CDM: Proposed New Methodology
Meth Panel recommendation to the Executive Board
(version 03)
(To be used by the Meth Panel to make a recommendation to the Board regarding a proposed new methodology)

Date of Meth Panel meeting:	7-9 July, 2004
Related F-CDM-NM document ID number (electronically available to EB members)	F-CDM-NM0044 Energy Efficiency Improvements in Municipal Water Utilities in Karnataka, India - power factor improvements
Related F-CDM-NMex document ID number(s) (electronically available to EB members)	F-CDM-NMex0044 Deepak Mawandia / Roger Peters
Related F-CDM-NMpu document ID number(s) (electronically available to EB members)	F-CDM-NMpu0044 Lambert Schneider

Note to those completing this form, as applicable: Please provide recommendations on the proposed new baseline and monitoring methodologies based on an assessment of annexes 3 and 4 and of their application in sections A to E of the draft CDM PDD, desk reviews and public input. Please ensure that the form is entirely filled and that arguments and expert judgements are substantiated.

A. Final recommendations by the Meth Panel

I. Recommendation on the proposed new baseline methodology: *(checkmark the choice made)*

Title of proposed new baseline methodology:>> Power factor improvement in municipal water pumping systems

a. To approve this proposed methodology with minor changes

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i. Conditions under which this proposed methodology is applicable to other potential CDM project activities (e.g. project type, region, data availability):

>>

ii. Minor changes:

>>

b. To reconsider this proposed methodology, subject to required changes

☐

i. Conditions under which the proposed methodology is applicable to other potential projects (e.g. project type, region, data availability):

>>

ii. Required changes:

>>

(Project participants shall make required changes to the proposed new methodology and send it back to the Meth Panel. The proposed new methodology will be reconsidered by the Meth Panel if changes required are made by the project participants. The Executive Board will only consider this proposed new methodology after the revised proposed methodology has been reconsidered by the Meth Panel.)

c. Not to approve the proposed methodology

☒ [NB This recommendation is based on the revised version of the methodology: Some changes were made to NM44 as well as NM42]

i. Reasons for non-approval:

>>

- Effect of increased power factor on lowering power demand (kWh) not convincingly shown.
- Information on what is included in the additionality assessment should be clarified.
- Lack of transparency in some formulae and/or values used to determine baseline emissions.
- Indication that AM0005 (for renewable power projects) or SSC rules (for small projects) will be used to calculate the carbon emission factor for electricity not generated as a result of this project activity. These rules were developed for a different type of project activity.
- The methodology should be re-drafted as a stand-alone methodology unless it is always to be used in conjunction with NM42 (at present, information on the additionality assessment as well as "generic information" is included in NM42 only).
- Other points are included in the text below.

(A new proposal should be submitted in accordance with the procedures for submission and consideration of proposed new methodologies of the Executive Board.)

II. Recommendation on the proposed new monitoring methodology: *(checkmark the choice made)*

Title of proposed new monitoring methodology: >> Monitoring methodology for power factor improvement

a. To approve this proposed methodology with minor changes

☐

i. Conditions under which methodology is applicable to other potential projects (e.g. project type, region, data availability):

>>

ii. Minor changes:

>>

b. To reconsider this proposed methodology, subjected to required changes

☐

i. Conditions under which the proposed methodology is applicable to other potential projects (e.g. project type, region, data availability.):

>>

ii. Required changes:

>>

(Project participants shall make required changes in the proposed new methodology and send it back to the Meth Panel. The proposed new methodology will be reconsidered by the Meth Panel if changes required are correctly made by the project participants. The Executive Board will only consider this proposed new methodology after required changes proposed have been made and the revised proposed methodology has been

reconsidered by the Meth Panel.)

c. Not to approve the proposed methodology

☒

i. Reasons for non-approval:

>>

- The methodology proposed for assessing (baseline) and monitoring GHG reductions from reductions in excess power is not appropriate.
- Assumptions incorporated in the formulae used to determine emission reductions due to a reduction in energy losses are not transparent or justified.
- As for baseline methodology, formulae and sources used to calculate CEF not appropriate.
- Further details given below.

(A new proposal should be submitted in accordance with the procedures for submission and consideration of proposed new methodologies of the Executive Board.)

