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**Date** 8 June 2013  
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**Subject**

**Call for input on the draft revision of the methodology  
AMS-II.D "Energy efficiency and fuel switching measures  
for industrial facilities"**

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Honorable Members of the CDM Executive Board,

Please see below our proposed revisions to AMS-II.D based on our Membership's experience of using this methodology.

We would of course be very happy to discuss any part of this submission with you.

Kind regards,



Rachel Child  
Co Vice Chair,  
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**TYPE II - ENERGY EFFICIENCY IMPROVEMENT PROJECTS**

Project participants shall take into account the general guidance to the methodologies, information on additionality, abbreviations and general guidance on leakage provided at <http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html>.

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

**Technology/measure**

1. This category comprises any energy efficiency and fuel switching measures implemented at a single or several industrial or mining and mineral production facility(ies). This category covers project activities aimed primarily at energy efficiency; a project activity that involves primarily fuel switching falls into category III.B.<sup>1</sup> Examples include energy efficiency measures (such as efficient electric motors, internal combustion engines, steam engines or turbine(s)), fuel switching measures (such as switching from steam or compressed air to electricity) and efficiency measures for specific industrial or mining and mineral production processes (such as steel furnaces, paper drying, tobacco curing, etc.).
2. The measures may replace, modify or retrofit existing facilities or be installed in a new facility.
3. This category is applicable to project activities where it is possible to directly measure and record the energy use from primary source or secondary source within the project boundary, e.g., electricity and/or fossil fuel consumption, and/or the consumption of the medium containing energy. The medium containing energy is typically steam, hot water, compressed air, etc.
4. This category is applicable to project activities where the impact of the measures implemented (improvements in energy efficiency) by the project activity can be clearly distinguished from changes in energy use due to other variables not influenced by the project activity (signal to noise ratio).
5. The aggregate energy savings of a single project (inclusive of a single facility or several facilities) may not exceed the equivalent of 60 GWh<sub>e</sub> per year. A total saving of 60 GWh<sub>e</sub> per year is equivalent to a maximal saving of 180 GWh<sub>th</sub> per year in fuel input.

**Boundary**

6. The project boundary is the physical, geographical site of the industrial or mining and mineral production facility(ies), processes or equipment that are affected by the project activity. The input and output of the project activity due to the project boundary should also be defined.

**Baseline**

7. In the case of replacement, modification or retrofit measures, the baseline consists of the energy baseline of the existing facility or sub-system that is replaced, modified or retrofitted. In the case of project activities involving several facilities, the baseline needs to be established separately for each site. In the case of project activities involving multiple energy efficiency measures at

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<sup>1</sup> 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.

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*II.D. Energy efficiency and fuel switching measures for industrial facilities (cont)*

individual facilities, the interaction between the measures should be taken into consideration when establishing the baseline.

8. For new facilities and project activities involving capacity additions, the energy baseline consists of the facility that would otherwise be built; the most plausible baseline scenario for the project activity shall be evaluated based on the related and relevant requirements in the General Guidance for SSC methodologies.

9. In the absence of the CDM project activity, **baseline emissions from** the existing facility(ies) would continue until the time at which the industrial or mining and mineral production facility(ies) would be likely to be replaced, modified or retrofitted in the absence of the CDM project activity ( $DATE_{BaselineRetrofit}$ ). From that point of time onwards, the baseline scenario is assumed to correspond to the project activity, and baseline **emissions (BE) are** assumed to equal project **emissions (PE)**, and no emission reductions are assumed to occur.

The requirements concerning demonstration of the remaining lifetime of the replaced equipment shall be met as described in the ‘General Guidance to SSC CDM methodologies.’ If the remaining lifetime of the affected systems increases due to the project activity, the crediting period shall be limited to the estimated remaining lifetime, i.e., the time when the affected systems would have been replaced in the absence of the project activity.

In order to estimate the point in time when the existing equipment would need to be replaced in the absence of the project activity ( $DATE_{BaselineRetrofit}$ ), project participants may follow the procedures described in the general guidance.

**The baseline of the proposed energy efficiency project should be determined using the most conservative of the following two approaches:**

**Approach 1: from the performance data obtained from historical operation records. This approach would only be applicable if data exists for at least the most recent three years of operation prior to the project start date.**

**Approach 2: from a baseline measurement campaign carried out (before or in parallel with the project implementation) on the existing equipment/system, to establish the performance characteristics of the baseline scenario over all the identified independent parameters that will have an effect on the performance of the equipment. The baseline measurement campaign would be conducted for a period of time sufficient to capture the range of the independent variables expected to be, or actually, encountered during the crediting period.**

**Using either one of the above approaches, baseline emissions (BE) shall be determined as follows:**

$$BE = \sum_{i=1}^n (e_i * P_i) + \sum_{j=1}^m (f_j * q_j) \quad (1)$$

Where:

- BE** = Baseline emissions which are used to determine the baseline (t CO<sub>2</sub>e /year)
- e<sub>i</sub>** = The volume of the energy type *i* that was consumed in the baseline (GWh or TJ)
- P<sub>i</sub>** = Emission coefficient of the energy type *i* (t CO<sub>2</sub>e/GWh or t CO<sub>2</sub>e/TJ)

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

- n = Types of the energies that were consumed in the baseline
- f<sub>j</sub> = The volume of the energy contained in the medium j that was consumed in the baseline (TJ)
- q<sub>i</sub> = Emission coefficient of the medium j (t CO<sub>2</sub>e/TJ)
- m = Types of the medium j that were consumed in the baseline

**Project emissions**

PE<sub>y</sub> shall be determined in one of the following way with respect to different project circumstances.

