



**CDM: Recommendation Form for Small Scale
Methodologies (version 01)**
(To be used for presenting questions/proposals/amendments to the
simplified methodologies for small-scale CDM project activity
categories)

Date of SSC WG meeting:	30 January–02 February 2012, SSC WG 35
Title/Subject (give a small title or specify the subject of your submission, maximum 200 characters):	Revision of AMS-III.AN for fossil fuel switch project in energy production processes
Indicative methodology to which your submission relates (refer the items of Appendix B of the Simplified Modalities and Procedures), if applicable.	AMS-III.AN “Fossil fuel switch in existing manufacturing industries”
Name of the authors of the query:	Jamie MacKinnon Institution: Repsol YPF jmackinnon@repsol.com , iriveras@repsol.com , angel.bueno@repsol.com

Summary of the query:

Please use the space below to summarize the query related to SSC methodologies/categories SSC Modalities and Procedures provide recommendation/analysis of the SSC WG.

Original text from PP:

A revision of the AMS-III.AN Fossil fuel switch in existing manufacturing industries - Version 02 is proposed in order to broaden its scope and applicability to project activities in which, as a result of a fossil fuel combustion, an energy output is produced in the element process. Therefore, this revision proposal includes more potential project types or conditions for use and consolidates different types of fossil fuel switch methodologies under a unique methodology.

Alternative approaches when estimating the energy output in baseline and project scenarios have been incorporated taking into account the accepted request for deviation M-DEV0281 to AMS-III.B Switching fossil fuels submitted by Germanischer Lloyd Certification GmbH (GLC) and the request for clarification SSC_318 to AMS-I.C submitted by Seleha Lockwood. The method used in other methodologies such as ACM0009 Consolidated baseline and monitoring methodology for fuel switching from coal or petroleum fuel to natural gas - Version 3.2 for emissions reduction calculations has also been considered.

A revision proposal of AMS-III.B Switching Fossil Fuels - Version 14 has also been submitted in parallel to the SSC WG. The objective is to broaden scope of applicability of not just AMS-III.AN but other relevant fuel switch methodologies especially regards to their application in PoAs.

Background

Repsol YPF Comercial del Perú S.A. (RYCOPESA) is developing a *Programme of activities to switch from residual fuel oil to LPG in manufacturing industries in Peru* which consists of offering incentives to industrial facilities (small and medium industries in most cases) in Peru to replace residual fuel oil consumption with a low-carbon fuel: liquefied petroleum gas (LPG).

The purpose of the Programme is to provide the necessary incentives to industrial consumers of residual fuel oil to undertake a fuel switch to a low-carbon fuel: liquefied petroleum gas (LPG). Residual fuel oil is the fuel of choice amongst industrial plants due to its low cost relative to other fuels. The potential revenues from the CDM, as well as the qualitative benefits of participation in a CDM Programme of Activities, will allow the Project Proponent to finance the costs of the fuel switch and offer LPG at a sufficient discount in order to make it more competitive with residual fuel oil.

The initially submitted CPA reduces greenhouse gas emissions by replacing residual fuel oil used in Agroindustrias AIB food processing plant. Agroindustrias AIB has 23 years of experience in manufacturing and commercialising high-quality canned, fresh and frozen vegetables which are distributed in markets worldwide.

Agroindustrias AIB's processing and packaging plant produces in processing lines, taking into account the best flow of raw materials. Steam is consumed only in those processing lines in which canned and frozen vegetables (artichokes, asparagus, jalapeños, etc.) are produced. Therefore, the production of fresh vegetables has been excluded from the Programme activity boundary.

The fuel used in Agroindustrias AIB's productive process is R6 residual fuel oil, a carbon intensive fuel commonly used in Peruvian industry. R6 is stored in a fuel tank where the unloading of fuel is undertaken from the trucks of the fuel supply company. The fuel is consumed in two boilers (both of 300 BHP or 223.71 kW) for steam generation purposes. The steam produced is used in the processing lines of canned and frozen vegetables for: 1) washing and blanching of raw materials and 2) sterilization of packaging products such as bottles and cans in the autoclaves. Those processing lines in which steam is not used (fresh vegetables) are not within the boundary of the Programme activity. Raw materials as well as type of vegetable are independently measured by type in calibrated mass meters at the beginning and at the end of the process.

