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:	21–24 June 2011, SSC WG 32
Title/Subject (give a small title or specify the subject of your submission, maximum 200 characters):	Clarification on calculation of baseline emissions for chiller programme under AMS-II.C
Indicative methodology to which your submission relates (refer the items of Appendix B of the Simplified Modalities and Procedures), if applicable.	AMS-II.C "Demand-side energy efficiency activities for specific technologies"
Name of the authors of the query:	Sudhi Ranjan Sinha Institution: Johnson Controls (India) Private Limited sudhi.sinha@jci.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

The methodology applicable to the Programme of Activity (PoA) titled "Demand Side Management (DSM) for accelerating the diffusion of energy-efficient chiller technology" is AMS-II.C. (Version 13, EB 48). The program is restricted to promotion of water cooled chillers. The procedure adopted for emission reduction calculations is as follows:

Baseline Emissions

As per equation (1) given in the methodology AMS-II.C. (Version 13, EB 48), baseline emissions are computed as per the formula:

$$BE_y = E_{BL,y} * EF_{CO2,ELEC,y} + Q_{ref,BL} \times GWP_{ref,BL}$$

The approach requires the calculation of the parameter $EL_{BL,y}$ (Energy consumption in the baseline in year), which is calculated as per equation (2) provided in the methodology:

$$E_{BL,y} = \sum_i (n_i * \rho_i * o_i)/(1 - l_y)$$

The parameter power (p_i) for chillers is not a fixed parameter and depends on several factors related to the operating parameters including ambient temperature, quantity of cooling provided, inlet temperature of condensing water and outlet temperature of chilled water. However, the approved methodology does not provide details on the approach to be followed for calculation of p_i.

Hence, as an alternative, the project proponent seeks a clarification as to whether the formulae provided in the approved large scale methodology AM0060 (Version 1.1) (Power saving through replacement by energy efficient chillers) for calculation of the parameter pi can be applied.

AM0060 (Version 1.1) has provided for procedures to determine electricity consumption of the existing chiller ($EC_{BL,y}$) taking into account the operating parameters of the cooling system to calculate the energy

that would be consumed in the baseline scenario. The procedure requires the monitoring of the following three parameters:

- The inlet temperature of the chill water (T_0)
- The outlet temperature of the chill water (T_1) and
- The inlet temperature of the condensing water (V_0)
- Average rate of the chilled water

During the crediting period, the above-mentioned operating parameters are monitored. The electricity consumption of the existing chiller is estimated by applying the power output function to the monitored parameters as required in AM0060 (Version 1.1). As the operating parameters vary over time, this procedure is applied for every distinct time intervals t (1 hour). Annual baseline electricity consumption is then calculated as the summation over all time intervals t.

The baseline electricity consumption ($EC_{BL,y}$, kWh) is then calculated in accordance with equations (2), (3) and (4) provided in methodology AM0060 (Version 1.1). The parameter $EC_{BL,y}$ corresponds to the term (p_i*o_i) in the equation (2) given in the methodology AMS-II.C. (Version 13, EB 48). The product is then multiplied with n_i and the parameter $E_{BL,y}$ is then arrived at.

Though the procedure is not a part of the calculation procedure given in the methodology AMS-II.C (Version 13, EB 48), it takes into account the varying efficiency levels of a chiller as the operating parameters vary and leads to an accurate assessment of the energy consumption in the baseline chillers.

The project proponent would like to seek a clarification from the SSC-Working Group if the approach followed for estimating the baseline emissions as given above is applicable for the proposed chiller programme..

Recommendation by the SSC WG:

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

Please refer to paragraph 21 of the meeting report of the SSC WG 32 <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.

Based on the information provided the SSC WG agreed to provide the response as below.

The SSC WG recognized the fact that AMS-II.C does not provide necessary procedures to estimate emissions reduction in the specific case of chiller application (see also issues discussed in the response provided by the SSC WG to SSC_510) such as lifetime of equipment and service level etc.).

The group is of the opinion that baseline electricity consumption can be calculated in principle using the provision of AM0060 for the replacement of existing chillers. The group however noted from the PoA-DD/CPA-DD that CPA also includes new installation i.e. Greenfield projects for which a computer simulation model is used to estimate baseline emissions.

Please note that AM0060 is restricted to retrofit project whereas AMS-II.C is applicable to existing installation as well as to Greenfield projects.

However there is no procedure provided in the case of Greenfield projects. For example Option 2 of AMS-II.C for baseline calculations may be appropriate for chiller application but procedure for establishing specific energy consumption (EER) is established based on historical data.

The group is of the opinion that in the specific case of chiller applications in Greenfield projects, the project proponents can estimate the baseline emissions using a certified computer simulation model (e.g. certified by AHRI), provided that all the relevant input parameters required to establish the baseline are transparently described in the PDD and the DOE can validate that: (a) All the relevant model input parameters reasonably describe a credible and conservative baseline scenario; and that (b) The computer simulation model, and its fundamental algorithms, reliably describe the performance of the baseline chiller (s) and auxiliary systems.

Please note that the SSC WG is also in the process of revising AMS-II.C or developing a new methodology to cover project activities involving technologies with variable input/output characteristics such as chillers. This clarification may be superseded by a new version AMS-II.C or a new methodology specifically prepared for retrofit and Greenfield chiller projects.

Furthermore, in the case of project activity involving replacement of multiple chillers with a large centralized chiller system, the query may refer to the issues highlighted in the response provided by the SSC WG to SSC_510 a part of which is also reproduced below.

> *" AMS-II.C is applicable to ".... activities that encourage the adoption of energy-efficient equipment/appliance (e.g. lamps, ballasts, refrigerators, motors, fans, air conditioners, pumping systems) at many sites." AMS-II.C is thus not specifically designed for centralizing of utility (cooling) provisions as is similarly addressed in the methodologies AMS-II.H "Energy efficiency measures through centralization of utility provisions of an industrial facility" and AMS-II.K "Installation of co-generation or tri-generation systems supplying energy to commercial building". AMS-II.C is designed for applications where many relatively small, individual pieces of equipment are replaced with many more efficient pieces of equipment.*
>
> *As it stands now AMS-II.C does not provide provision to: (1) Conservatively determine a baseline EER taking into consideration the variable performance efficiencies of multiple baseline chilling/cooling units (taking into consideration auxiliary loads such as cooling towers and chilled water circulating pumps); and (2) Demonstrate what the baseline scenario is, taking into consideration issues such as remaining life of the baseline equipment. With these two issues, it may be that a new methodology for centralizing of cooling utilities, without the use of co-generation or tr-igeneration, would be needed. The provisions of AMS-II.H and AMS-II.K can be the start of such a methodology."*

Signed by the Chair, Ms. Fatou Gaye

Date: 24/06/2011

Signed by the Vice-Chair, Mr. Peer Stiansen

Date: 24/06/2011

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