Option 1: Calculation of project emissions

The following equation shall be applied with the realised consumption of the energy and the medium containing energy in the project activity, when there is no difference in output performance between the baseline and project scenario.

$$PE_y = \sum_{i=1}^n (e_i * P_i) + \sum_{j=1}^m (f_j * q_j) \quad (2)$$

Where:

- PE<sub>y</sub> = Project emissions during year y of the project activity (t CO<sub>2</sub>e /year)
- e<sub>i</sub> = The volume of the energy type i that is consumed by the project activity (GWh or TJ)
- P<sub>i</sub> = Emission coefficient of the energy type i (t CO<sub>2</sub>e/GWh or t CO<sub>2</sub>e/TJ)
- n = Types of the energies that are consumed by the project activity
- f<sub>j</sub> = The volume of the energy contained in the medium j that is consumed by the project activity (TJ)
- q<sub>i</sub> = Emission coefficient of the medium j (t CO<sub>2</sub>e/TJ)
- m = Types of the medium j that are consumed by the project activity

Option 2: Calculation of project emissions for unit output product when there is a difference in output performance between the baseline and project scenario.

$$PE_y = \left[ \sum_{i=1}^n (e_i * P_i) + \sum_{j=1}^m (f_j * q_j) \right] \frac{Q_{BL}}{Q_{PJ,y}} \quad (3)$$

Where:

- PE<sub>y</sub> = Project emissions during year y of the project activity (t CO<sub>2</sub>e /year)
- e<sub>i</sub> = The volume of the energy type i that is consumed by the project activity (GWh or TJ)

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$P_i$	= Emission coefficient of the energy type $i$ (t CO <sub>2</sub> e/kWh or t CO <sub>2</sub> e/TJ)
$n$	= Types of the energies that are consumed by the project activity
$f_j$	= The volume of the energy contained in the medium $j$ that is consumed by the project activity (TJ)
$q_j$	= Emission coefficient of the medium $j$ (t CO <sub>2</sub> e/TJ)
$m$	= Types of the medium $j$ that are consumed by the project activity
$Q_{PJ,y}$	= The quantity of the output from the project activity during year $y$ ;
$Q_{BL}$	= The quantity of the output from the project activity in the baseline scenario;

Option 3: Calculation of project emissions for unit output value when there is a difference in output performance between the baseline and project scenario.

$$PE_y = \left[ \sum_{i=1}^n (e_i * P_i) + \sum_{j=1}^m (f_j * q_j) \right] \frac{G_{BL}}{G_{PJ,y}} \quad (4)$$

Where:

$PE_y$	= Project emissions during year $y$ of the project activity (t CO <sub>2</sub> e /year)
$e_i$	= The volume of the energy type $i$ that is consumed by the project activity (GWh or TJ)
$P_i$	= Emission coefficient of the energy type $i$ (kg CO <sub>2</sub> e/kWh or kg CO <sub>2</sub> e/TJ)
$n$	= Types of the energies that are consumed by the project activity
$f_j$	= The volume of the energy contained in the medium $j$ that is consumed by the project activity (TJ)
$q_j$	= Emission coefficient of the medium $j$ (kg CO <sub>2</sub> e/TJ)
$m$	= Types of the medium $j$ that are consumed by the project activity
$G_{PJ,y}$	= The value of the output from the project activity during year $y$ (in currency);
$G_{BL}$	= The value of the output from the project activity in the baseline scenario (in currency, discounted by inflation); <sup>2</sup>

10. Each energy form in the emission reduction calculations is multiplied by an emission coefficient (in kg CO<sub>2</sub>e/kWh or kg CO<sub>2</sub>e/TJ). For the electricity displaced, the emission coefficient is calculated in accordance with provisions under category I.D. For fossil fuels, the IPCC default values for emission coefficients may be used. For the mediums containing energy, the emission coefficient shall be converted into kg CO<sub>2</sub>e/kWh or kg CO<sub>2</sub>e/TJ. A list of mediums containing energy is presented in Annex 1 but this should not be considered an exhaustive list.

<sup>2</sup> The inflation rate must be retrieved from credible national sources (e.g. Central bank annual inflation reports etc.) in the host country

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*II.D. Energy efficiency and fuel switching measures for industrial facilities (cont)*

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**Leakage**

11. If the equipment currently being utilised is transferred from outside the boundary to the project activity, leakage is to be considered.

