CLEAN DEVELOPMENT MECHANISM

CDM-SSCWG48-A04

Draft Small-scale Methodology

AMS-III.AG: Switching from high carbon intensive grid electricity to low carbon intensive fossil fuels

Version 03.0

Sectoral scope(s): 01

United Nations
Framework Convention on
Climate Change

COVER NOTE

1. Procedural background

1. The Conference of Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP) in decision 3/CMP.9 in paragraph 11 of further guidance to clean development mechanism (CDM) has reiterated its encouragement to the Executive Board (hereinafter referred to as the Board), as contained in decision 5/CMP.8, to continue its work on the simplification and streamlining of methodologies, with the aim of reducing transaction costs for all project activities and programmes of activities, especially those in regions underrepresented in the clean development mechanism.

2. The Board, at its seventy-eighth meeting, considered a concept note on further work on methodologies, tools and standards and agreed on the methodological products for further work in 2014 and 2015. The EB 82, Annex 8 provided further guidance on timelines requesting call for public inputs to be initiated by EB 83 and final revised AMS-III.AG to be recommended for consideration by EB 85.

3. Issues related to small-scale methodological products for simplification and streamlining under MAP project 223 are targeted to include consistent and comparable methods distinguished by project size across small-scale methodologies for fuel switch (e.g. emission reduction calculations, applicability, definition of existing facility, simplification for micro-scale projects) taking into account the methods in the approved large-scale methodologies.

4. The Small-Scale Working Group (SSC WG) at its 45th meeting initiated a discussion on the potential elements for revision of small-scale fuel switch methodologies and agreed on elements for revisions of small-scale fuel switch methodologies as per the agreements reflected in the information note contained in annex 1 to SSC WG 45th meeting internal report.

5. The SSC WG at its 47th meeting agreed to recommend the draft revised methodology “AMS-III.AG: Switching from high carbon intensive grid electricity to low carbon intensive fossil fuels” for call for public input. No input was received.

2. Purpose

6. The purpose is to revise “AMS-III.AG: Switching from high carbon intensive grid electricity to low carbon intensive fossil fuels” in order to:

   (a) Simplify and streamline as per the objective MAP project 223 for 2015;

   (b) Further improve consistency amongst small and large scale fuel switch methodologies; and

   (c) Provide options with distinguishing methods by project size (e.g., microscale) with an aim to further simplify emission reduction calculations, applicability, and definition of existing facility.

3. Key issues and proposed solutions

7. "AMS-III.AG: Switching from high intensive grid electricity to low carbon intensive fossil fuel" currently does not allow switch to a mix of low carbon intensive fuels. The methodology also has limited options to determine baseline emissions.

8. The proposed revision broadens the application of methodologies covering multiple project energy sources and also provides alternative options to determine baseline emission. Project emissions estimation is as per the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion".

4. Impacts

9. The revision will:

   (a) Expand the applicability the methodology by allowing switching to multiple fossil fuels under the project scenario;

   (b) Facilitate the implementation of CDM project activities and component project activities (CPAs) involving switching from high carbon grid electricity or high carbon grid and captive electricity to low carbon fossil fuel and may potentially contribute to increased number of projects in LDCs and underrepresented countries where the grid emission factor is high due to the fuel energy mix.

5. Subsequent work and timelines

10. The methodology is recommended by the SSC WG for consideration by the Board at its eighty-fifth meeting. No further work is envisaged.

6. Recommendations to the Board

11. The SSC WG at its 48th meeting agreed to recommend to the Board the revision of AMS-III.AG for approval.

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1. Introduction

1. The following table describes the key elements of the methodology:

Table 1. Methodology key elements

Typical project(s)	Switch from high carbon grid electricity to electricity generation using less-carbon-intensive fossil fuel such as captive natural-gas-based power generation
Type of GHG emissions mitigation action	Fuel switch. Switch to a less-carbon-intensive fuel for power generation

2. Scope, applicability, and entry into force

2.1. Scope

2. This methodology comprises switch from a carbon intensive energy source (or mix of energy sources) to a single or multiple[1] low carbon intensive energy source/s in existing and new industrial, residential, commercial, and institutional for electricity generation applications. This methodology is applicable only if the sole energy source or one of the energy sources in the baseline is high carbon intensive grid electricity (e.g. switch from a diesel based captive electricity generation complemented by a grid electricity import to a natural gas based captive electricity generation)[2].

