PROJECT DEVELOPER FORUM

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Subject **Response to the draft** "Tool to determine the baseline efficiency of thermal or electrical energy generation systems"

Dear Mr. Kirkman,

We are writing this letter in response to the call for public inputs on the draft "Tool to determine the baseline efficiency of thermal or electrical energy generation systems".

We welcome the drafting of this methodological tool to ensure consistency and conciseness of CDM methodologies. We also appreciate that the tool provides numerous options for determining the efficiency of the energy generation system, including a default value. However, we would like to express our concerns about the restrictive applicability of the tool and its conservativeness, which in practice imply that many projects may no longer be able to use methodologies that were previously applicable. Furthermore, we would like to request a number of clarifications and make specific suggestions, as detailed below.

Applicability of the tool

Possible methodology restrictions
The Tool specifies that it can be used under three conditions; however, these three conditions significantly reduce its applicability. Restricting the applicability of the tool is not a problem *in itself*. However, *if the tool becomes mandatory within methodologies* then effectively the applicability of those methodologies will be heavily restricted by this new Tool[1]. So far, our experience of methodological tools approved by the EB is that they quickly become mandatory in all relevant methodologies. We see this as a positive movement to ensure consistency across methodologies, however there is a risk of needlessly restricting the applicability of those methodologies.

Among the three applicability conditions of the proposed tool, a distinction must be made between:

- The first one, which says that the tool cannot be applied to "cogeneration or waste heat recovery systems". Methodologies for these project types will clearly see that

[1] Methodologies usually require mandatory use of the Tools that they refer to. This is usually explicated with a sentence like "In addition, the applicability conditions included in the tools referred to above apply" (see for instance page 2 of ACM0001 at http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_966E1RSS33CHOSKBU3DTFBP8SZ8EEQ).

they cannot refer to the Tool and so we see little risk of unnecessarily restricting the applicability of those methodologies.

- The other two conditions which restrict the tool applicability to certain "sub-types" of energy generation projects. Here, there is a risk that methodologies will refer to the tool without the consideration that the methodology applicability will be restricted as a result.

Applicability criteria

Asides from the risk of severely restricting the applicability of methodologies that refer to the Tool, we believe that conditions 2 and 3 could be slightly altered so that the tool would be more widely applicable while still maintaining environmental integrity.

Suggestions for condition 2:

→ Condition 2 could be amended to read:

"The tool is only applicable to energy generation systems that use

a) A single fuel type for at least 95%[2] of the energy input. In this case, the baseline efficiency should be determined for that majority fuel type.
b) Several fuels *alternatively* for at least 95% of the energy input at any time (e.g. firing of gas <u>or</u> diesel in a dual firing gas-turbine, firing of biomass <u>or</u> coal in a seasonal bagasse-coal plant). In this case, one baseline efficiency figure should be determined for each fuel type used, and the proportion of each fuel type that would be used in the baseline has to be determined in the PDD ex ante[1].

[1] If the baseline is the continuation of the current practice, then the proportion of each fuel type in the baseline can be calculated as the average of the last three years.

In order to further broaden the applicability of the tool, the following case could be added, although it is slightly more complex (especially if the baseline fuel mix is not constant):

c) Several fuels *simultaneously* that make up more than 5*% of the energy* input each at a certain time (e.g. co-firing of biomass <u>and</u> coal). In this case, the fuel mix that would be used in the baseline has to be determined in the PDD ex ante[2], and the baseline efficiency has to be determined for that baseline fuel mix.

[2] If the baseline is the continuation of the current practice, then the fuel mix in the baseline can be calculated as the average of the last three years.

Condition a) is important to cover the widespread case of projects using alternative fuels in small quantities (e.g. for start-up or during maintenance).

Condition b) is important to cover the relatively widespread case of plants using a seasonal fuel (e.g. bagasse) or the more rare case of dual firing plants.

Condition c) is important to cover the case of biomass co-firing plants which is relatively widespread (e.g. under ACM0006).

In all cases, we suggest to broaden the definition of fuel type in order to avoid unnecessarily complicated determination of baseline fuel mix/qualities when this mix/quality does not affect significantly the efficiency:

[2] Several CDM methodologies use 99% (e.g. AM0058), however this is unnecessarily restrictive.

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→ We suggest adding a definition at the beginning of the tool, which implicitly define the quality of a fuel in relation to its impact on the efficiency.

→ Furthermore, we suggest adding the following note at the end of the applicability section:

> "Note: if historical and/or manufacturer's data is not available on the specific energy generation system that would be used in the baseline, then options a) to e) cannot be applied and the baseline efficiency figure determined with this tool will be a default value as specified in Table 1 of option f".