The Programme of Activities was initially submitted to UNFCCC web page applying the small scale methodology AMS-III.B Switching Fossil Fuels - Version 14. The PoA-DD and the Specific CPA-DD are still available in UNFCCC's website:

<http://cdm.unfccc.int/ProgrammeOfActivities/Validation/DB/TUXCL897X8BIPUGILATNNKL4JTRB39/view.html>

Several problems in CPAs implementation arose since following AMS-III.B specifications were not feasible to address:

1. *In case of existing facilities historical information (detailed records) on the use of fossil fuels and the plant output (e.g. heat or electricity) in the baseline captive energy generation plant from at least three years prior to project implementation shall be used in the baseline calculations (paragraph 15).*

To determine baseline emissions in those activities in which the fuel switch occurs, the steam generated in boilers should have been recorded for the most recent 3 years. However, the CPAs under the proposed Programme of Activities are likely to be small and medium sized industrial facilities within a variety of sectors, many of which are unlikely to have reliable historical data on energy output.

In general, such facilities concentrate their limited resources on controlling the raw materials and the final products. For this reason, access to reliable historical data on consumption of fuel is not expected to be a barrier to inclusion of CPAs. However, they are less likely to carry out an exhaustive control of those parameters related to the net energy generated in the element process. For small boilers, historical and systematic registration of steam recorded for the most recent 3 years is not available in many cases, thereby limiting greatly the scope of the Programme and the emissions reductions achieved.

For these reasons, it is RYCOPESA's opinion that the estimation of the emission factor for the baseline situation (EF_{BSL}) per element process will not be possible in the case of many potential CPAs since the net energy output, $Q_{BSL,j}$, has not been systematically recorded for the most recent years. Therefore, the applicability conditions of AMS-III.B regarding the availability of the historical information will not be met in most cases.

2. *Monitoring shall include monitoring of the fossil fuel use and output of element process i after the project activity has been implemented (paragraph 23a).*

It was RYCOPESA's intention, under the Programme of Activities, to finance the installation of the specific equipment required to improve the control and data collection of several key

it was not feasible for RYCOPESA to carry out these measures due to the characteristics and the number of small scale industrial plants to be included in the Programme of Activities. Energy output monitoring equipment would have been installed along the production process of the industries to be included in the PoA and entails an exhaustive control of production parameters related to energy production. Carrying out this exhaustive control is complicated for RYCOPESA since the operation and maintenance of the monitoring equipment depends on the client's practice. It is RYCOPESA's opinion that a less intrusive monitoring procedure is viable if fossil fuel consumption is used for baseline emissions calculations. This parameter is better controlled by RYCOPESA and, as the fuel supplying company, the quality of the monitoring can be ensured.

The PoA-DD and the initially submitted CPA-DD were made publicly available from 22 Jul 10 to 20 Aug 10 in order to receive possible comments in accordance with sub-paragraphs 40 (b) and (c) of the CDM modalities and procedures. Additionally, an invitation for comments by local stakeholders was made in November 2009 and May 2010: a letter was sent with in-depth information on the impacts expected of the Programme by the coordinating entity, and each agent involved was asked for feedback on them with a view to improving any impact not initially detected in the best way possible. A period of two weeks within the reception of the letters was offered to the stakeholders in order to send any comments. The feedback was then filed and answered, attempting to clarify the aspects of the Programme that may not had been sufficiently clarified in the initial notification.

Due to the difficulties described above, RYCOPESA decided to use the methodology AMS-III.AN - Fossil fuel switch in existing manufacturing industries, approved in EB 56 (17 September 2010). It was Repsol's opinion that this methodology was more appropriate to the characteristics of the industrial processes to be included in the PoA since no energy output measurement is required and no historical information regarding this parameter is necessary.

In October 2010, RYCOPESA communicated to the UNFCCC Secretariat and the CDM Team its intention to re-submit the documentation of the Programme of Activities with a new CPA-DD adapted to the recently approved AMS-III.AN. The new documentation was submitted using a slightly different name in order to differentiate it from the former. The documentation was made publicly available again from 04 Nov 10 to 03 Dec 10. The PoA-DD and the Specific CPA-DD are available in UNFCCC's website:

<http://cdm.unfccc.int/ProgrammeOfActivities/Validation/DB/HFW0T3MI9XVUXRHNNVADOJTK4IK0SF/view.html>

However, the use of this new methodology AMS-III.AN makes a large number of small and medium industries, in which a fossil fuel switch is feasible and therefore a greenhouse gases emissions reduction achievable, not eligible as a CPA. This is mainly due to the limited scope of the methodology and the demanding conditions regarding the availability of historical data and the monitoring of some parameters.