B. Details of the evaluation of the proposed new methodology by the Meth Panel:

I. Proposed new baseline methodology *(specify title here):* >> Power factor improvement in municipal water pumping systems

(1) Short description of the methodology, including an assessment of which approach from paragraph 48 of the CDM modalities and procedures was used:

a) Describe the methodology:

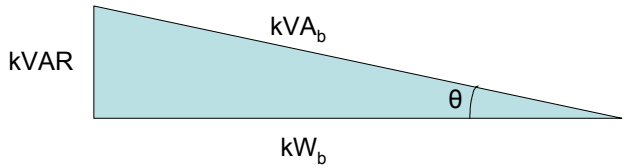
>>The methodology provides formulae by which to calculate the carbon emissions baseline due to a low power factor. The methodology indicates that raising the power factor will reduce "reactive power" (kVAR) so that the ratio of "apparent power" (kVA) to "real power" (kW) is closer to unity. The methodology further outlines that this will reduce:

a) Excess demand due to high reactive power consumption and sub-optimal power supply, and

b) Energy loss in cables.

The methodology states that $(kVA)^2 = (kW)^2 + (kVAR)^2$

The effect of the project activity can be visualised as follows: The project activity reduces the length of kVAR and therefore of kVA.



The methodology provides formulae by which to estimate the carbon emission baseline for both the excess demand and the energy loss components. It is proposed that the measurement of the baseline CO_2 emissions due to excess demand can be estimated as follows:

Excess power consumption = kVA (1-power factor) * 0.8 * Annual plant operating hours.

The methodology further proposes that the cable losses associated with poor power factor can be estimated from the plant load factor, and the current, resistance and length of cables in the plant.

b) State the approach selected:

>> Approach outlined in paragraph 48 (a) of the CDM modalities and procedures: "Existing or historical emissions, as applicable."

c) Indicate (in summary form) why the approach selected is the most appropriate. Please

provide your expert judgement on the appropriateness of the selected approach to the project category:

>> While in theory 48a would be an appropriate approach, the formula for determining excess power consumption is not appropriate to the project activity. This is because, as indicated by several experts, the effect of raising the power factor of an installation is to reduce losses (and associated fuel consumption), not to reduce "excess demand". Although justification for the formula to calculate the loss load factor was asked for in April 2004, it has not been adequately provided.

(2) Basis for determining the baseline scenario:

a) State whether the documentation explains how the baseline scenario is to be chosen and identified:

>> The baseline scenario is clear, as it is the pre-project situation. However, how this baseline scenario is "translated" into baseline emissions is not clear.

b) State the basic underlying rationale for algorithms/formulae used (e.g. marginal vs. average basis) (see also section 4 below):

>> The basic assumption is that excess demand (kWh) results from a low power factor and that raising the power factor will reduce power consumption and losses. (However, experts consulted indicate that increasing the power factor will only reduce losses, not power consumption.)

c) State whether the documentation explains how, through the use of the methodology, it can be demonstrated that a project activity is additional and therefore not the baseline scenario. If so, what are the tools provided by the project participants?

>> The methodology refers to a description of NM42 (submitted alongside NM44, for the same project activity) for a description of how it is demonstrated that a project activity is additional and therefore not the baseline scenario. However, it is not always clear from NM42 how much of the description applies to power factor improvements. If NM44 is proposed as a stand-alone methodology, it would need to include all relevant information, including on how to assess additionality in the description of NM44. (It would also need to include "generic comments" in both NM42 and NM44.)

d) State whether the basis for determining the baseline scenario and for assessing additionality is appropriate and adequate:

>> **Assessing additionality**:

Clarity is needed as to whether the additionality assessment for NM44 will involve:

- As for NM42, contacting five similar municipalities in the same geographic region (and whether these municipalities will need to be water-pumping municipalities, or any public service). The current methodology for NM44 indicates that the project developer will be asked to "conduct survey's (sic) in several cities".
- An investment analysis (as in NM42), and if so whether the same criteria as in NM42 apply.

Determining the baseline scenario:

It is unclear from the methodology for calculating the baseline for "excess demand":

- What the rationale is for "translating" savings in peak demand (kW) to kWh at the project site.
- Whether an increased power factor effects the efficiency of equipment, if so how, (this has an impact on the applicability of the methodology if an increased power factor affects efficiencies of different equipment in different ways).
- What the rationale behind the assumption 1kVA = 0.8 kW is.
- What the definition of "$kVA_{excess\ demand}$" is.
- What "excess capacity due to sub-optimal power system or equipment" is (and why taking this into account does not result in double-counting the emission reductions calculated by applying methodology NM42).
- The revisions to NM42 also included revisions to NM44 that indicated that the CEF would be

calculated according to AM005 or SSC rules. However, this project is a different project activity for which the aforementioned methods do not apply. Thus, an indication of how the CEF should be calculated should be included in NM44.