3. Energy source switch may be in a single element process or may include several element processes within the facility. Non-element processes (e.g. gas turbine with heat recovery) are also included under this methodology, provided that emission reductions are only claimed for one of the outputs i.e. electricity[3]. Multiple fossil fuels switching in an element process is allowed if one of the energy sources in the baseline is high carbon intensive grid electricity. ~~is not covered under this methodology; however project proponents may explore applying AMS-III.AH~~.

2.2. Applicability

4. This methodology is applicable for retrofit or replacement of existing installations[4], as well as for Greenfield and capacity expansion project activities.

5. The requirements concerning demonstration of the remaining lifetime of the replaced equipment shall be met as described in the latest approved version of the "Tool to determine the remaining lifetime of equipment".

[1] Multiple fossil fuels in the project scenario are only allowed if the primary low carbon intensive fuel amounts to at least 80 per cent of the total equivalent annual energy input and other fossil fuels are only used only in situations where the primary fossil fuel is not available.

[2] ~~Cases involving shift to low GHG intensive grid electricity may be submitted through the request for revision process.~~

[3] As an example gas firing combustion engines with heat recovery are not considered element processes as they produce electricity as well as recovered heat energy as output.

[4] I.e. the project capacity is within ±20 % of the baseline installed capacity.

6. Switching of energy sources 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.

7. The primary low carbon intensive fossil fuel used in the project should not have been used previously as a baseline fossil fuel under the captive electricity generation component, except in the cases where the primary project fuel was used for experimental purposes in the baseline.

8. In case of retrofit the methodology requires capital investments such as for example creating infrastructure required to use the primary project fuel or retrofitting existing installations.

9. 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.

10. This methodology is applicable to project activities where it is possible to directly measure and record the energy use/output and consumption (e.g. fossil fuels) within the project boundary.

11. 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.

12. Export of electricity to a grid is not eligible under this methodology. That is, the project activity may physically connect to a grid but emission reduction cannot be claimed by exporting electricity to the grid.

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

14. 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.

2.3. Entry into force

15. The date of entry into force is the date of the publication of the EB 85 meeting report on 24 July 2015.

3. Normative references

16. This methodology is based on the proposed new methodology “SSC-NM014 Switch from High Carbon Intensive Energy Source (HCES) to Low Carbon Intensive Energy Source (LCES)” submitted by Emergent Ventures India.

17. Project participants shall apply the "General guidelines for SSC CDM methodologies" and the tools "Demonstration of additionality of small-scale project activities" and/or "Demonstrating additionality of micro scale project activities" provided at: <http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html> mutatis mutandis.

18. This methodology also refers to the latest approved versions of the following tools and methodologies:

(a) "Tool to calculate emission factor for an electricity system";

(b) "Tool to calculate baseline, project and/or leakage emissions from electricity consumption";

(c) "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion";

(d) "ACM0009: Fuel switching from coal or petroleum fuel to natural gas";

(e) "AMS-III.Q: Waste energy recovery (gas/heat/pressure) projects".

4. Definitions

19. The definitions contained in the Glossary of CDM terms shall apply.

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

~~21. For the purpose of this methodology, natural gas is defined as a gas which consists primarily of methane and which is generated from (i) natural gas fields (non-associated gas), (ii) associated gas found in oil fields. It may be blended up to 1% on a volume basis with gas from other sources, such as, inter alia, biogas generated in biodigesters, gas from coal mines, gas which is gasified from solid fossil fuels, etc.~~

5. Baseline methodology

5.1. Project boundary

22. The project boundary is the physical, geographical site where the fossil fuel switching takes place, and all installations affected due to fuel switching.

23. All power plants connected physically to the baseline grid as defined in "Tool to calculate emission factor for an electricity system" shall be included in the project boundary.

5.2. Baseline

24. If during the crediting period, total annual production of electricity for the existing systems does not increase by more than 20% from the established baseline values[5] then the baseline scenario is the continuation of the operation of the existing systems.

25. If during the crediting period, total annual production of electricity for the existing systems 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 SSC general guidance, 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~~ procedure in paragraph 26 shall be followed to define the baseline scenario~~, as defined below shall be used~~.

~~26. 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.~~

27. Replacing system that would have been built: In cases where the project consists of the installation of a new system that replaces the operation of systems that would have been built and utilized, the ~~Baseline Reference Plant Approach~~ procedure in paragraph 26 shall be followed, ~~as defined below, shall be used~~ to define the baseline scenario.

~~Baseline Reference Plant Approach~~

~~28. In cases where the baseline scenario consists of the installation of new systems and/or the utilization of new energy sources, a Reference Plant shall be defined as the baseline scenario. The Reference Plant 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 Plant should exclude plants implemented as CDM project activities. In cases where no such plant exists within the region, the economically most attractive technology and fuel type should be identified among those which provide the same service, that are technologically available, and that are in compliance with relevant regulations. The efficiency of the technology should 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.~~

[5] Baseline emissions are established from the characteristics of the existing systems using data from the immediately prior three years as described in paragraph 27.

