CLEAN DEVELOPMENT MECHANISM
PROPOSED NEW METHODOLOGY: MONITORING (CDM-NMM)
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CONTENTS

SECTION A. Identification of methodology

A.1. Title of the proposed methodology:

>> Fuel switching from naphtha to natural gas in power plant project without extension of capacity and lifetime of the facility.

A.2. List of category(ies) of project activity to which the methodology may apply:

>> The project activity is considered under Sectoral Scope 1 (Energy industries (renewable - / non-renewable sources) as per CDM-ACCR-06.

A.3. Conditions under which the methodology is applicable to CDM project activities:

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- The project activity does not increase the capacity of final outputs and lifetime of the existing facility during the crediting period (i.e. this methodology is applicable up to the end of the lifetime of existing facility if shorter than crediting period);
- Data required for the methodology can be monitored using available on-site project monitoring facilities; and
- The facility would not have major efficiency improvements during the crediting period or any integrated process changes except whatever is required for the fuel switch.

A.4. What are the potential strengths and weaknesses of this proposed new methodology?

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Potential Strengths

1. Data Level- all project data will be from actual verifiable site project records, that is easy to obtain, cost effective to use and reliable.
2. Transparency – due to the nature of data source, the emission reduction calculation is transparent.
3. Replicability – due to simple nature of the emission reduction processes involved, the replicability of the methodology to various situations in a country or region is high.

Potential Weakness

1. Project non-viability – the methodology does not consider the economic costs to assess continued viability of the project activity if the cost of natural gas rises to prohibitive levels in the future.

SECTION B. Proposed new monitoring methodology

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B.1. Brief description of the new methodology:

>> For generation of electricity, several types of fuels with varying degrees of GHG intensity could be used. In this methodology, a power plant has been considered where the project proponent has chosen to replace a higher GHG intensive fuel (naphtha) with a lower GHG intensive fuel (natural gas). The methodology monitors parameters that will be required to calculate the annual emission reductions. The parameters to the monitored are the following:

Baseline parameters:
Historical consumption and gross calorific values for naphtha usage at the power plant (data will be of 3 years vintage, unless existing power plant is of a lesser vintage).

Project parameters:
Actal annual consumption and gross calorific values for natural gas (and naphtha, if applicable) usage at the power plant.

B.2. Option 1: Monitoring of the emissions in the project scenario and the baseline scenario:

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B.2.1. Data to be collected or used in order to monitor emissions from the project activity, and how this data will be archived:

ID number *(Please use numbers to ease cross-referencing to table B.7)*	Data variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
Qg	Actual Annual consumption of natural gas	Power plant records	SCM	m	Annual	Annual	electronic/ paper	--
GCVg	Gross Calorific Value of natural gas	Power plant records	Kcals/ SCM	e	Annual	Annual	electronic/ paper	--

B.2.1. Data to be collected or used in order to monitor emissions from the project activity, and how this data will be archived:								
ID number *(Please use numbers to ease cross-referencing to table B.7)*	Data variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
PLFp	Plant Load Factor	Power plant records	%	e	Annual	Annual	electronic/ paper	--
EFg_IPCC	Default emission factor for natural gas	IPCC	Ktonnes CO_2 /Tj	e	One-time published results	One-time published results	electronic	--
Qng	Actual annual consumption of naphtha	Power plant records	Tonnes	m	Annual	Annual	electronic/ paper	--
GCVnp	Gross Calorific Value of naphtha	Power plant records	Kcals/Kg	e	Annual	Annual	electronic/ paper	--
EFn_IPCC	Default emission factor for naphtha	IPCC	Ktonnes CO_2 /Tj	e	One-time published results	One-time published results	electronic	--

B.2.2. Description of formulae used to estimate project emissions (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.):

>> The annual project emissions *PE(ng)y* (tonne of CO_2 equivalents during a year *y*) due to use of natural gas is calculated based on the following formulae:

PE(ng)y = (Qg * GCVg * EFg_IPCC) * (4.18 / 1000)…….(1)

where, the factors used are analogous to those used for baseline emission calculations:

Qg, = Actual annual consumption of natural gas (e.g., SCM)
GCVg = Gross Calorific Value of natural gas during project scenario (e.g., Kcals/SCM)
PLFp = Plant Load Factor (actual annual data in %)
EFg_IPCC = IPCC default emission factor for natural gas (e.g., Ktonnes CO_2 /Tj)

If in any project, a partial substitution occurs for initial few years of switched-over operation (i.e., both naphtha and natural gas are used), then the total project emissions will also include emissions due to use of naphtha. In that case, the project emission contribution from naphtha can be calculated as:

PE(n)y = (Qy * GCVn * EFn_IPCC) * (4.18 / 1000)…….(2)

where:

Qy, = Actual annual consumption of naphtha (e.g., Tonnes/hour).
GCVnb = Gross Calorific Value of naphtha during project (e.g., Kcals/Kg)

B.2.3. Relevant data necessary for determining the baseline of anthropogenic emissions by sources of greenhouse gases (GHG) within the project boundary and how such data will be collected and archived:

ID number *(Please use numbers to ease cross-referencing to table B.7)*	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e),	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
Qn	Historical annual consumption of naphtha	Power plant records	Tonnes	m	Annual	Past 3 years, unless the power plant is of lesser vintage	electronic/ paper	--

B.2.3. Relevant data necessary for determining the baseline of anthropogenic emissions by sources of greenhouse gases (GHG) within the project boundary and how such data will be collected and archived:

ID number *(Please use numbers to ease cross-referencing to table B.7)*	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e),	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
GCVnb	Gross Calorific Value of naphtha	Power plant records	Kcals/Kg	e	Annual	Past 3 years, unless the power plant is of lesser vintage	electronic/ paper	--
PLFb	Plant Load Factor	Power plant records	%	e	Annual	Past 3 years, unless the power plant is of lesser vintage	electronic/ paper	--
EFn_IPCC	Default emission factor for naphtha	IPCC	Ktonnes CO_2 /Tj	e	One-time published results	One-time published results	electronic	--

B.2.4. Description of formulae used to estimate baseline emissions (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.):

>> The baseline scenario for the project, which is eligible to use this methodology, is that the current fuel (naphtha) is continued to be used in the existing facility at least up to the end of the crediting period. The annual baseline emissions *BEy* (tonne of CO_2 equivalents during a year *y*) is expressed as:

$$BEy = (Qn * GCVnb * EFn\_IPCC) * (4.18 / 1000) \quad \text{.....(3)}$$

where:

Qn, = Historical annual consumption of naphtha (e.g., Tonnes)
GCVnb = Gross Calorific Value of naphtha in the baseline scenario (e.g., Kcals/Kg)
PLFb = Plant Load Factor in the baseline scenario (past data in %)
EFn_IPCC = IPCC default emission factor for naphtha (e.g., Ktonnes CO_2 /Tj)

B.3. Option 2: Direct monitoring of emission reductions from the project activity:

>> Not opted for.

B.3.1. Data to be collected or used in order to monitor emissions from the project activity, and how this data will be archived:

ID number *(Please use numbers to ease cross-referencing to table B.7)*	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e),	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment

B.3.2. Description of formulae used to calculate project emissions (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.):

>> Not applicable.

B.4. Treatment of leakage in the monitoring plan:

>> Assumed to be zero as described in the baseline methodology.

B.4.1. If applicable, please describe the data and information that will be collected in order to monitor leakage effects of the project activity:								
ID number *(Please use numbers to ease cross-referencing to table B.7)*	Data variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment

B.4.2. Description of formulae used to estimate leakage (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.):

>> Not applicable.

B.5. Description of formulae used to estimate emission reductions for the project activity (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.):

>> The annual emission reductions will calculated using equations (1), (2) and (3), as applicable:

$$ERy = BEy - PE(ng)_y - PE(n)y \quad \text{.....(4)}$$

B.6. Assumptions used in elaborating the new methodology:

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- During the project activity, natural gas would be transported through pipeline, and fugitive emissions will be negligible as compared to the baseline/ project emissions; and

- IPCC default emission factor for naphtha and natural gas is applicable to a country situation where the project would occur.

B.7. Please indicate whether quality control (QC) and quality assurance (QA) procedures are being undertaken for the items monitored:		
Data *(Indicate table and ID number e.g. 3.-1.; 3.2.)*	Uncertainty level of data (High/Medium/Low)	Explain QA/QC procedures planned for these data, or why such procedures are not necessary.
Qg	Low	Monitoring should be covered under the ISO:9001: 2000 or similar quality management standards of the project proponent, and hence additional QA/QC checks need not be required.
GCVg	Low	As above.
PLFp	Low	As above.
Qng	Low	As above.
GCVnp	Low	As above.
Qn	Low	As above.
GCVnb	Low	As above.
PLFb	Low	As above.

B.8. Has the methodology been applied successfully elsewhere and, if so, in which circumstances?

>> This is a proposed monitoring methodology based on a proposed baseline methodology called "Fuel switching from naphtha to natural gas in power plant project without extension of capacity and lifetime of the facility". The same has been applied to a applicant CDM project called "Switching of fossil fuel from naphtha to natural gas at Essar Power Limited's (EpoL) generation station located at Hazira, Gujarat, India, for power generation and supply to Gujarat Electricity Board (GEB) Grid and to Essar Steel Limited (ESTL)".

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