It is unclear from the methodology for calculating the baseline for "energy loss in cables":

- What the "loss load factor" is and what the justification/rationale is for its definition:

  $LLF = (0.3)(\text{Load factor}) + (0.7)(\text{load factor})^2$

- Whether the "length of cable in meters" refers to the length of cable in the project-site only.
- What the rationale/justification for the definition of kWH_{EL} is.

  $$kWH_{EL} = \frac{3 * I^2R * LLF * L * H_b kWh}{N * 1000}$$

- Whether all/the vast majority of T&D losses arise within the project boundary (i.e. between the step-down transformer and project site) or whether they also significant on "main distribution lines".

(3) Assessment of the description of the proposed methodology and its applicability

a) State whether the methodology has been described in an adequate manner:

>> The description of the methodology is not clear, and some key concepts are not transparent. The methodology does not show how power savings would be achieved as a result of power factor improvements (see above). The methodology description is also not "stand-alone", as it relies on information outlined in NM42.

b) State whether the proposed methodology is appropriate for the referred proposed project activity and the referred project context (described in Sections A-E of the draft CDM-PDD and submitted along with Annex 3):

>> The energy loss component of the methodology may be appropriate to the project activity described in the associated PDD, although further clarifications (as outlined above) are needed, as outlined above. However, the excess demand component of the methodology is not appropriate.

c) State whether the application of the methodology could result in a baseline scenario that reasonably represents the anthropogenic emissions by sources of greenhouse gases that would occur in the absence of the proposed project activity.

>>No – the excess demand component of the baseline is not appropriate, and the energy loss component of the baseline needs further clarification.

Please explain:

>> (See above: Formula to define energy loss not explained, nor is the 1kVA = 0.8 kW, CEF source inappropriate)

(4) Assessment of algorithms/formulae and type of data needed:

a) State whether the description of the methodology includes algorithms and generic formulae that can be applied to other potential project activities (if not, the proposed new methodology will be considered as a project-specific methodology):

>> It is not clear whether or not the methodology is limited to water-pumping plants in project activities also undertaking other energy-efficiency measures, or whether it can be a stand-alone methodology for power factor improvements. The proposed title is generic, but part of the proposed additionality test is strongly linked to the survey of water utilities in NM42.

b) Explain the spatial scope of data used to determine the baseline and whether the scope is appropriate:

>>Carbon electricity factor should be determined by local electricity grid [but the revised version of the methodology indicated that the CEF would in fact be that used from applying either AM0005 of SSC rules, which is inappropriate]. Otherwise, most data used to develop the baseline linked to the project-site (appropriate). It is unclear whether the "length of cables" refers to the length within the project boundary

or not.

c) Explain the vintage of data used (in relation to the duration of the project crediting period) and whether the vintage of data is appropriate, indicating the period covered by the data:

>> Not applicable.

(5) Definition of the project boundary related to the baseline methodology:

a) State how the project boundary is defined in terms of:

i) Gases and sources

>>CO_2 only from the grid power plant(s) from where emission reductions are assumed to take place.

ii) Physical delineation

>>Power factor improvements are within the proposed project boundary (project site to the point where the project site is responsible for power factor charges, likely the step-down transformer from the main distribution lines).

b) Indicate whether this project boundary is appropriate:

>> Yes, if the methodology were appropriate.

(6) Key assumptions/parameters (including emission factors and activity levels) and data sources:

a) List the implicit and explicit key assumptions. Identify those, if any, which are problematic and explain:

>>Implicit assumptions (see section 2C for further details why they are problematic):

- Justification for formulae/assumptions of loss load factor.
- Definition of kWH_{EL}.
- The assumption 1kVA = 0.8 kW.
- There is no leakage (losses not important outside the project boundary).
- [The assumptions included in the additionality component of the methodology are unclear, so it is difficult to identify what they are and whether they are problematic]

Explicit assumptions:

- Annual excess consumption (kWh) = excess demand (kVA) * 0.8 * hours of plant operation per year (problematic – experts not convinced that this formula is appropriate).
- CEF can be calculated by using methodologies approved for other project activity types (i.e. AM0005 or SSC rules) (problematic – methods should only be applied to the project activities for which they were developed).
- "Market barriers" will prevent the project activity from taking place.

b) State whether the key assumptions are arrived at in a transparent manner:

>>No – references/justification for individual assumptions needed.

c) Give your expert judgement on whether the assumptions/parameters are adequate:

>> No - the assumptions and parameters used to estimate excess power consumption are not accurate. Those used to assess line losses may be adequate but are not justified. Calculating the CEF by using a methodology approved for a different type of project activity is not appropriate.

d) Indicate which data sources are used and how the data are obtained (e.g. official statistics, expert judgement):

>> Data sources: Plant measurements of power factor, peak demand, current, resistance, and cable length. Power factor values would come from measured values used for power factor charges by power utility. Other measurements would be plant measurements/statistics.

e) Give your expert judgement on whether the data used are adequate, consistent, accurate and reliable:

>> Insufficient information available to make this judgement.

f) State possible data gaps:

>> Whether the value of the baseline emissions factor will be updated. [Information on how the CEF is to be calculated will also be needed]

(7) Assessment of uncertainties:

a) State whether the methodology includes an assessment of uncertainties regarding:

i) The basis for determining the baseline scenario:

>> No – but there are few uncertainties on the baseline scenario as this is the pre-project situation.

ii) Algorithms/formulae:

>> No. It is unclear as to whether the formulae provided to determine the emissions baseline are appropriate.

iii) Key assumptions:

>> No – see problems outlined above.

iv) Data:

>> No.

b) State whether the uncertainties presented are reasonable:

>> Need more information to make a judgement.

(8) Leakage:

a) State how the baseline methodology addresses any potential leakage due to the project activity:

>> No leakage is expected, and no methodology is provided for identifying or addressing any leakage.

b) Indicate whether the treatment for leakage is appropriate and adequate:

>> Further justification would be useful in assessing the appropriateness of this claim. Alternatively, this could be done by the DOE.

(9) Transparency and "conservativeness":

a) Indicate whether the baseline methodology was developed in a transparent way:

>> The baseline methodology and some assumptions/emission factors are not transparent. More than one comment by experts indicates that the methodology is flawed.

b) State whether the baseline methodology is conservative:

>> The methodology is not conservative as it overestimates the impact of power factor improvements on emissions.

(10) Potential strengths and weaknesses of the proposed baseline methodology *(please explain)***:**

>> Weaknesses: Difficult to understand, lack of transparency in some areas, no supporting documentation provided for the use of annual operating hours to translate kVA or peak demand into annual savings in power.

(11) Other considerations, such as a description of how national and/or sectoral policies and circumstances have been taken into account *(please explain)***:**

>> The DOE will need to verify if national or regional standards on capacitors are in force in the project-site area.

(12) Applicability of the proposed methodology across project types and regions *(please*

indicate):

>> As per comments above, it is not clear from the documentation whether this methodology is applicable only to PF improvements in conjunction with energy efficiency improvements in a water pumping system, or to PF improvements more generally. If the latter, the methodology needs to be re-written as a stand-alone methodology.

(13) Any other comments:

a) State whether any other source of information (i.e. other than documentation on this proposed methodology available on the UNFCCC CDM web site) has been used by you in evaluating this methodology. If so, please provide specific references:

>> Appropriate size capacitors shall be installed in accordance with Electricity Supply Regulation 1988 / KERC (Electricity Supply and Distribution) Code, 2000 –01 in case of installations covered under Tariff category LT 3, LT 4, LT 5, & LT 6 where motive power is involved.

- The specified P.F. is 0.85. If the PF is found to be less than 0.85 Lag, a surcharge of 1 Paise per unit consumed will be levied for every reduction of P.F. by 0.01 below 0.85 Lag. However in respect of LT installations, this is subject to a maximum surcharge of 15 Paise per unit." http://www.kptcl.com/kptcltariffltpf.htm

For the application of this methodology to the proposed project activity, the DOE should verify what the impact of this code has on the additionality aspect of the proposed project activity.

b) Indicate any further comments:

>> No further comments.

