CDM: Proposed new methodology expert form (version 04)

(To be used by methodology experts providing desk review for a proposed new methodology)

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Related F-CDM-NM document ID number	NM 0121

Note to those completing this form, as applicable: Please provide recommendations on the proposed new baseline and monitoring methodologies based on an assessment of CDM-NMB and CDM-NMM 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. Evaluation of the proposed new methodologies by desk reviewers:

I. Evaluation of the porposed new baseline methodology:

Title of new baseline methodology:>>Hydropower Projects that Create New Reservoirs or Expand Existing Ones

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

>> Applicable to renewable energy projects

ii. Strengths and weaknesses of the methodology:

>> **Strengths -** The methodology expands ACM 002 making it applicable to hydropower projects that expand existing reservoirs. It expands ACM 002 by incorporating an option for projects where the grid is so small that it is not possible to calculate an operating or build margin.

Weaknesess - The methodology is in some parts unclear and some information (e.g. vintage and definition of gases) is missing. Due to inconsistencies there is a danger that the methodology may result in an inaccurate calculation of emission reductions. Changes are recommended below in section iii.

iii. Any changes needed to improve the methodology:

a. Minor changes:>>

1. **Further clarification of the baseline approach is required -** ACM 002 forms the basis for the proposed methodology. In ACM 002 project developers may use either approach 48a – Existing actual or historic emissions or 48 b – Emissions from a technology that represents an economically attractive course of action, taking into account barriers to investment. The proposed new methodology allows only the use of 48a for hydro reservoir projects. It is not clear why 48 b could not be used for hydro projects with reservoirs. Further clarification is requested.

2. **Further clarification to confirm that the methodology is conservative is required** - If the fuel mix of power plants and efficiency has been improving in the last few years, using data from older constructed plants may not reflect accurately business as usual practice. Therefore the methodology could be improved if an assessment of the improvements in the fuel mix and efficiency of the grid was required. If the fuel mix and efficiency has been improving (i.e. resulting in a decrease in GHG emissions over time)

project developers should refer to emissions from power plants that are under construction or planned. If the fuel mix or efficiency has been declining (i.e. resulting in an increase of GHG emissions) then emissions from existing plants would be valid. Incorporation of a requirement for project developers to review the changes in the grid under review would improve the conservativeness and accuracy of baselines that utilise this approach.

3. **Vintage of the Data needs to be Defined**

The vintage of the data is not clear. Further information is required to clarify how old the national level data should be. Local data will be collected ex post and the data will be current.

4. **Gases and sources are not clearly defined.**

Gases and sources should be listed in section D5 of the new baseline methodology form.

5. **Uncertainties are not fully explored.**

The methodology suggests the use of the default diesel emission value from the small scale diesel generation category baseline. The figure is taken from the small scale diesel generation approved baseline. Justification of the use of the small scale emission factor intended for large scale projects is not provided

b. Major changes:>>

1.The current baseline methodology may result in lax emission calculations because:

a) – Temporal factors and the different application of hydro facilities in a grid at different loads (e.g.base load, mid load and peak load) are not fully accounted for in the methodology. This is important because run of river hydroelectric plants are often used as base load plants. Storage hydroelectric plants (i.e. with dams) are more commonly used as peak load plants or base load following plants. Even in developing countries where reservoir hydroelectric plants contribute to base load energy supply, this contribution is highly dependent on water supply and local climate and varies throughout a year. For example, in a country X there is a wet and dry season. During the wet season (e.g. 8 months) electricity demand is low (e.g. less cooling) and only hydro power plants are operated to respond to demand. During the dry and hot season (4 months) electricity demand is larger and water supply is smaller. Thus fossil fuel fired power plants are used as base load and hydro plants will operate at 25% of their capacity. Thus not all hydroelectric plants will displace off- grid diesel generators and even in countries where this occurs, some consideration of temporal factors should be acknowledged in the methodology.

b) - Additionally in many developing countries the electrical grids can not provide a consistent uninterrupted supply of electricity, due to over-demand. As a result it is common in developing countries for households and companies to have a back up diesel generator to provide on site electricity in the event of shortages in the supply from the grid that result in power cuts and these back up generators are used regularly, in some instances e.g. Sri Lanka on a daily basis.

