

 <p style="text-align: center;">CDM: Proposed new methodology expert form (version 03) (To be used by methodology experts providing desk review for a proposed new methodology)</p>	
Name of expert responsible for completing and submitting this form	YASH PAL ABBI
Related F-CDM-NM document ID number	NM0073
<p><i>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.</i></p>	
A. Evaluation of the proposed new methodologies by desk reviewers:	
I. Evaluation of the proposed new baseline methodology:	
<p>Title of new baseline methodology:>>Fuel switching from naphtha to natural gas in power plant project without extension of capacity and lifetime of the facility.</p>	
<p>i. Conditions under which this methodology is applicable to other potential projects (e.g. project type, region, data availability):</p> <p>>>The baseline methodology (with the changes suggested in section B.I.3 a)) is applicable for any power plant taking up switch over of the fuel from naphtha to natural gas.</p> <p>ii. Strengths and weaknesses of the methodology:</p> <p>>>The potential strength of the baseline methodology (with the changes suggested) is that it is based on actual recorded data and there are no uncertainties. There is no weakness envisaged.</p> <p>iii. Any changes needed to improve the methodology:</p> <p>a. Minor changes:>>The changes suggested should be incorporated in the Project Design Document, and the Baseline Methodology.</p> <p>b. Major changes: >>Nil</p>	
II. Evaluation of the proposed new monitoring methodology:	
<p>Title of new monitoring methodology: >>Fuel switching from naphtha to natural gas in power plant project without extension of capacity and lifetime of the project.</p>	
<p>i. Conditions under which this methodology is applicable to other potential projects (e.g. project type, region, data availability):</p> <p>>>The monitoring methodology (with the changes suggested in section B.II.2 c)) is applicable for any power plant taking up switch over of the fuel from naphtha to natural gas.</p> <p>ii. Strengths and weaknesses of the methodology:</p> <p>>>The potential strength is that it is based on the data from actual records of the operation of the power plant. No weakness is seen.</p> <p>iii. Any changes needed to improve the methodology:</p> <p>a. Minor changes:>>The changes suggested should be incorporated in the Project Design Document, and the Monitoring Methodology.</p> <p>b. Major changes: >>Nil</p>	
B. Details of the evaluation of the proposed new methodology by the desk reviewer:	

I. Proposed new baseline methodology (specify title here): >>Fuel switching from naphtha to natural gas in power plant project without extension of capacity and lifetime of the facility.

(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 baseline emissions for the project are due to combustion of naphtha (fuel) in the gas turbines before the switch over to natural gas as fuel. After the switch over to natural gas, the GHG emissions are reduced. Thus the reduction in GHG emissions are accounted as the credits. The emission factors for the two fuels are taken as the IPCC default values which are based on the Gross Calorific Values of the fuels.

b) State the approach selected:

>>Existing and 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:

>>The approach selected is the most appropriate as it is based on actual data which is normally recorded during the operation of the power plant. It is quantifiable data,and baseline GHG emissions for the historical years (before switch over) and the GHG emissions after the switch over to new fuel (during the crediting period) can be calculated accurately.

(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 (PDD & proposed new methodology) explains very well the baseline scenario. However, few changes need to be made as detailed out in section 3 a) below. The changes need to be made in view of the fact that the project may be operating historically with two fuels (with naphtha mainly and with smaller quantities of natural gas as it is the case for Essar Power Limited, Hazira --the project selected for this PDD). The GHG reduction credits can be earned only for substituting the naphtha fuel with less GHG intensive fuel like natural gas. This has not been explained in the PDD or the baseline methodology.

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

>>The baseline emissions should be averaged for three historical years, or actual operation time of the project if it has operated for lesser time period before the fuel switch over. A minimum historical operation of one year with naphtha should be the condition for switch over. This aspect has not been explained in the PDD or the baseline methodology.

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 (PDD Section B.2) has explained systematically the additionality of the project based on " Draft consolidated tools for demonstration of of additionality", approved subsequently in the 16th meeting of the Executive Board. It explains clearly that the project activity's internal management approvals had considered CDM benefits, and has demonstrated that switch over is not mandated under current laws and regulations, and further it is within the laws and regulations of the country. The barriers with respect to additional investment required, inadequate infrastructure for transportation of natural gas within the State, and not a prevalent practice (as many natural gas operated plants are facing shortage of gas supply), are justified. The impact of getting this methodology approved will have positive impact and will encourage other power plants operating on naphtha as primary fuel to switch over to less GHG intensive natural gas.