29. Procedure to determine baseline scenario for Greenfield project activity: In cases where the baseline scenario includes the installation of new systems and/or the utilization of new energy sources, one of the baseline energy sources must be grid electricity. In order to establish the baseline scenario, the common practice identification 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 shall be undertaken. The identification of common practice should exclude plants implemented as CDM project activities. In cases where the identification of common practice cannot be applied (e.g., similar industries do not exist in the region), then the economically most attractive technology shall be identified. The methodology applies only if grid electricity generation or a combination of grid and captive electricity generation is identified as the common practice or most economically attractive scenario which provide the same service, and is available and in compliance with relevant regulations.

30. For existing facilities, historical information (detailed records) on the use of energy sources (e.g. electricity, fossil fuel) and the plant output (i.e. electricity) in the baseline captive energy generation plant from at least 3 years prior to project implementation shall be used in the baseline calculations, e.g. 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[6]). For facilities that are less than 3 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 is required.

31. Baseline emissions shall be determined as follows:

~~$BE_y = EF_{BL} \times Q_{PJ,y}$~~ ~~Equation (1)~~

$$BE_y = Q_{PJ,y} \times \left[f_{grid} \times EF_{grid} + (1 - f_{grid}) EF_{BL,captive} \right]$$ Equation (1)

Where:

BE_y	=	Baseline emissions in the project activity in year *y* (tCO_2)
f_{grid}		Fraction of the project electricity that would have been supplied by the grid (fraction) see paragraph 32 below
$EF_{BL,captive}$	=	Emission factor for the captive electricity generation baseline situation (e.g. tCO_2/MWh).
EF_{grid}		Grid emission factor (t CO_2/MWh)
$Q_{PJ,y}$	=	Net electricity output in the project activity in year *y* (e.g. MWh)

32. If the identified baseline is the continuation of the current practice the emission factor of captive plants ($EF_{BL,captive}$) is determined based on the historical information as follows:

[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.

$$EF_{BL,catpive} = \frac{(FC_{BL,captive} \times NCV_{FF} \times EF_{FF,CO2})}{Q_{BL,catpive}}$$ Equation (2)

Where:

$FC_{BL,captive}$	=	Amount of fuel consumed for captive electricity generation in the baseline situation in accordance with paragraph ~~19~~ 27(mass or volume unit)
$EF_{FF,CO2}$	=	CO_2 emission factor for the baseline fossil fuel (tCO_2/TJ)
NCV_{FF}	=	Net calorific value of the baseline fossil fuel (TJ/ mass or volume unit)
$Q_{BL,catpive}$	=	Net electricity output in the baseline situation during the corresponding period of time for which the total fuel consumption was taken, in accordance with paragraph ~~19~~ 27 (MWh)

33. If the identified baseline scenario ~~includes~~ ~~reference captive plant approach~~ is as per the procedure in paragraph 26, (i.e. in the absence of the project activity, the electricity demand of consumers is met through a new captive fossil fuel fired power plant "reference plant"), the emission factor for the baseline electricity generation from the reference plant ($EF_{BL,captive}$ /EF_{grid}) is calculated as per the procedures described in the latest version of "Tool to calculate baseline, project and/or leakage emissions from electricity consumption".

34. If in the absence of the project activity, electricity is sourced from a grid the emission factor for the baseline electricity supply corresponds to the grid emission factor. The baseline grid emission factor (EF_{grid}) shall be estimated based on the procedures described under "Tool to calculate emission factor for an electricity system".

35. In the absence of the project activity, if electricity is sourced from the combination of the grid and captive power plant, ~~a combined emission factor for an~~ the fraction of the electricity that would be supplied by the existing captive power plant and a grid has to be determined. The share of contributions (f_{grid}) has to be determined using historical information over the three years period prior to the project activity e.g. if the captive power plant provided 30% of the electricity and the grid 70%, the emission factor should be calculated based on this historical allocation. ~~Alternatively, for~~ For ~~new~~ greenfield facilities the most conservative (lowest) emission factor of the two electricity sources shall be used for the baseline emissions calculation ~~as it is difficult to determine and justify the ratio sources of the hypothetical electricity supply~~. If the grid system offers the lowest emission factor the value of f_{grid} will be 1, in case the captive system offers the lowest emission factor f_{grid} will be 0.