Current version of AMS-III.AN is focused on project activities in which *the element process is a process, with associated equipment, in which an energy source (e.g. fuel or electricity) is used for production purposes to convert raw materials into intermediate or finished product using heat*. In many industrial processes an energy output (e.g. steam) resulting from a fossil fuel combustion is used in the production process in order to convert raw materials into a product output. The scope of the methodology should be flexible in order to allow project developers to define the element process in the most convenient way depending on the characteristics of the production process and the measures undertaken. Either the energy output or product output should be eligible as the element process's output depending on the monitoring practices carried out in the industrial process. This is even more valuable in case of Programme Activities.

The objective of this revision proposal is to broaden the scope and applicability of the methodology and to facilitate its implementation in case of Programme of Activities, where different scenarios and conditions may arise in each small scale CPA. These objectives are in line with the Criteria for consolidations and revision of methodologies (EB 27 Annex 10) in which it is mentioned that *a revision may be carried out when the applicability conditions require broadening to include more potential project types or conditions for use*. The proposed revision includes:

- 1) A clarification in order to indicate that projects activities in which the output of the element process are both an energy output and a product output are eligible under AMS-III.AN's scope.

- 2) A new approach in order to estimate the energy output in baseline scenario, in cases where it is possible to demonstrate that historical information on the use of fossil fuels and the energy output (e.g. heat, steam or electricity) in the element process are not available. This new approach is based on the accepted request for deviation M-DEV0281 submitted by Germanischer Lloyd Certification GmbH (GLC).
- 3) A new approach in order to estimate the energy output in project scenario in cases where could not be plausible for the Project Developer to carry out energy output measurements. This new approach could optionally be limited to very small scale project activities based on an equivalent provision to consider simplified procedures for determining efficiency of small thermal appliances used in household or commercial applications (<45kW thermal capacity) included in AMS-I.C Thermal energy production with or without electricity --- Version 15.0, in response to the submission SSC_318.

RYCOPESA has taken into account the following conditions when defining this methodology revision proposal:

- The impact on the efficiency of the system due to change in fuel type has to been taken into account
- The impact of other factors (e.g., quality of raw materials, quality of the lining materials, quality of output) in the specific fuel consumption has to been assessed

As indicated above, a revision proposal of AMS-III.B Switching Fossil Fuels - Version 14 has also been submitted in parallel to the SSC WG. The objective is to broaden scope of applicability of not just AMS-III.AN but other relevant fuel switch methodologies especially regards to their application in PoAs.

Proposed Approach

The improvements included in this revision proposal are described below:

1) Clarification regarding the type of projects activities included under AMS-III.AN's scope

Some editorial changes have been included in order to broaden the scope of the methodology. Energy output has been included as possible output of the element process additionally to product output. The definition of element process has been updated in order to consider this new approach: *an element process is a process, with associated equipment, in which a single energy source (e.g. fuel or electricity) is used to generate a single output. The single output could be either a finished or intermediate product output resulting from the raw materials conversion or an energy output resulting from a fossil fuel combustion.* Examples of energy conversion equipment and usual outputs have been also updated.

2) New approach in order to estimate the energy output in baseline scenario

As a result of the lack of historical data on the use of fossil fuels and the energy output in several potential CDM project activities, RYCOPESA recommends to determine baseline emissions, using the approach proposed in the accepted request for deviation M-DEV0281 to AMS-III.B submitted by Germanischer Lloyd Certification GmbH (GLC):

As per the procedures given in AMS-III.AN – Version 02, the specific baseline emission *ex ante* ($SEF_{CO2,BL,i(ex-ante)}$) and *ex post* ($SEF_{CO2,BL,i(ex-post)}$) can be determined using the following equations:

$$SEF_{CO2,BL,i(ex-ante)} = (FC_{FF,BL,i} * NCV_{FF,BL} * EF_{FF,CO2,BL}) / P_{BL,i} \quad (1)$$

$$SEF_{CO2,BL,i(ex-post)} = (FC_{FF,PJ,i,y} * NCV_{FF,PJ} * EF_{FF,CO2,BL}) / P_{PJ,i,y} \quad (2)$$

Where:

$FC_{FF,BL,i}$ Baseline fossil fuel consumption in element process i (mass or volume units)