We think it is important to specify from the beginning of the tool which type of projects the majority of the steps of the tool is intended for, and to quickly and efficiently guide project and methodology proponents to option f) if specific historical/manufacturer data is not available. This may be the case for the instance for greenfield projects where the baseline boiler does not exist but is instead part of a hypothetical scenario (based on the project-specific case or on the common practice in the industry); in this case, the methodology could simply refer to the default values in the tool or incorporate the values directly into the methodology.

Suggestions for condition 3:

In order to cover the case of systems where the main parameter affecting the efficiency is not the load (e.g. temperature for a CCGT system in a warm climate), condition 3 could be amended to read:

> "The tool can be applied ~~only~~ if load is the main operating parameter that influences the efficiency of the energy generation system. The tool can also be applied if another parameter influences the efficiency more than the load. In this situation, one baseline efficiency figure should be determined for each range of values of that parameter (at least 5 ranges should be identified), and the proportion of the time during which the system would operate in each range in the baseline has to be determined in the PDD."

Conservativeness of the tool and applicability for Energy Efficiency and Fuel Switch projects

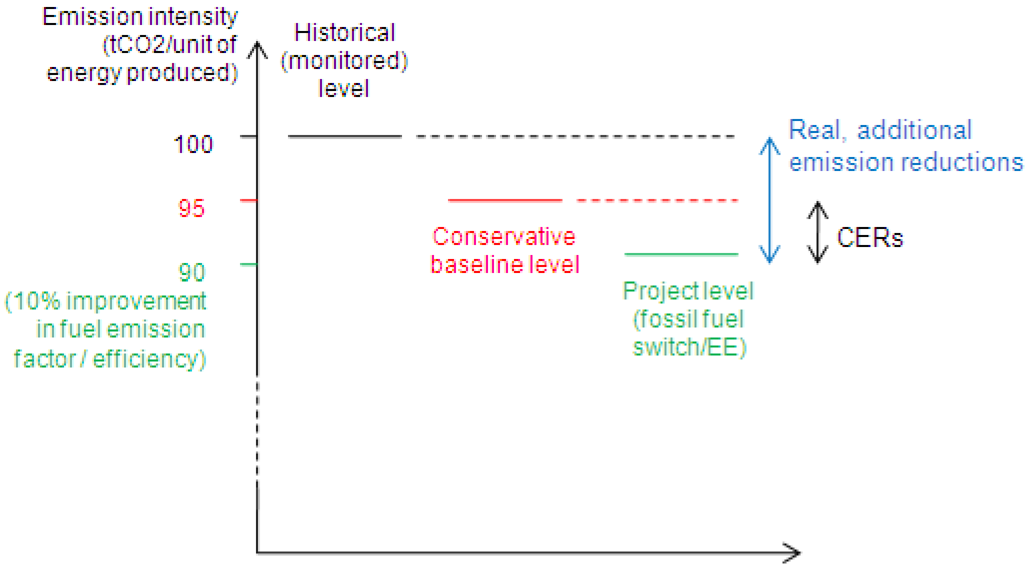
Although energy efficiency (EE) and fuel switch projects are not formally excluded from the applicability conditions of the tool, they may in some cases be effectively excluded because of the conservativeness of the tool.