It is therefore suggested that the diesel emission factor is only used when project developers: a). provide evidence that the proposed project will be supplying base load electricity; b) provide evidence that there are no expansion plans for new alternative electricity generating facilities in the proposed grid; c) Evaluate the contribution of the proposed hydro plant to the baseload accounting for changes within a year due to climate influences on water resources and power cuts.

2. **ACM 002 is not applicable to projects that expand existing hydro facilities**.

The rational for this is not clear. The proposed baseline methodology however utilises ACM 002 for hydro expansion projects. Clarification regarding why ACM 002 is not applicable to hydro reservoir expansions would ensure consistency between methods and may have an impact on the validity of the proposed new baseline methodology.

II. Evaluation of the proposed new monitoring methodology:

Title of new monitoring methodology: >> **Hydropower Projects that Create New Reservoirs or Expand Existing Ones**

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

>> The monitoring methodology is applicable to hydro reservoir projects in all regions. It can only be used by project developers that can collect air samples from reservoirs and where energy planning information is publicly available.

ii. Strengths and weaknesses of the methodology:

>> **Strengths** - Expands existing methodology

Weaknesses - Plan is not easy to follow due to lack of data (see comments below for details). This data needs to be provided before a full review of the monitoring methodology can be fully reviewed.

iii. Any changes needed to improve the methodology:

a. Minor changes:>>

1. **Leakage:**

The methodology could include a reference to ACM 002 in the section on leakage for consistency.

2. **Completion of monitoring data in Section B.4.1**

In section B.4.1 of the monitoring plan no data is included. However the method does require that methane is measured from reservoirs. Therefore the table in B.4.1 could be completed.

b. Major changes:>>

1. Missing data

Additional monitoring data is required to monitor projects that displace off grid diesel generators such as:

a) the amount of renewable power that is being used to offset grid electricity

b) the quantity of diesel generators that are displaced by the proposed project

B. Details of the evaluation of the proposed new methodology by the desk reviewer:

I. Proposed new baseline methodology *(specify title here):* >> Hydropower Projects that Create New Reservoirs or Expand Existing Ones

(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 expands the application of ACM 0002 to hydro electric plants that create new reservoirs or expand existing ones. ACM 0002 was only applicable to new reservoirs and not for hydro electric plants that expand existing facilities. The methodology also incorporates a diesel emission factor on

the grounds that in developing countries hydro facilities can replace off-grid diesel generation as well as grid connected electricity generation facilities. The diesel-generation default emission factor is defined according to the method described in the small scale diesel category baseline method as 0.8 TCO2/MWh. In the event that a project impacts both grid and off grid energy supply, the project developer shall use the default diesel emission factor of 0.8 TCO2/MWh to calculate emissions from electricity supplied that exceeds the maximum production potential in the baseline year of the grid. The method includes an ex post correction of emission calculations to account for emissions of methane from the hydro electric facility reservoir. Ex post measurements are used since it is currently not possible to make accurate predictions of these emissions ex ante. The monitoring methodology defines the approach for determining the emissions from the reservoir.

b) State the approach selected:

>> 48a - Existing actual or historic emissions

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:

>>ACM 002 forms the basis for the proposed methodology. In ACM 002 project developers may use either the approach 48a – Existing actual or historic emissions or 48 b – Emissions from a technology that represents an economically attractive course of action, taking into account barriers to investment. The proposed new methodology allows only the use of 48a for hydro projects. It is not clear why 48 b could not be used for hydro projects with reservoirs and thus further clarification is requested.

(2) Basis for determining the baseline scenario:

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

>> The documentation explains how the baseline scenario is to be chosen and identified.