$NCV_{FF,BL}$ Net calorific value for the baseline fossil fuel (MJ per unit mass or volume)

$EF_{FF,CO_2,BL}$	CO ₂ emission factor of the baseline fossil fuel
$P_{BL,i}$	Baseline production in element process i (tonnes)
$FC_{FF,PJ,i,y}$	Fossil fuel consumption in element process i during the year y (mass or volume units)
$NCV_{FF,PJ}$	Net calorific value for the fossil fuel during the year y (MJ/mass or volume)
$P_{PJ,i,y}$	Production during the year y in element process i (tonnes)

In order to clarify that either an energy output or a product output can be eligible as the element process's output, $P_{BL,i}$ and $P_{PJ,i,y}$ have been substituted by $O_{BL,i}$ and $O_{PJ,i,y}$ in the revision proposal:

$$SEF_{CO_2,BL,i(ex-ante)} = (FC_{FF,BL,i} * NCV_{FF,BL} * EF_{FF,CO_2,BL}) / O_{BL,i} \quad (2)$$

$$SEF_{CO_2,BL,i(ex-post)} = (FC_{FF,PJ,i,y} * NCV_{FF,PJ} * EF_{FF,CO_2,BL}) / O_{PJ,i,y} \quad (3)$$

Where:

$FC_{FF,BL,i}$	Baseline fossil fuel consumption in element process i (mass or volume units)
$NCV_{FF,BL}$	Net calorific value for the baseline fossil fuel (GJ per unit mass or volume)
$EF_{FF,CO_2,BL}$	CO ₂ emission factor of the baseline fossil fuel
$O_{BL,i}$	Baseline production in element process i (tonnes or GJ)
$FC_{FF,PJ,i,y}$	Fossil fuel consumption in element process i during the year y (mass or volume units)
$NCV_{FF,PJ}$	Net calorific value for the fossil fuel during the year y GJ/mass or volume)
$O_{PJ,i,y}$	Production during the year y in element process i (tonnes or GJ)

In cases where it is possible to demonstrate that historical information (detailed records) on the use of fossil fuels and the energy output (e.g. heat, steam or electricity) in the element process are not available, an alternative approach shall be used in order to calculate the historical energy use/output. Therefore, for an element process which uses a single fuel j , *ex ante* ($SEF_{CO_2,BL,i(ex-ante)}$) and *ex post* ($SEF_{CO_2,BL,i(ex-post)}$) can be determined in another form as follows (similar to AM0036's approach):

$$SEF_{CO_2,BL,i(ex-ante)} = \frac{EF_{FF,CO_2,BL}}{\eta_{BSL}} \quad (4)$$

Where:

$EF_{FF,CO_2,BL}$	CO ₂ emission factor of the baseline fossil fuel (tCO ₂ /GJ)
η_{BSL}	Average net efficiency of energy generation in the element process i when fired with fossil fuel in the baseline situation, determined using the "Tool to determine baseline efficiency of thermal and electricity systems"

$$SEF_{CO_2,BL,i(ex-post)} = \frac{EF_{FF,CO_2,BL}}{\eta_{PJ}} \quad (5)$$

Where:

$EF_{FF,CO_2,BL}$	CO ₂ emission factor of the baseline fossil fuel (tCO ₂ /GJ)
η_{PJ}	Average net efficiency of energy generation in the element process i when fired with fossil fuel in the project situation, determined using the "Tool to determine baseline efficiency of thermal and electricity systems"

The efficiency of the baseline/project element process i is the output generated in the element process divided by the input energy in the fuel in the element process:

$$\eta_{BSL} = \frac{P_{BL,i}}{FC_{FF,BL,i} * NCV_{FF,BL}} \quad (6)$$

$$\eta_{PJ} = \frac{P_{PJ,i,y}}{FC_{FF,PJ,i,y} * NCV_{FF,PJ}} \quad (7)$$

Thus, the equations 1 - 4, and 2 - 5 are the same.

Equations 3 and 4 are suggested to be used to determine the emission factor for the baseline situation taking into account that, as indicated in AM0036, the average net efficiency of the boiler for steam generation in the baseline shall be determined using the latest approved version of the “Tool to determine the baseline efficiency of thermal or electric energy generation systems”.

While taking into account the procedures given in AM0036, the following approach is thus suggested by the project participants to determine the efficiency η_i which is based on the existent guidance of the latest version of the “Tool to determine baseline efficiency of thermal and electricity systems”.