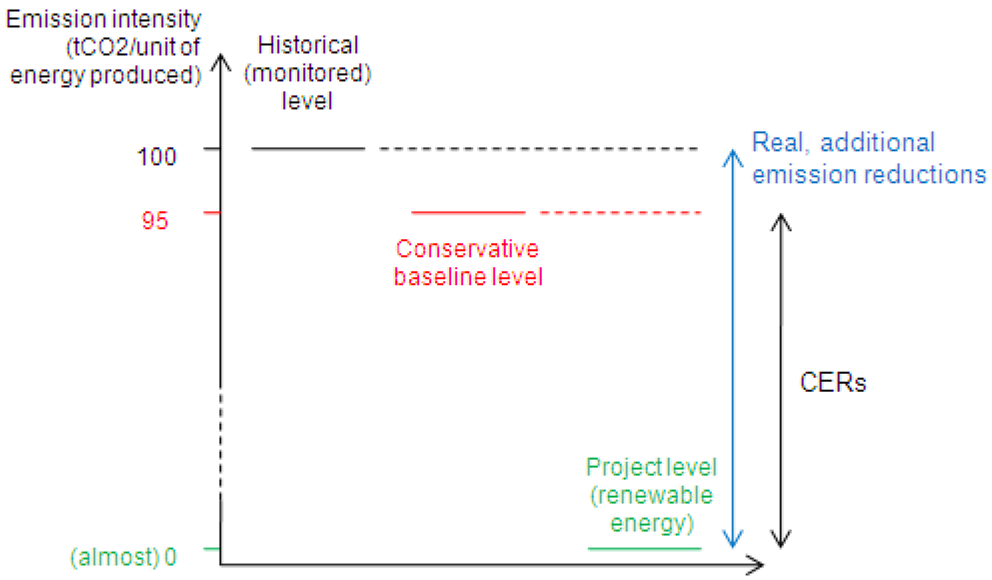
Values under optimal test conditions (options b and e) and highest historical values (option c) and default values (option f)[3] all over-estimate the real efficiency of the system and can easily result in a value which is more conservative than the real one by at least 5%[4]. For a project which increases the efficiency by 10% or switches to a fuel whose carbon intensity is reduced by 10%, this would effectively halve the CERs from the project, as illustrated on figure 1a below. This lower CER incentive may simply discourage the project developer from reducing their emissions. Another way of looking at it is to say that this Tool excludes from the CDM all EE/fuel switch projects which do not reduce emissions by more than 5%. The case is different

[3] Not only these values are taken from optimal test conditions, but they also have to be taken at the higher end of the 95% confidence interval.

[4] Especially when project proponents are required to take the high end of the confidence interval (option c) or the highest values (option e) of those already optimal values.

for renewable or zero-carbon energy projects, as these project types can ‘afford’ to have a 5% lower baseline level because the project level is (almost) 100% lower (see figure 1b below).





Furthermore, the number of conditions, testing requirements and data processing imposed on the project participants in applying options b, c, e and f of the tool will prove very challenging to implement. If all of the requirements can be achieved by the project participants, the results will already be conservative. Therefore, it is unjust to require project participants to meet these conditions and then impose further conservatism upon the results. It is only if the strict requirements cannot be met should a degree of conservatism be imposed.

Option a, c and d do not allow for any retrofitting to be done prior to implementation of the project activity. When already outdated equipment is modernized/rehabilitated, it is hardly likely or even impossible that the modernized equipment will have an efficiency higher than the initial efficiency, unless of course the major parts of the energy systems are replaced completely by the newly (recently) designed and more efficient units/parts. Since most equipment has undergone at least some retrofitting after a certain time, this restriction may make the options inapplicable to many cases.

We appreciate that conservativeness, defined as not leading to an overestimation of emission reductions is an inherent component of the CDM, and it is often necessary to be conservative in the case of doubt, such that values that generate a lower baseline projection shall be used. However, when the element of doubt is absent, for example when good historical records exist, baselines will generally be representative of the real situation. Most of the options to determine baseline efficiency under the proposed tool do not seek to determine whether there is any doubt about the real baseline but simply provide methods that tend to result in a higher efficiency than the one that may actually be the true case.

Suggestions:

We do not have specific suggestions on how to make manufacturer values (options a) and d)) more realistic so that they can cover the case of EE/fuel switch projects. However:

1. Consider the use of the heat loss method, especially in cases where an absolute value of efficiency is not paramount.

   → Explore the option of using the heat loss method to determine the before and after efficiencies throughout the load range (in boilers) in project activities where a ratio of efficiencies can be used, e.g. fuel switching.

2. Values based on tests (options b) and e)) are based on optimal conditions (test environment) and therefore already conservative.

   → The requirement to take the high end of the 95% confidence interval in option b) could be removed.

   → The requirement to take the highest value in option e) implicitly assumes that the system normally operates at optimal load. As it may sometimes be the case, we understand that this requirement cannot be removed. However, the procedures to prove that the system may not operate at optimal load could be eased, as explained below:

3. The use of historical values (option c) could be made easier by allowing load-efficiency curve to be determined over a shorter period (if that period is representative of the conditions over a year). This is especially important for projects that may be waiting to finish this 'baseline efficiency measurement campaign' before they can implement the project.

   → The 1st bullet point in option c) could be amended to read:

   > "In the case where the tool is used to establish a load-efficiency function (…) for the most recent year prior to the implementation of the project activity; **a period shorter than one year (but no shorter than 2 months) can be used provided that it is representative of the operating conditions occurring throughout a year**"

4. In regards to not allowing any retrofitting prior to the implementation of the project activity, we advocate to differentiate between major and minor retrofitting measures and allowing A for the latter.