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

>> The basic underlying rationale for algorithms/formulae is averages

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 documentation utilises the Tool for Additionality defined in ACM 002.

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

>> Regarding the basis for determining the baseline scenario the methodology could be improved:

If the fuel mix of power plants and efficiency has been improving in the last few years, using data from older constructed plants may not be an accurate reflection of business as usual practice. Therefore the methodology could be improved if an assessment of the improvements in the fuel mix and efficiency of the grid was required. If the fuel mix and efficiency has been improving (i.e. resulting in a decrease in GHG emissions over time) to refer to emissions from power plants that are under construction or planned. If the fuel mix or efficiency has been declining (i.e. resulting in an increase of GHG emissions) then emissions from existing plants would be valid. Incorporation of a requirement for project developers to review the changes in the grid under review would improve the conservativeness and accuracy of baselines that utilise this approach.

Regarding the basis for determining additionality the method is appropriate and adequate.

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

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

>> Further clarification is required. See comments in section A1 above.

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 CDM-NMB):

>> If the methodology is revised the methodology is appropriate for the referred proposed project. See section A.1. for details of revision recommendations.

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.

>> With some minor and major amendments the proposed methodology *could* result in an accurate baseline scenario.

Please explain:

>> See comments in section A.1.above.

(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):

>>The methodology includes algorithms and generic formulae that can be applied to other potential project activities.

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

>>National level data is used to determine the carbon emission factor for the grid. Local data will be used to calculate emissions from the proposed CDM project and for the calculation of the ex post emissions from the reservoir site.

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:

>>The vintage of the data is not clear. Further information is required to clarify how old the national level data needs to be included. Local data will be collected ex post and the data will be current.

(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

>> Gases and sources are not clearly defined. Additional information that defines what gases are accounted for in the methodology needs to be incorporated into section D5 of the New baseline methodology sheet.

ii) Physical delineation

>> The project boundary includes the project site and all the power plants connected physically to the electricity grid that the CDM hydro facility is connected to. The project electricity system (i.e. regional grid) is defined by the spatial extent of the power plants that can be dispatched without significant transmission constraints. Similarly a connected electricity system (national or international grid) is defined as a system that is connected by transmission lines to the proposed project electricity system and in which power plants can be dispatched without significant transmission constraints.

b) Indicate whether this project boundary is appropriate:

>> Yes the project boundary is 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:

>> It is assumed that:

- Hydro plants are operated consistently throughout a year
- The total electricity generated by the project can be accurately measured and recorded.
- Project developers can get access to accurate data to calculate the combined margin/carbon emissions factor.
- Frequent sampling over different parts of a reservoir can provide a realistic and accurate measurement of GHGs from the reservoir.

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

>> The key assumptions are arrived at in a transparent manner.

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

>> Hydro plants are not operated consistently throughout a year, since their capacity is affected by the availability of water resources which in turn is affected by climate. See recommendations for changes in section A. 1 for further details.

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

>> Official data is used to determine the build/operate margin and the diesel emission factor.

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

>> Provided a reasonable vintage for the data is defined (e.g. 3 to 5 years old) the data used could be considered adequate, consistent, accurate and reliable.

f) State possible data gaps:

>> See section A. 1 above.

(7) Assessment of uncertainties:

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

i) The basis for determining the baseline scenario:

>> The key uncertainty is the variation in reservoir emissions and the amount of off grid diesel generation capacity that is replaced by the proposed project..

Uncertainty regarding the availability of water resources is not addressed.

ii) Algorithms/formulae:

>> The methodology does not explicitly address uncertainties related to algorithms and formulae used. Given that the methodology is based on ACM 002, it is not expected that uncertainties be repeated, however there are additional algorithms and formulae that are not applied in ACM 002 for hydro reservoirs that displace off grid diesel generators.

iii) Key assumptions:

>>It is assumed that the hydro facilities will run constantly, however, water resources usually vary over a year and the uncertainties are not fully accounted for.

iv) Data:

>> The methodology suggests the use of the default diesel emission value from the small scale diesel generation category baseline. The figure is taken from the small scale diesel generation approved baseline. Uncertainties regarding the use of this emission factor for a larger scale projects, is not fully addressed.

b) State whether the uncertainties presented are reasonable:

>> Uncertainties regarding methane emissions from reservoirs are reasonable. Assumptions regarding off grid diesel replacement need to be addressed. See comments in A.1 for more details.

