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TYPE III - OTHER PROJECT ACTIVITIES

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>.

III.AF. Switching from high carbon intensive grid electricity to low carbon intensive fossil fuel

Technology/measure

1. This methodology comprises activities that result in increased share of low GHG intensive fossil fuel in an elemental process[1] of an industrial, residential, commercial, and institutional or electricity generation application that uses a mix of fossil fuel. For example shift from high carbon intensive fuel mix ratio to low carbon intensive fuel mix ratio on an annual basis in power generation[2].

2. This methodology is applicable for new facilities as well as for retrofit or replacement of existing installations[3].

3. Switching of fuel mix ratio may also result in energy efficiency improvements of the facility, thus both the project activities with or without energy efficiency improvements are eligible under this category. Project activities for implementation of energy efficiency measures not-related to the switch of energy sources shall apply Type II SSC methodologies.

4. New facilities (Greenfield projects) and project activities involving capacity additions compared to the baseline scenario are only eligible if they comply with the related and relevant requirements in the General Guidance for SSC methodologies. In addition the requirements for demonstration of the remaining lifetime of the equipment replaced shall be met as described in the general guidance. If the remaining lifetime of the plant increases due to the project activity, the crediting period shall be limited to the estimated remaining lifetime, i.e., the time when the existing equipment of the element process would have been replaced in the absence of the project activity.

5. 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. This methodology is not applicable to project activities utilising waste gas or energy; these project activities may consider applying AMS-III.Q.

[1] An "*element process*" is defined as fuel combustion, energy conversion or energy use in a single equipment. Each element process generates a single output (such as electricity, steam, hot air) by using a single or combinations of fossil fuels. This methodology covers fuel switch in several element processes, i.e., project participants may submit one CDM-PDD for fuel switch in several element processes within a facility.

[2] Substitution of heavy fuel oil (HFO) engine with a Natural Gas (NG) engine to shift to a low GHG intensive fuel mix ratio of 25:74:1 (HFO: NG: Diesel) from a baseline fuel mix ratio of 69:30:1 (HFO: NG: Diesel) on an annual basis.

[3] Fuel switch in transportation technologies is not eligible under this methodology.

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6. This category is applicable to project activities where it is possible to directly measure and record the energy use (e.g., heat and electricity) and consumption (e.g., fossil fuel) within the project boundary.

7. Heat or electricity produced under the project activity shall be for on-site captive use and/or export to other facilities included in the project boundary. In case energy produced by the project activity is delivered to another facility, or facilities, within the project boundary, 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. Export of electricity to the grid is not allowed under this category.

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

9. Regulations do not constrain the facility from using the energy sources cited in paragraph 1 before or after the fuel switch. Regulations do not require the use of low carbon energy source (e.g., natural gas or any other fuel) in the element processes.

10. The project activity does not result in integrated process change. The purpose is to exclude measures that affect other characteristics of the process besides switch of energy sources e.g., operational conditions, type of raw material processed, use of non-energy additives, change in type or quality of products manufactured etc.

Boundary

11. The project boundary is the physical, geographical site where the switching of energy source takes place. It includes all installations, processes or equipment affected by the switching. The boundary also extends to the industrial, commercial or residential facilities consuming energy generated by the system.

Baseline

12. In case of existing facilities historical information (detailed records) on the use of fossil fuels and the plant output (e.g., heat or electricity) from at least three years prior to project implementation shall be used in the baseline calculations, e.g., information on 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 collecting baseline validation data). For facilities that are less than three years old, all historical data shall be available (a minimum of one year data would be required).

13. The base line scenario is determined as per the procedures described in annex.

14. The baseline emissions can be determined as follows:

$$BE_y = \sum_{i,j} FC_{i,j,BL,y} * NCV_j * EF_{CO2,j} \quad \textbf{(1)}$$

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Where:

BE_y Baseline emissions during year y (tCO_2e)

$FC_{i,j,BL,y}$ Amount of fuel j consumed by the element process i during the year y operating at the baseline energy scenario (liters, tons, etc.)