II. Proposed new monitoring methodology *(specify title here):* >> Monitoring methodology for power factor improvement

In respect of the proposed new monitoring methodology, evaluate each section of annex 4 to the draft CDM PDD. Please provide your comments section by section:

(1) Brief description of new methodology:

Describe new methodology:

>> The methodology attempts to show that savings in power consumption and grid emissions ("marginal plant" – no further information given) would result from power factor improvement at the municipal pumping stations upgraded in the project activity. It is assumed that the measurement of the before and after power factor can be used to estimate these savings in power consumption as follows:

Savings in power consumption for period x = [change in kVA (1-power factor)] * 0.8 * operating hours in period x.

The methodology further proposes a scaling factor to take into account changes in production efficiency or volume.

The methodology also proposes that there are reductions in cable losses associated with poor power factor, and assumes that these losses are related to changes in load factor, and the current, resistance and length of cables in the plant. The carbon emissions due to direct energy savings are calculated according to a second formula:

$[CO_2 \text{ emission reductions}]_{ES} = kWh_{ES} * CEF_b$

kWh_{ES} is influenced by the loss load factor (the formula for which has not been justified).

(2) Key assumptions/parameters:

a) List the implicit and explicit key assumptions. Identify those, if any, which are problematic and explain:

>> The following assumptions are unclear:

- Rationale/definition of kVA_{po} (as in baseline methodology).
- "Appropriate carbon emission factor" (not defined – see comments in baseline methodology above).
- Rationale behind assumption 1 kVA = 0.8 kW, kWh_{ES}.
- "Number of cable runs".
- Definition of line loss factor (as in baseline methodology).
- How the project developer should distinguish between release of kVA demand to grid that is due to improvement of the power factor or to other actions.
- Savings in excess consumption (kWh) = excess consumption – project demand (kVA) * hours per year plant operation.

b) State whether the key assumptions are arrived at in a transparent manner:

>> No.

c) Give your expert judgement on whether the assumptions/parameters are adequate:

>> No – see comments in baseline methodology.

(3) Data sources and data quality:

a) Indicate which data sources are used and how the data are obtained (e.g. official statistics, expert judgement):

>> Data sources – plant measurements of power factor, peak demand, current, resistance, cable length. Power factor values would come from measured values used for power factor charges by power utility. Other measurements would be plant measurements/statistics.

b) Give your expert judgement on whether the data used are adequate, consistent, accurate and reliable:

>> No – as per comments on baseline methodology above.

c) S*tate possible data gaps:*

>> No information on where the data sources to calculate the CEF would be (although as mentioned above, using AM0005 or SSC methods to calculate the CEF is not appropriate in this case).

(4) Assessment of the description of the proposed methodology and its applicability:

a) State whether the proposed methodology has been described in an adequate manner:

>> Not easy to follow. Appropriateness of methodology questioned by several electronic engineers.

b) State whether the proposed methodology is appropriate for the referred proposed project activity and the referred project context (described in Sections A-E of the draft CDM-PDD and submitted along with annex 4):

>> With more clarification on how emissions due to direct energy savings are calculated, the part of the methodology related to calculating the GHG equivalent of reduced losses may be appropriate. The first equation in (1) above is not appropriate – see discussion in the baseline section of this report.

c) State whether this proposed monitoring methodology is compatible with the proposed baseline methodology described in annex 3 of the draft CDM-PDD:

>> Yes, but there are similar concerns as with the proposed baseline methodology.

(5) Leakage *(please elaborate, if appropriate)***:**

>> Not assessed.

(6) Quality assurance and control procedures *(please explain)***:**

>> Some QA/QC procedures are planned for information collected from meters and bills.

(7) Potential strengths and weaknesses of the proposed monitoring methodology *(please explain)***:**

>> The part of the methodology aiming to quantify GHG emission reductions due to reductions in excess demand is not applicable to the proposed project activity. The remainder of the methodology is not transparent, and difficult to understand.

(8) Applicability of the proposed methodology across project types and regions *(please indicate)***:**

>> Please see above.

(9) Any other comments:

a) State whether any other source of information (i.e. other than documentation on this proposed methodology available on the UNFCCC CDM web site) has been used by you in evaluating this methodology. If so, please provide specific references:

>> None.

b) Indicate any further comments:

>> No further comments

Signature of Meth Panel Chair …… ……..

Date: 23/07/2004 *(Jean-Jacques Becker)*

Signature of Meth Panel Vice-Chair ……..

Date: / / *(José Miguez)*

Information to be completed by the secretariat	
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