(8) Leakage:

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

>> Leakage is addressed according to the approved approach defined in ACM 002

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

>> The treatment of leakage is appropriate and adequate.

(9) Transparency and "conservativeness":

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

>> The baseline methodology has been developed in a transparent way.

b) State whether the baseline methodology is conservative:

>> The current baseline methodology may result in lax emission calculations because of:

First - Run of river hydroelectric plants are often used as base load plants. Storage hydroelectric plants (i.e. with dams) are more commonly used as peak load plants or base load following plants. However, there are cases In developing countries where reservoir hydroelectric plants may contribute to base load energy supply. In this case, the amount that a hydro reservoir contributes to the base load is highly dependent on water supply and local climate. For example, in a country X there is a wet and dry season. During the wet season (e.g. 8 months) electricity demand is low (e.g. less cooling) and only hydro power plants are operated to respond to demand. During the dry and hot season (4 months) electricity demand is larger and water supply is smaller. Thus at these times fossil fuel fired power plants are used as base load and hydro plants will operate at approximately 25% of their capacity. Thus it is rare that a hydroelectric plant will displace a constant number of off- grid diesel generators for an entire year. This should be acknowledged in the methodology.

Second - In many developing countries the electrical grids can not provide a consistent uninterrupted supply of electricity, due to over-demand. As a result it is common in developing countries for households and companies to have a back up diesel generator to provide on site electricity in the event of power cuts in the supply from the grid.

It is suggested therefore, that the diesel emission factor is only used when project developers:

1. provide evidence that the proposed project will be supplying base load electricity;

2. provide evidence that there are no expansion plans for new alternative electricity generating facilities in the proposed grid;

3. Evaluation the contribution of the proposed hydro plant to the baseload accounting for changes within a year due to climate influences on water resources.

If the fuel mix of power plants and efficiency has been improving in the last few years, using data from older constructed plants may not accurately reflect business as usual practice. Therefore the methodology could be improved if an assessment of improvements in the fuel mix and efficiency of the grid was required. If the fuel mix and efficiency has been improving (i.e. resulting in a decrease in GHG emissions over time) a reference to emissions from power plants that are under construction or planned is appropriate. If the fuel mix or efficiency has been declining (i.e. resulting in an increase of GHG emissions) then the reference to emissions from existing plants would be valid. Incorporation of a requirement for project developers to review the changes in the grid under review would improve the conservativeness and accuracy of baselines that utilise this approach.

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

>> **Strengths -** The methodology expands ACM 002 making it applicable to hydropower projects that expand existing reservoirs. It aims to make the methodology more applicable to real life developing country situations by acknowledging that in some countries national grids are so small that it is not possible to calculate an operating or build margin.

Weaknesess - The methodology is in some parts unclear and some information (e.g. vintage and definition of gases) is missing. Due to some of these inconsistencies there is a danger that the methodology may result in an inaccurate calculation of emission reductions. Changes are recommended in section 1 iii above.

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

>> National circumstance and sectoral policies are taken into account in the process of proving the projects additionality.

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

>> The project is applicable to hydroelectric facilities across all regions (i.e. local, regional and international) provided the amendments outlined in A.1. are taken into account. In particular, the method must be flexible enough to accommodate different climate factors that will affect water resources and thus the use of the proposed hydro facility as either base load, base following or peak load plant.