NCV_j Net calorific value of the fuel type j (kJ/unit)

$EF_{CO2,j}$ CO_2 emission factor of the fuel type j (tCO_2/kJ)

$EC_{i,el,BL,y}$ Amount of grid electricity consumed by the element process i during the year y operating at the baseline energy scenario (kWh)

$EF_{CO2,el}$ CO_2 emission factor for grid electricity consumption (t CO_2/kJ), determined as per AMS-I.D

The amount of each fuel type j consumed is calculated ex-post using the total monitored energy output of the element process i during year y and the share of each energy source in the identified baseline scenario:

$$FC_{i,j,BL,y} = \frac{EG_{i,y} * a_{i,j,BL}}{NCV_j * Eff_{i,BL,j}} \quad \textbf{(2)}$$

Where:

$EG_{i,y}$ Total monitored output (heat, electricity etc) of the element process i during year y

$a_{i,j,BL}$ Share of fuel j in the total input energy of the element process i for the identified baseline scenario (ratio)

$Eff_{i,BL,j}$ Conversion efficiency of the element process i when operating with fuel type j in the baseline scenario (output / kWh), see below

The efficiency of the element process in the baseline scenario ($Eff_{i,BL,j}$) may be estimated using one of the following options:

(i) For an existing element process, that is able to utilize the baseline fuel mix, the efficiency directly determined by a measurement campaign for at least 5 days at the beginning of the project activity. The measurement should be undertaken during a period that is representative for the typical operation conditions of the systems e.g., ambient conditions, type and quality (moisture, composition, etc.) of raw materials and fuels. Average values from the measurement campaign shall be used to determine $Eff_{i,BL,j}$. The campaign shall be repeated if changes occur in the element process during the project activity, so as to significantly increase its efficiency (more than 5%), and the newly established measured values shall be used from that point onwards.

(ii) For a baseline scenario where the efficiency cannot be directly measured (e.g., in case it is technically not feasible to operate the element process with the baseline mix of energy sources, or in case of greenfield projects), a conservative efficiency value shall be chosen from the following options, in decreasing order of preference: a) benchmark value obtained from historical data or from measurement campaign done in existing similar element processes found in other application(s), where the baseline fuel or energy source mix is used, (b) Highest of the annual operational efficiency values provided by two or more manufacturers of the element process with similar specifications, using the baseline fuel;(c) Default efficiency of 100%.

15. The *ex ante* calculation of the baseline emissions shall be presented in the PDD based on the estimated production of the element process *i* during the crediting period. The *ex post* calculations are done based on measured output of the element process. The monitored production output will be capped to the levels considered in the PDD for the investment analysis.

Project Activity Emissions

16. Project activity emissions consist of those related to use of fossil fuel and grid electricity in element processes *i* during the crediting period.

$$PE_y = \sum_{i,j} FC_{PJ,i,j,y} * NCV_j * EF_{CO2,j} \quad \textbf{(3)}$$

Where:

PE_y Project emissions during the year *y* (t CO_2e)

$FC_{PJ,i,j,y}$ Quantity of fuel type *j* combusted in element process *i* during the year *y* (mass or volume unit)

Leakage

17. No leakage calculation is required.

Emission Reductions

18. The emission reduction achieved by the project activity will be calculated as the difference between the baseline emissions and the project emissions.

$$ER_y = BE_y - PE_y \quad \textbf{(4)}$$

Where:

ER_y Emission reductions in the year *y* (tCO_2e)

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19. For the determination of the emission factor ($EF_{CO2,j}$) and the net calorific value (NCV_j) for the fuels used in the alternative scenarios, 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, either for the *ex ante* investment analysis and efficiency determination, or for the *ex post* determination of the baseline and project emissions.

Monitoring

20. Monitoring shall include the energy source input ($FC_{PJ,i,j,y}$, NCV_j), and output of the element process *i* after the project activity has been implemented e.g., gas use and heat output by a district heating plant, gas use and electricity generated by a generating unit.

21. For electricity/thermal energy exported to other facilities, monitoring of the use of electricity and thermal energy shall be undertaken in the recipient end.

22. Monitoring related to the determination of grid emission factor shall take place as per the "Tool to calculate emission factor for an electricity system".

Project activity under a programme of activities

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

23. Leakage emissions resulting from fuel extraction, processing, liquefaction, transportation, re-gasification and distribution of fossil fuels outside of the project boundary shall be considered, as per the guidance provided in the leakage section of ACM0009. In case leakage emissions in the baseline situation are higher than leakage emissions in the project situation, leakage emissions will be set to zero.