   → The last bullet point in option a), c) and d) could be amended to read:

   > **"If no major retrofitting was done..."**

provided that the definition of "major retrofitting" is provided in a footnote or in the "Definitions" chapter in the beginning of the tool as:

Major Retrofitting - Retrofitting that envisages the replacement of core parts (units) of the energy generation system. For example, it may include replacement (where applicable for the energy generation system, depending on whether it is only power or only thermal generation) of boilers, pre-heaters, turbines, generators, ducting system, condensers, cooling water system, milling system, exhaust gas system, etc. At the same time Major Retrofitting does not include measures like repair and/or optimization of the main parts (units) of the energy system. These measures may be i.e. improvement/repair of insulation, repair of heater housing, re-blading of shafts, cleaning of boiler piping, etc.

Furthermore, default values given in Table 1 are very conservative; most of them correspond to the best efficiency values, a lot of them in developed countries, as explained in Appendix 1 of AM0058[5]. We do not have further documentation to justify the use of lower values, but suggest the EB to review the appropriateness of those values.

Specific comments (clarifications/suggestions)

1. Definition of efficiency

It could be clarified where the enthalpy of feedwater should be accounted for in the determination of "efficiency" and of "useful energy generated", i.e. whether the efficiency is defined as $\left(\frac{\text{Net energy output - Feedwater enthalpy}}{\text{Fuel input}}\right)$ (which is more widely used)

or as: $\left(\frac{\text{Net energy output}}{\text{Fuel input} + \text{Feedwater enthalpy}}\right)$

It should also be clarified that the "quantity of energy contained in the fuel" should be expressed in Net Calorific Value (NCV) terms as efficiency figures are usually divided by Net (and not Gross) Calorific Values of fuels in order to calculate baseline emissions in methodology equations.

The above clarifications are important to ensure that baseline and project emissions are calculated on the same basis. To prevent a lack of clarity, clear definitions should be provided for each term in the equations in the tool. An example of a term that could cause confusion is: "net quantity of useful energy generated". Does this refer to the energy content of the steam produced including that which is used for de-areation? Furthermore, how should the energy contained in bottom and continuous blow downs to be treated? Clarity on these issues needs to be provided.

2. Verification of efficiency tests by an independent entity (option B)

[5] See http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_PX8L7HMDBVY1NCL43IC4V3UR5JUAYY

Under option B, “efficiency tests shall be conducted following the guidance provided in relevant national / international standards, such as AMSE PTC-6 or IEC 60953-3, ASME PTC-4 or BS 845 or EN 12952-15, etc”.

These standards are very well defined and efficiency tests have to be performed by qualified staff, which may be internal to the project developer or external consultants/manufacturers.

Asking another ‘independent entity’ to verify those tests therefore seems both unnecessary and inappropriate (especially considering the fact that DOEs are rarely qualified to do these tasks).

Suggestion:

The tool could require the DOE to check the documentation from the test and that all instruments and meters are properly calibrated but not require the DOE to re-do (part of) the test themselves.

3. Data vintage for efficiency function (option C)

Under option C, the last sentence of the 3rd bullet point “The highest annual efficiency from the most recent three years should be chosen” should be moved to the end of the section:

- “No retrofitting was done (…) as applicable (e.g. from plant operational log books). ~~The highest annual efficiency from the most recent three years should be chosen.~~

> If the tool is used to establish a load-efficiency function, (…) Project participants shall document the complete data set used to establish the efficiency function.
>
> If the tool is used to determine a constant efficiency, the highest annual efficiency from the most recent three years should be chosen.”

This move will avoid confusion as using the highest annual efficiency is not applicable to the load-efficiency function option.

Furthermore, the term “constant” efficiency should be defined in order to provide clarity to this option.

4. Number of efficiency measurements (option E)

Under option E, the minimum number of efficiency measurements should be clarified, as the following two sentences seem to contradict each other:

> “For tests, two successive load points in the load range shall have an increment of at least 5% of the systems’ rated capacity.”
>
> “A minimum of 10 measurements shall be taken at different loads”

5. Default values (option F)

The following default values should be added:

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- Default values for New coal boilers. In AM0058 this has been determined at [a very high] 85%.
- Default values for electricity generation equipment as the values in the tool currently provided only apply to heat generation equipment although the tool is applicable to thermal or electric energy generation systems. The “Tool to calculate the emission factor for an electricity system” has a table with such values.

Thank you very much for your consideration. We look forward to a revised version of the "Tool to determine the baseline efficiency of thermal or electrical energy generation systems",

Best regards,

Martin Enderlin
Chairman