(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:

>> No other information has been used.

b) Indicate any further comments:

>> ACM 002 is not applicable to projects that expand existing hydro facilities. The rational for this is not clear. The proposed baseline methodology however utilises ACM 002 for hydro expansion projects. Clarification regarding why ACM 002 is not applicable to expansions would clarify the eligibility of this methodology and ensure consistency between methods.

II. Proposed new monitoring methodology *(specify title here):* >>Hydro projects that create new reservoirs or expand existing ones.

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

(1) Brief description of new methodology:

Describe new methodology:

>> The methodology utilises and includes an addition to ACM 002. The new methodology differs to ACM 002 since it:

a) Broadens its application to include hydro reservoir expansion projects.;

b) Allows the use of a diesel emission factor to calculate emissions reductions (the emission factor is taken from the approved small scale diesel generator baseline methodology). The diesel emission factor is only to be used where the national grid is too small for the combined-margin approach to be appropriate and the proposed project replaces off grid diesel generators.

c) Incorporates monitoring of methane and co2 from reservoirs through air sampling at representative points in the reservoir.

(2) Key assumptions/parameters:

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

>>It is assumed that monitoring methodology in ACM 0002 can be applied to hydro facilities with reservoirs (newly built and expansions) with some minor changes for the monitoring of project activity.

It is assumed that no monitoring is required for the displacement of off-grid diesel generators.

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

>> The assumptions are not all derived in a transparent manner.

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

>> Additional monitoring data is required to monitor projects that displace off grid diesel generators such as:

a) the amount of renewable power that is being used to offset grid electricity

b) the quantity of diesel generators that are displaced by the proposed project

(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 obtained from expert opinion of the dam operator

- Sq. meters of reservoir surface area fitting
- Different categories to measure in flux testing

Data to be measured

- Emissions of CH4
- Concentration of CH4 at water in take.
- Concentration of CH4 in water downstream of dam.
- Total volume of water moving through dam.
- electricity produced at hydro plant

Public sources of information including IPCC data.

- Carbon emissions factor for the grid
- Carbon emission factor for the operating and build margin.
- Total emissions from the grid
- Total electricity to the grid
- Amount of fossil fuel used in the grid
- GHG co-efficient of each fuel
- Electricity generation of the plant
- list of plans for operating margin and list of plans in build margin
- total electricity generation of imported power
- carbon co-efficient of imported electricity
- Weight factor of operating margin
- Evidence of barriers to proposed project
- Evidence of alternatives to proposed projects

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

>> The data used should be expanded to include monitoring data for off grid diesel generators if displaced by the proposed project.

c) *State possible data gaps:*

>> See comment in 3b above.

(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:

>> The monitoring methodology has been described in an adequate manner and could be improved by accounting for the minor changes listed at the start of this form.

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 CDM-NMM):

>> The proposed methodology is appropriate for the proposed project activity.

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

>> The monitoring methodology is compatible with the proposed baseline.

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

>> The proposed methodology incorporates analysis of leakage from reservoirs. Due to uncertainty and lack of data for the sampling of methane from reservoirs it is recommended that ex post measurements of emissions from reservoirs are used.

A reference to ACM 002 would be useful in this section of the methodology since ACM 0002 monitoring procedures are to be followed.

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

>> The methodology expands the procedures included in ACM 0002 by requiring frequent samples of emissions from the reservoir and the proposed project site. The data required for this monitoring should be completed in B.4.1. Currently the table is not completed.

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

>> **Strengths** - Expands existing methodology

Weaknesses - Plan is not easy to follow due to lack of data. This data needs to be provided before a full review of the monitoring methodology can be fully reviewed.

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

>>The proposed methodology is applicable to hydro reservoir projects in all regions.

(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:

>> No other information or documentation has been used in evaluating this methodology.

b) Indicate any further comments:

>> It would be good to review the book referred to in the methodology - " *Greenhouse Gas Emissions . Fluxes and Processes:Hydroelectric Reservoirs and Natural Environments* (Alain Tremblay, et. al, Springer Press, 2005)

Signature of desk reviewer  …….....… Date: 19 /07/05

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