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Annex

PROCEDURE TO DETERMINE THE BASELINE SCENARIO

1. The baseline scenario is identified as the use of a high carbon fuel mix ratio that is the most attractive based on analysis as below (step 1 to step 4). The baseline fuel mix ratio shall be determined *ex ante* by comparison of the reasonable mix of energy sources for each element process and the investment analysis shall compare all reasonable scenarios.

2. The economic analysis will compare the attractiveness without revenues from CERs for the identified alternative scenarios of fuel mix ratio, using the following procedure:

Step 1: Identify all fuel mix scenarios that can potentially be used for the operation of the element process *i* during the crediting period including:

(a) Historic fuel mix ratio for the element process *i*, in case identical fuel mix has been used for at least the last three years;

(b) If the *ex ante* identified energy source/s of element process *i* can not be used for any unavoidable reasons such as supply constraints (e.g., lack of availability during certain seasons, months etc) during the crediting period an alternative fuel mix scenario shall be so chosen that the deficit is met by the least expensive of the remaining energy sources. Deviation from the projected scenario shall be justified with supporting data (e.g., supplier quotations, estimates of the deliverable amount of a fuel, etc.);

(c) A mix of energy sources that can potentially be used during the crediting period, combining the different energy sources for example considering the supply conditions and/or seasonal availability of the different energy sources. Each mix included into this category shall be properly justified.

Step 2: Scenarios that face prohibitive barriers should be eliminated by applying Barrier analysis as specified in attachment A to appendix B of simplified modalities and procedures of SSC CDM.

Step 3: Apply "Step 3 - Investment analysis" of the latest version of the "Combined tool for identification of baseline scenario and demonstrate of additionality" to compare economic attractiveness of the remaining alternatives. The analysis shall use the net present value (NPV) method, all the assumptions made for calculations shall be included in the PDD, and the analysis shall explicitly consider the following parameters:

- Investment requirements (including break-up into major equipment cost, required construction work, installation). For existing element processes, only investment costs associated with new installations due to the project activity shall be considered in the analysis. The scenario for an existing element process using fuel mix ratio that is identical to 3 year historic use, zero investment cost shall be assumed (i.e., the project has no need for an additional investment). This is justified even in the case of existing

element process consuming more than one energy source historically, as changes in relative share of energy sources is unlikely to result in additional investment requirements. If investment costs are necessary only to the energy sources proposed to be included by the project activity (e.g., new burners to use the low carbon fuel, or to use electricity), they shall be considered only for this scenario. For greenfield projects, the full investment cost shall be considered to all identified alternative scenarios;

- A discount rate appropriate to the country and sector (use government bond rates, increased by a suitable risk premium to reflect private investment in fuel switching projects, as substantiated by an independent (financial) expert);
- Efficiency of each element process, taking into account any differences between energy sources, see below;
- Current price and expected future price (variable costs) of each alternative energy source mix. Estimates of the future prices have to be substantiated by a public and official publication from a governmental body or an intergovernmental institution. If such publications are not available, highlight the key logical assumptions and quantitative factors for determining the development of costs of each fuel (e.g., international market price, transport costs, level of taxes/subsidies, local price). State clearly which assumptions and factors have significant uncertainty associated with them, and include these uncertainties in the sensitivity analysis in "Step 3 – investment analysis". Operating costs for each energy source (especially, handling/treatment costs);
- Lifetime of the project, that may be equal to the crediting period or to the remaining lifetime of the existing element process;
- Other operation and maintenance costs, e.g., of slag and ash disposal, environmental pollution fees etc.

The NPV calculation should take into account the residual value of the new equipment at the end of the lifetime of the project activity.

Outcome of Investment analysis: Ranking of the short list of alternative scenarios according to the NPV taking into account the results of the sensitivity analysis.

- If the sensitivity analysis is not conclusive, identify the baseline scenario alternative with the least emissions among the alternatives (i.e., the most conservative);
- If the sensitivity analysis is conclusive and confirms the result of the investment comparison analysis, then the most economically or financially attractive alternative scenario is considered as baseline scenario.

Step 4: Determine the baseline emissions during the year *y* of the crediting period, using formula 1 as in paragraph 14.

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History of the document

Version	Date	Nature of revision
01	EB xx, Annex # 28 May 2009	To be considered at EB xx.