeneration or trigeneration system that replace the operation of systems that would have been built and utilized, a reference cogeneration or trigeneration facility shall be defined as the baseline scenario using the reference plant approach as defined below.

16. **Baseline reference plant approach.** The reference facility shall be based on common practice for similar industrial, residential, commercial, and institutional energy generation systems and sources in the same sector and in the same country or region as the project. The identification of the reference facility should exclude plants implemented as CDM project activities. In cases where no such facility exists within the country or region, the economically most attractive technology and fuel type shall be identified among those that provide the same service, that are technologically available, and that are in compliance with relevant regulations. The efficiency of the facility shall be selected in a conservative manner, i.e. where several technologies could be used and are similarly economically attractive, the most efficient technology should be defined as the baseline scenario. In addition, the least carbon intensive fuel type should be chosen in case of multiple fuels being possible choices.

17. For existing facilities, historical information (detailed records) on the use of energy sources (e.g. electricity, fossil fuel) and the plant output (i.e. heat and electricity) in the baseline captive

energy generation plant from at least three years prior to the start date of the validation shall be used in the baseline calculations. For facilities that are less than three years old, all historical data shall be available (a minimum of one year data would be required). In case of project activity exporting energy to other facilities included in the project boundary, the above historical information from the recipient plants are required.

Baseline emissions

18. Baseline emission is calculated as below:

$$BE_y = FC_{PJ,y} \times NCV_{FF,PJ,y} \times EF_{FF,CO2,BL} \quad \textbf{(1)}$$

Where:

$FC_{PJ,y}$	Amount of fuel consumed in the project activity during year *y* (mass or volume unit)
$NCV_{FF,PJ,y}$	Net calorific value of the fossil fuel used in the project activity in TJ/mass or volume unit
$EF_{FF,CO2,BL}$	CO_2 emission factor of the fossil fuel used in the baseline activity (tCO_2/TJ)

19. For the emission factor of the baseline fuel ($EF_{FF,CO2,BL}$), guidance by the 2006 IPCC Guidelines for National Greenhouse Gas Inventories shall be followed where appropriate. Project participants may either conduct measurements or they may use accurate and reliable local or national data where available. In the case of coal, the data 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. Where such data is not available, IPCC default emission factors (country-specific, if available) may be used if they are deemed to reasonably represent local circumstances. All values shall be chosen in a conservative manner (i.e. lower values for the baseline and higher values for the project should be chosen within a plausible range) and the choice shall be justified and documented in the SSC-CDM-PDD. Where measurements are undertaken, project participants shall document the measurement results and the calculated average values of the emission factor or net calorific value for the ex ante determination of the baseline emissions.

Project emissions

20. Project emissions from on-site consumption of fossil fuel by the cogeneration or trigeneration system is calculated as:

$$PE_y = FC_{PJ,y} \times NCV_{FF,PJ,y} \times EF_{FF,CO2,PJ} \quad \textbf{(2)}$$

Where:

$EF_{FF,CO2,PJ}$	CO_2 emission factor of project fuel combusted in the project activity in tCO_2/TJ
$NCV_{FF,PJ,y}$	Net calorific value of the fossil fuel used in the project activity in TJ/mass or volume unit

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

III.AM. Fuel switch in a cogeneration/tri-generation system (cont)

Leakage

21. If the equipment proposed for implementation is transferred from another activity, leakage is to be considered.

Emissions Reductions

22. The emission reduction achieved by the project activity will be calculated as the difference between the baseline emissions, project emissions and the leakage.[3]

$$ER_y = BE_y - PE_y - LE_y \quad \textbf{(3)}$$

Where:

ER_y	Emission reductions in the year y (tCO_2e)
LE_y	Leakage emissions in year y

Monitoring

23. Monitoring shall consists of:

(a) Documenting of the technical specification of the equipment and systems displaced or equipment/systems that would otherwise have been built;

(b) The relevant parameters shall be monitored as indicated in the Table below. The applicable requirements specified in the "General Guidelines to SSC CDM Methodologies" (e.g. calibration requirements, sampling requirements) are also an integral part of the monitoring guidelines specified below and therefore shall be referred by the project participants

[3] If a project activity temporarily results in "negative emission reductions", any further CERs will only be issued when the emissions increase has been compensated by subsequent emission reductions by the project activity (EB 21, paragraph 18).