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

>>In view of the explanation given at points a), b), and c) above, the baseline (with the changes suggested) and assessment of additionality is 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:

>>As given in Section A.4.3 of the Project Design Document, the power plant has, prior to switch over of primary fossil fuel, been using natural gas to some extent, in a mixed fired operation with naphtha, which has been the primary fuel. This may also be the case for other power plants who select this methodology (once it is approved by the Executive Board). Thus

i) For baseline, the electric power generated from naphtha only should be used. It is explained further as follows:

Let X = kWh generated from naphtha/year

Y = kWh generated from natural gas/year

Thus, $X + Y = \text{EGn, Total kWh generated/year}$ (Equation A)

If $Q_n =$ Naphtha consumption, kg/ year
 $Q_{ng} =$ Natural gas consumption, SCM/ year
 $HR_{av} =$ Average heat rate of the plant kCal/ kWh
 (1,777 kCal/kWh in case of this plant)
 $GCV_g =$ Gross calorific value of natural gas, kCal/SCM
 $GCV_n =$ Gross calorific value of naphtha, kCal/kg

Then, $Y * HR_{av} = Q_{ng} * GCV_g$ (Equation B)

From equations A & B, X and Y can be determined for a particular historical year.

ii) X should be averaged out for three preceding (historical) years for the baseline. It should be averaged for actual operation time, if the project has operated (before switch over) for lesser time period. However, it must be at least one year operation with naphtha predominantly.

iii) Carbon Emission Reduction (CER) credits during the crediting period should be calculated for the upper limit of X, kWh/year, after the fuel switch from naphtha to natural gas has occurred.

iv) Since, the project has still not guaranteed supply (as stated in the PDD) of natural gas for future years (after the switch over), there is a possibility of use of naphtha partly during any year. Thus for each year (y), Y_y should be calculated similar to the procedure given in para (i) above.

v) Then, the ratio R_i should be calculated as follows :

$$R_i = Y_y / X$$

If R_i is more than 1, it should be treated as 1, and if it is less than 1, the actual value should be considered.

vi) The annual project emission PE (NG)_y (tonne of CO₂ equivalent during a year y) due to natural gas will be calculated by the following formula :

$$PE(NG)_y = R_i * (Q_g * GCV_g * EF_g - IPCC) * (4.18/1000)$$
 (Equation C)

(It can be seen that, the equation (1) suggested in the methodology proposed in the PDD gets multiplied by factor R_i)

vii) The baseline emission for Y_y (kWh) of power generation during a year y due to naphtha would be calculated as follows :

Heat used for power generation = $Y_y * HR_{av}$, kCal/year

Equivalent amount of naphtha required, $Q_{ny} = (Y_y * HR_{av}) / GCV_n$, kg/year

Thus, baseline emissions, $PE(n)y = R_i * (Q_{ny} * EF_n - IPCC) * (4.18/1000)$,
tonnes/year (Equation D)

viii) The net GHG emission reduction ER_y in the year y (tonnes of CO₂ equivalent) is difference of equations D & C.

$ER_y = PE(n)y - PE(ng)y$, tonnes/year (Equation E)

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):

>>Would be appropriate for the the referred proposed project activity, or a similar project activity, with the changes suggested in 3 a) above.

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.

>>Yes, it represents reasonably the anthropogenic emissions by source of GHG that would occur in the absence of the proposed project activity.

Please explain:

>>The baseline scenario is the GHG emissions from combustion of naphtha in the power plant. This is quantifiable and verifiable from the records normally kept in the operation of the power plant.

(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 algorithms and formulae, with the changes suggested, can be applied to other potential project activities of fuel switch from naphtha to natural gas.

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

>>The baseline is to be determined as average of the actual emissions during the last three years (before switch over of the fuel). This is appropriate.

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 baseline, with the changes suggested, is determined from the electric power produced with naphtha as fuel before the switch over to natural gas. This will remain constant (the upper limit is never exceeded) during the crediting period as suggested in section 3 a) above.

(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

>>The gaseous emissions are defined from the project (the power plant) before and after the switch over of the fuel.

ii) Physical delineation

>>The project boundary is the power plant itself, and the upstream activities for the supply of fuel (naphtha or natural gas).

b) Indicate whether this project boundary is appropriate:

>>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:

>>There are no assumptions for the calculation of GHG emissions; these are based on actual records available from the operation of the power plant. There is only one assumption for the upstream activities that the GHG emissions from the energy used for the transport of natural gas through pipeline and the transport of naphtha through tankers is the same. In fact, for naphtha it is more. Thus assuming it to be the same, is conservative.

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

>>The assumption is transparent and conservative.

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

>>As explained in a) above, the assumption is adequate.

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

>>The data source is the computerised records of data normally kept through Data Acquisition System for the operation of the power plant.

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

>>Yes, the data used is adequate, consistent, accurate, and reliable.

f) State possible data gaps:

>>Nil

(7) Assessment of uncertainties:

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

i) The basis for determining the baseline scenario:

>>The methodology (with the changes suggested) will not have any uncertainties.

ii) Algorithms/formulae:

>>The formulae are accurate and there are no uncertainties.

iii) Key assumptions:

>>There are no key/critical assumptions. It is assumed that during the crediting period there is no likely change in local government regulations for compulsory use of any fuel (naphtha or natural gas) for the power plant. It is expected to be true, as choice of the fuel is always left to the power plant operator who chooses the fuel depending upon availability and technoeconomics.

iv) Data:

<p>>>No uncertainties in the data used.</p> <p>b) State whether the uncertainties presented are reasonable:</p> <p>>>The uncertainties are reasonable.</p>
<p>(8) Leakage:</p> <p>a) State how the baseline methodology addresses any potential leakage due to the project activity:</p> <p>>>There are no leakages from this project activity.</p> <p>b) Indicate whether the treatment for leakage is appropriate and adequate:</p> <p>>>Treatment of leakage is appropriate.</p>
<p>(9) Transparency and “conservativeness”:</p> <p>a) Indicate whether the baseline methodology was developed in a transparent way:</p> <p>>>The data to be used for the baseline are actual data and are transparent.</p> <p>b) State whether the baseline methodology is conservative:</p> <p>>>It is conservative especially for the upstream activity for transport of fuel that emissions from the transport activities for the two fuels are the same. Secondly, the baseline emissions have been made conservative (through the changes suggested) that credits should be given for the power produced by natural gas for a value equal to power produced in the baseline case with naphtha fuel only.</p>
<p>(10) Potential strengths and weaknesses of the proposed baseline methodology (please explain):</p> <p>>>The potential strength of the baseline methodology (with the changes suggested) is that it is based on actual recorded data and there are no uncertainties. There is no weakness envisaged.</p>
<p>(11) Other considerations, such as a description of how national and/or sectoral policies and circumstances have been taken into account (please explain):</p> <p>>>National/Sectoral policies, in a developing country, put no restrictions on the use of fuel (naphtha or natural gas). It is purely based on availability and technoeconomics.</p>
<p>(12) Applicability of the proposed methodology across project types and regions (please indicate):</p> <p>>>This methodology (with the changes suggested) is applicable for all projects for switch over of the fuel for power generation from naphtha to natural gas.</p>
<p>(13) Any other comments:</p> <p>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:</p> <p>>>IPCC default factors for GHG emissions from the two fuels (naphtha and natural gas) based on Gross Calorific Value of the fuel, have been used. This is appropriate.</p> <p>b) Indicate any further comments:</p> <p>>>The baseline methodology, as proposed, should be revised suitably to incorporate the changes suggested in section B.I.3 a).</p>
<p>II. Proposed new monitoring methodology (specify title here): >>Fuel switching from naphtha to natural gas in power plant project without extension of capacity and lifetime of the project.</p>
<p><i>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:</i></p>
<p>(1) Brief description of new methodology:</p> <p>Describe new methodology:</p>

>>An electricity generating plant using Gas Turbines (as is the case for the proposed project activity) can use a number of alternate fuels such as naphtha, LDO, natural gas, etc. In this project activity, a switch over of the fuel is made from naphtha to natural gas (which is less GHG intensive). The electricity generation and the fuel consumption can be monitored and verified from the records of the operation of the power plant. For the baseline, three years vintage data (before the fuel switch) is considered. If the power plant is less than three year old, the actual period of operation of the power plant is considered for calculating the average baseline emission. After the fuel switch over (during the crediting period), the natural gas consumption and the electricity generation is monitored from the records of the the operation of the power plant.

(2) Key assumptions/parameters:

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

>>There is no assumption in the monitoring methodology, as it is based on actual records of the the operation of the power plant.

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

>>The data records are transparent.

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

>>The parameters proposed to be monitored (Table B.2.1 and B.2.3 of the proposed methodology) are adequate. However, the formulae to be used (section B.2.2 of the methodology) need to be modified as explained in section B.I.3 a) of this evaluation/desk review.

(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):*

>>The data source used is the records of the the operation of the power plant. This can be monitored and verified accurately.

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

>>The data used are adequate, accurate, and reliable.

c) *State possible data gaps:*

>> Nil

(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:*

>>Yes, the methodology has been described in an adequate manner.

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):*

>>Changes suggested in section B.II.2 c) above should be incorporated in the formulae to be used for calculation of certified emission reductions.

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

>>It is compatible (with the changes suggested)

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

>>There is no leakage envisaged from the project activity.

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

<p>>>The power plant data is monitored through standardised instruments which are calibrated from time to time as per ISO:9001:2000 or any other QA/QC system adopted by the power plant. The verifier may ascertain whether quality standards followed by the plant are as per some established norms.</p>	
<p>(7) Potential strengths and weaknesses of the proposed monitoring methodology <i>(please explain):</i></p> <p>>>The potential strength is that it is based on the data from actual records of the operation of the power plant. No weakness is seen.</p>	
<p>(8) Applicability of the proposed methodology across project types and regions <i>(please indicate):</i></p> <p>>>The methodology is applicable for similar projects of fuel switch over from naphtha to natural gas in a power plant.</p>	
<p>(9) Any other comments:</p> <p><i>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:</i></p> <p>>>IPCC default factors for GHG emissions from the two fuels (naphtha and natural gas) based on Gross Calorific Value of the fuel, have been used. This is appropriate.</p> <p><i>b) Indicate any further comments:</i></p> <p>>>The monitoring methodology should be revised based on changes suggested in B.II.2 c).</p>	
<p>Signature of desk reviewer</p> <p>Date: / /</p>	
<p>Information to be completed by the secretariat</p>	
F-CDM-NMex doc id number	
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