**Monitoring**

12. In the case of replacement, modification and retrofit measures the monitoring shall consist of:
- (a) Documenting the specifications of the equipment replaced;
  - (b) Metering the energy use of the industrial or mining and mineral production facility, processes or the equipment affected by the project activity;
  - (c) Calculating the energy savings using the metered energy obtained from sub-paragraph (b).

In the case of project activities involving several facilities, the monitoring procedure as described above shall apply for each facility.

13. In the case of 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.

14. Where applicable, mediums should be monitored continuously in order to record its flow and the energy density. In case continuous monitoring is not practical, then appropriate modification must be considered.

**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:

15. 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 as per the guidance provided in the leakage section of the most recent version of the large scale approved methodology 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.

16. 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.

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## Annex 1

Types of Energy-consumed medium	Energy density per unit of Energy-consumed medium	
Fresh water	2.51 MJ/tonne	600 Kcal/tonne
Soft water	14.23 MJ/tonne	3400 Kcal/tonne
Deoxygenated water	28.45 MJ/tonne	6800 Kcal/tonne
Calcium carbide	60920 MJ/tonne	14560840 Kcal/tonne
Compressed air	1.17 MJ/m <sup>3</sup>	280 Kcal/m <sup>3</sup>
Blasted air	0.88 MJ/m <sup>3</sup>	210 Kcal/m <sup>3</sup>
Oxygen	11.72 MJ/m <sup>3</sup>	2800 Kcal/m <sup>3</sup>
Nitrogen(as main product)	11.72 MJ/m <sup>3</sup>	2800 Kcal/m <sup>3</sup>
Nitrogen(as by-product)	19.66 MJ/m <sup>3</sup>	4700 Kcal/m <sup>3</sup>
CO <sub>2</sub>	6.28 MJ/m <sup>3</sup>	1500 Kcal/m <sup>3</sup>
Acetylene gas	243.67 MJ/m <sup>3</sup>	58200 Kcal/m <sup>3</sup>

Source: Chinese National Standard: General principles for calculation of the comprehensive energy consumption (GB/T 2589-2008)

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*II.D. Energy efficiency and fuel switching measures for industrial facilities (cont)*

**History of the document\***

Version	Date	Nature of revision
12	EB 51, Annex 16 04 December 2009	To broaden the applicability to include several industrial facilities involving multiple energy efficiency measures. The revision provides guidance on determining the baseline scenario for new facilities and project activities involving capacity expansion.
11	EB 35, Annex 30 02 November 2007	To clarify that the methodologies are only applicable to project activities where it is possible to directly measure and record the energy use within the project boundary (e.g., electricity and/or fossil fuel consumption) and where the impact of the measures implemented by the project activity to improve energy efficiency can be clearly distinguished from changes in energy use due to other variables not influenced by the project activity (e.g., changes in ambient conditions).
10	EB 33, Annex 27 27 July 2007	Revision of the approved small-scale methodology AMS-II.C to allow for its application under a programme of activities (PoA).
09	EB 31, Annex 24 18 May 2007	To broaden the applicability of the methodology to include energy efficiency activities in mining.
08	EB 28, Annex 25 23 December 2006	To broaden its applicability to include retrofit project activities, and to exclude technical line losses from the calculation of the emission factor.
<b>Decision Class:</b> Regulatory <b>Document Type:</b> Standard <b>Business Function:</b> Methodology		

\* This document, together with the 'General Guidance' and all other approved SSC methodologies, was part of a single document entitled: Appendix B of the Simplified Modalities and Procedures for Small-Scale CDM project activities until version 07.

**History of the document: Appendix B of the Simplified Modalities and Procedures for Small-Scale CDM project activities**

Appendix B of the Simplified Modalities and Procedures for Small-Scale CDM project activities contained both the General Guidance and Approved Methodologies until version 07. After version 07 the document was divided into separate documents: 'General Guidance' and separate approved small-scale methodologies (AMS).		
Version	Date	Nature of revision
07	EB 22, Para. 59 25 November 2005	References to "non-renewable biomass" in Appendix B deleted.
06	EB 21, Annex 22 20 September 2005	Guidance on consideration of non-renewable biomass in Type I methodologies, thermal equivalence of Type II GWhe limits included.
05	EB 18, Annex 6 25 February 2005	Guidance on 'capacity addition' and 'cofiring' in Type I methodologies and monitoring of methane in AMS-III.D included.
04	EB 16, Annex 2 22 October 2004	AMS-II.F was adopted; leakage due to equipment transfer was included in all Type I and Type II methodologies.
03	EB 14, Annex 2 30 June 2004	New methodology AMS-III.E was adopted.
02	EB 12, Annex 2 28 November 2003	Definition of build margin included in AMS-I.D, minor revisions to AMS-I.A, AMS-III.D, AMS-II.E.
01	EB 7, Annex 6 21 January 2003	Initial adoption. The Board at its seventh meeting noted the adoption by the Conference of the Parties (COP), by its decision 21/CP.8, of simplified modalities and procedures for small-scale CDM project activities (SSC M&P).
<b>Decision Class:</b> Regulatory <b>Document Type:</b> Standard <b>Business Function:</b> Methodology		