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

III.AM. Fuel switch in a cogeneration/tri-generation system (cont)

Table 1. Parameters to be monitored

No.	Parameter	Description	Unit	Monitoring/recording Frequency	Measurement Methods and Procedures
1	$FC_{PJ,y}$	Quantity of fossil fuel combusted in year *y*	Mass or volume unit	As per the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion"	As per the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion."
2	$NCV_{FF,PJ,y}$	The net calorific value of the fuel used	MJ/mass or volume	As per the "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion"	As per the "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion"
3	$EF_{FF,CO2,PJ}$	Emission factor of the fossil fuels used	tCO_2/TJ	As per the "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion"	As per the "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion"
4	-	Net quantity of electricity generated by the project activity	MWh	Continuous, integrated hourly and at least monthly recording	Measurements are undertaken using calibrated energy meters. If applicable, measurement results shall be cross-checked with records for sold/purchased electricity (e.g. invoices/receipts)

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

III.AM. Fuel switch in a cogeneration/tri-generation system (cont)

No.	Parameter	Description	Unit	Monitoring/recording Frequency	Measurement Methods and Procedures
5	-	Thermal energy delivered by the project activity in year *y*	TJ/y	Continuous, integrated hourly, at least monthly recording	Measured using calibrated meters. Calibration shall be as per the related and relevant paragraph of "General guidelines to SSC CDMmethodologies". Thermal energy production is determined as the difference of the enthalpy of the steam or hot water generated by the heat generation equipment and the sum of the enthalpies of the feed-fluid and any condensate returns. The respective enthalpies should be determined based on the mass (or volume) flows, the temperatures and, in case of superheated steam, the pressure. Steam tables or appropriate thermodynamic equations may be used to calculate the enthalpy as a function of temperature and pressure In case of equipment that produces hot water/oil this is expressed as difference in the enthalpy between the hot water/oil supplied to and returned by the plant. In case the project activity is exporting heat to other facilities, the metering shall be carried out at the recipient's end

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

III.AM. Fuel switch in a cogeneration/tri-generation system (cont)

No.	Parameter	Description	Unit	Monitoring/recording Frequency	Measurement Methods and Procedures
6	-	Cooling output of the baseline chiller *i* displaced as a result of the installation of project activity in year *y*	MWh_{th}/year	Continuous, integrated hourly and at least monthly recording	Measured using calibrated meters.
7	-	The chilled water mass flow-rate for chiller(s) *i* produced by project in hour *h* of year *y*	tonnes/hour	Continuous, integrated hourly, at least monthly recording	Measured using calibrated meters.
8	-	Differential temperature for chiller(s) *i* in hour *h* of year *y* of incoming and outgoing water from project	°C	Continuous, integrated hourly, at least monthly recording	Measured using calibrated meters.
9	-	The water mass flow-rate from heater unit(s) i in year *y*	tonnes/hour	Continuous, integrated hourly, at least monthly recording	Measured using calibrated meters.
10	-	Differential temperature of incoming and outgoing water from heater unit *i*	°C	Continuous, integrated hourly, at least monthly recording	Measured using calibrated meters.

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

III.AM. Fuel switch in a cogeneration/tri-generation system (cont)

No.	Parameter	Description	Unit	Monitoring/recording Frequency	Measurement Methods and Procedures
11	-	Temperature	°C	Continuous, integrated hourly, at least monthly recording	Measured using calibrated meters.
12	-	Pressure	kg/cm^2	Continuous, integrated hourly, at least monthly recording	Measured using calibrated meters.

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

III.AM. Fuel switch in a cogeneration/tri-generation system (cont)

Project activity under a programme of activities

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

(a) In case the project activity involves fossil fuel switching measures leakage resulting from fuel extraction, processing, liquefaction, transportation, re-gasification and distribution of fossil fuels outside of the project boundary shall be considered. The guidance provided in the leakage section of ACM0009 shall be followed in this regard.

(b) 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 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.

- - - - -

History of the document

Version	Date	Nature of revision
01	EB 56, Annex # 17 September 2010	To be considered at EB 56.
Decision Class: Regulatory **Document Type**: Standard **Business Function**: Methodology		