5.3. Project Activity Emissions

36. Project activity emissions consist of those emissions related with the use of fossil fuels ~~after the fuel switch~~. Project emissions are to be determined as per the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion".

5.4. Leakage

37. If the energy generating equipment is transferred from another activity, leakage is to be considered.

5.5. Emission Reductions

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

$$ER_y = BE_y - PE_y - LE_y$$ Equation (3)

Where:

ER_y = Emission reductions in the year y (tCO2e)

6. Monitoring methodology

6.1. Parameters not monitored:

Data / Parameter table 1.

Data / Parameter:	$FC_{BL,captive}$
Data unit:	(TJ/mass or volume unit)
Description:	Amount of fuel consumed for captive electricity generation in the baseline situation
Source of data:	In accordance with paragraph 27

Data / Parameter table 5.

Data / Parameter:	$Q_{BL,captive}$
Data unit:	MWh
Description:	Net electricity output in the baseline situation during the corresponding period of time for which the total fuel consumption was taken
Source of data:	In accordance with paragraph 27

Data / Parameter table 6

Data / Parameter:	NCV_{FF}
Data unit:	(TJ/mass or volume unit)
Description:	Net calorific value of fuel in the year y
Source of data:	National values or the latest version IPCC

Any comment	Reliable local or national data for the NCV shall be used; IPCC default values should be used only when country or project specific data are not available or difficult to obtain. Note that IPCC default values are provided in the unit of TJ/Gg. To convert from mass to volume unit, the density of the fuel should be determined in accordance with the options and relevant conditions provided in the latest approved version of the "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion".

Data / Parameter table 2.

Data / Parameter:	**$EF_{FF,CO2}$**
Data unit:	gCO2/MJ
Description:	CO_2 emission factor of fuel in the year y
Source of data:	National values or the latest version IPCC

Data / Parameter table 3.

Data / Parameter:	f_{grid}
Data unit:	(-)
Description:	Fraction of the project electricity that would have been supplied by the grid
Source of data:	Historic data based on existing records.

6.2. Parameters that are monitored during the crediting period

39. Relevant parameters shall be monitored and recorded during the crediting period as indicated in the section below. The applicable requirements specified in the "General guidelines for SSC CDM methodologies" are also an integral part of the monitoring guidelines specified below and therefore shall be followed by the project participants.

Data / Parameter table 4.

Data / Parameter:	**$Q_{PJ,y}$**
Data unit:	MWh
Description:	Net electricity output in the project activity in year *y*
Measurement procedures (if any):	Measurements are undertaken using energy meters Calibration should be undertaken as prescribed in the related and relevant paragraph of General Guidelines to SSC Methodologies
Monitoring frequency:	Continuous monitoring, hourly measurement and at least monthly recording.

Data / Parameter table 5.

Data / Parameter:	**EF_{grid}**
Data unit:	t CO2e/ kWh

Description:	CO_2 emission factor for the grid electricity in year y
Measurement procedures (if any):	As per the "Tool to calculate emission factor for an electricity system"
Monitoring frequency:	As per the "Tool to calculate emission factor for an electricity system"

Data / Parameter table 6.

Data / Parameter:	**$FC_{PJ,y,i}$**
Data unit:	Mass or volume unit
Description:	Quantity of fossil fuel/s combusted in year y
Source of data:	
Measurement procedures (if any):	As per the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion"
Monitoring frequency:	As per the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion"

6.3. Project activity under a programme of activities

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

(a) 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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Document information

Version	*Date*	*Description*
04.0	2 July 2015	SSC WG 48, Annex 4 To be considered at EB85. This document was issued for call for public input from 1 April to 12 May 2015. The draft revision includes: (a) Provisions to allow the use of multiple fossil fuels in the project given that the primary project fossil fuel is low carbon intensive fuel; (b) Streamlined procedure for greenfield project activities; (c) Elaboration of monitoring requirements
03.0	27 March 2015	SSC WG 47, Annex 4
02.0	28 May 2010	EB 54, Annex 11 To include Greenfield project activities and to allow for non-element processes given that emission reductions are claimed for one output only.

Version	*Date*	*Description*
03.0	3 July 2015	SSC WG 48, Annex 4 To be considered by the Board at EB85. This draft methodology was available for public input from 1 April to 12 May 2015. Revision to: (a) Further improve consistency amongst small and large scale fuel switch methodologies; and (b) Provide options with distinguishing methods by project size (e.g., microscale) with an aim to further simplify emission reduction calculations, applicability, and definition of existing facility.
02.0	28 May 2010	EB 54, Annex 11 To include Greenfield project activities and to allow for non-element processes given that emission reductions are claimed for one output only.
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