It is important to note that RYCOPESA acknowledges the fact that the “Tool to determine baseline efficiency of thermal and electricity systems” is not applicable to determine the efficiency of cogeneration systems and that AM0036 methodology is not applicable to the proposed project activity either. Anyhow, as argued by the project participants, the guidance of such tool is being proposed only to determine the net efficiency of energy generation in the element process in the baseline situation (and not the efficiency of the cogeneration system as a whole). Furthermore, references to AM0036 methodology are provided just as a mere comparative example to justify the reasonability of the approach hereby proposed.

Although the methodology AM0036 (and other CDM methodologies e.g. AM0055) provides procedures and general guidance to determine the efficiency, RYCOPESA proposes to use the guidance provided in the “Tool to determine baseline efficiency of thermal and electricity systems” as such tool represents an approach which is the most recently one approved by the CDM EB and hence potentially provides a more detailed and systematic guidance than those present in the current approved methodologies.

3) New approach in order to estimate the energy output in project scenario

In some cases, such as very small scale project activities managed as CPAs under a Programme of Activities could not be plausible for the Project Developer to carry out energy output measurements in each CDM Programme activity.

In order to broaden the scope and applicability conditions of the methodology, RYCOPESA recommends including project activities where the output of the element process is an energy output which cannot be directly measured and recorded.

Where it can be demonstrated that the output cannot be directly measured, the input shall be used in order to estimate baseline emissions. In these cases and where the produced output is an energy output, the fossil fuel consumption, $FC_{FF,PJ,i,y}$, is the input, and shall be used as a proxy for determining Production during the year y in element process, $O_{PJ,i,y}$, using the following equation:

$$O_{PJ,i,y} = FC_{FF,PJ,i,y} * NCV_{FF,PJ} * \eta_{PJ} \quad (1)$$

Where:

$O_{PJ,i,y}$	Production during the year y in element process i (tonnes or GJ)
$FC_{FF,PJ,i,y}$	Fossil fuel consumption in element process i during the year y (mass or volume units)

$NCV_{FF,PJ}$ Net calorific value for the fossil fuel during the year y (GJ/mass or volume) η_{PJ} Average net efficiency of energy generation in the element process i when fired with fossil fuel in the project situation, determined using the “Tool to determine baseline efficiency of thermal and electricity systems”

This approach could optionally be limited to very small scale project activities with an estimated annual emission reduction equal to or less than 600 tCO₂e per year. An equivalent provision to include simplified procedures for determining efficiency of small thermal appliances used in household or commercial applications (<45kW thermal capacity) was included in AMS-I.C Thermal energy production with or without electricity --- Version 15.0, in response to the submission SSC_318.

Recommendation by the SSC WG:

Please use the space below to provide amendments/change (in your expert view, if necessary).

Please refer to paragraph 18 of the meeting report of the SSC WG 35
<http://cdm.unfccc.int/Panels/ssc_wg>.

Answer to authors of query by the SSC WG:

Please use the space below to provide answer to the authors of the above query.

The small-scale working group of the CDM Executive Board would like to thank the author for the submission.

The SSC WG agreed not to recommend the proposed revision. As per paragraph 2(a) of the methodology, AMS-III.AN “Fossil fuel switch in existing manufacturing industries” is applicable in cases where the baseline fossil fuel and the project low carbon emission source are consumed in thermal energy conversion equipment (e.g. furnaces, kilns, dryers) that are used in the manufacturing of products (e.g. steel, ceramics, aluminum), which is referred to as an element process. The element process is defined in footnote 3 of the methodology as a process with the associated equipment in which an energy source (e.g. fuel or electricity) is used for production purposes to convert raw materials into intermediate or finished products using heat where in it is not possible to measure the energy output. In accordance with paragraph 2(e) of AMS-III.AN each element process should have a distinct energy input (i.e. specific fuel or electricity) and distinct output (i.e. intermediate or finished product), whereas the proposed revision involves energy generation equipment where in the energy output can be monitored and it is not under the scope of AMS-III.AN.

The SSC WG agreed to further clarify that the fuel switch measures in energy generation equipment whose energy input/output can be directly measured are covered under AMS-III.B “Switching fossil fuels”.

Signed by the Chair, Ms. Fatou Gaye

Date: 02/02/2012

Signed by the Vice-Chair, Mr. Peer Stiansen

Date: 02/02/2012

Information to be completed by the secretariat

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