CLEAN DEVELOPMENT MECHANISM
PROPOSED NEW METHODOLOGY: MONITORING (CDM-NMM)
Version 01 - in effect as of: 1 July 2004

Energy Efficiency Improvement in Process and Manufacturing Industries

CONTENTS

SECTION A. Identification of methodology

A.1. Title of the proposed methodology:

>>Energy Efficiency Improvement in Process and Manufacturing Industries

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

Sectoral Scope: 3 Energy Demand

This methodology can be applied to the following industrial sectors

Sector 4: Manufacturing industries
Sector 5: Chemical industries
Sector 8: Mining/mineral production
Sector 9: Metal production

This methodology will apply to the following types of improvements, individually or together in various combinations, carried out in Process and Manufacturing industries:

- Improvements in electrical energy consumption in manufacturing processes which include inter-alia
  - Change in motors, drives and controls which allow equipment to be operated for lesser time (switching off when not needed) and at optimum speeds
  - Use of high efficiency equipment and drives requiring less energy/unit of production
  - Process load reduction leading to lower consumption of electrical power while in operation
  - Better controls which reduce consumption of electricity when production rate is decreased.

- Reducing loss of thermal energy through means which include inter-alia

  - Minimizing thermal losses through radiation by using better insulation
  - Minimizing loss of thermal carriers (ex: leakage of steam, air),
  - Better equipment design, better maintenance practices which reduce leakages and losses and improve heat transfer rates.
  - Recovering thermal for a useful application, or replacing fuel used for generation of thermal or electrical energy etc.

- Improving production rates, minimizing waste or recycling of materials which reduce energy consumption (thermal or electrical) for producing a unit quantity of useful product, because of better heat transfers, higher efficiency of usage etc.

- Improving efficiency of generation of electrical power within the plant, using recovered heat, improving boiler efficiency etc.

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

>> The methodology is applicable to CDM project activities under following conditions:

- The manufacturing plant is buying electrical energy from the grid and/or generating it in-house, using a mix of fuels.
- The thermal energy is generated with in the plant, using a mix of fuels.
- The projects result in demonstrable reduction in electrical energy /unit of production or fuel consumed/unit of production of useful products
- A single improvement or many improvements implemented simultaneously (implemented within 6months) are considered

This methodology will exclude improvements which

- Result from a change in product-mix produced (this will require a different analysis of markets etc and should be covered by a different methodology)
- Result from a change in fuel mix (will need a separate analysis as fuel-switch)
- This methodology will not apply to Projects which are mandated by law.

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

>> The key strengths of the proposed methodology are:

- Applies to a wide variety of improvements carried out in manufacturing sector which are difficult to classify as simple improvements in electrical energy consumption or thermal energy consumption or productivity.

- Allows aggregation of many improvements carried out simultaneously.

- Limits the benefits accrued by

  - Explicit incorporation of plant throughput (as it stands after project implementation) as a limiting factor. This ensures that future improvements in capacity (which are unrelated to the proposed Project) don't get benefit of improvements in energy consumption/unit.

  - Limiting the benefits to improvements from the project- excludes the benefits from energy efficiency projects in future. However penalizes if performance deteriorates over time.

- Applies to a variety of energy generation and sourcing strategies such as purchase of electrical energy from grid, supply to surplus energy to grid, generation of thermal energy within the plant, recovery of process heat through in-house generation etc.

Weaknesses of the methodology:

- In some cases it may be difficult to isolate the effect of product-mix changes.

SECTION B. Proposed new monitoring methodology

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B.1. Brief description of the new methodology:

>>The methodology monitors plant level aggregates such as quantity of products produced, electrical energy purchased, fuel consumption for energy generation (thermal, electrical), emission factor of grid, transmission and distribution losses of the grid

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
A 01-(01…n)[1]	*Q- quantity of saleable products produced*	*Production records*	*Tons*[2]	*m*	*monthly*	*100%*	*Electronic*	
A 02	*EG- electricity generated in the plant*	*Record of generating stations – energy meter*	*KW Hrs*	*m*	*m*	*100%*	*Electronic*	
A 03 (01….k[3]*)*	*eQ – quantity of fuel(s) consumed for generation of electricity*	*Records of generating station*	*Kgs*	*m*	*monthly*	*100%*	*Electronic*	

[1] No in the bracket indicates values for different product categories which have different energy consumption intensities, produced by the Plant

[2] Could be Litres, Nos, or other relevant units as well, depending on the nature of Industry.

A 04(01….k)	*eCV- calorific value of fuels (HCV) consumed for generation of electricity*	*Laboratory records or certificates of supplier*	*KJ/ Kg*	*C*	*monthly*	*100% of the lots(same supply source, same lot) consumed*	*Electronic*	*Calculation of this value is simple average of monthly samples for each lot, undertaken by the labs or wtd average of supplier certified calorific values wtd with qty consumed during the month.*
A 05 (01….k)	*tQ – quantity of fuel(s) consumed for generation of thermal energy*	*Records of generating station/ Consuming process*	*Kgs*	*m*	*monthly*	*100%*	*Electronic*	
A 06 (01….k)	*tCV- calorific value of fuels (HCV) consumed for generation of thermal energy*	*Laboratory records or certificates of supplier*	*KJ/ Kg*	*C*	*monthly*	*100%*	*Electronic*	*Calculation of this value is by wtd average value of fuel lots received and consumed (as per FIFO accounting method; wtd with weight consumed)*
A 07	*eEP- purchased electrical energy from the grid*	*Electricity Meter for the Project Boundary*	*KW Hr*	*m*	*monthly*	*100%*	*Electronic*	*Can be negative if the plant has been next exporter of the energy*
A 8	*EF- emission factor of the grid*	*Published statistics by National Electricity Authority or other such body*	*kg of Co2/ KW Hr generated*	*e*	*Annual*	*--*	*Electronic*	*Estimation method is given in baseline methodology document; however if this statistic is available directly as an estimate for the relevant region, it could be used*
A 9	*TD- transmission and distribution losses*	*Published statistics by National Electricity*	*%*	*e*	*Annual*	*--*	*Electronic*	

[3] The numbers in brackets identify different fuels used by the Plant

		Authority or other such body						

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

>>The calculations given below, separate the effects of improvements made after the implementation of Project Activity. Hence they use 2 sets of data, one just after the Project was implemented (target or benchmark data) and one at the time of periodic validation of emission reduction by the Validating Agency.

For benchmark setting post project implementation, data pertaining to 30 days after implementation would be used <u>(estimated for maximum capacity production)</u>

Q_T = quantity of production (of the main product) by the plant – capacity production
eE_T = total electrical energy consumed in the plant
= $(eEP_T + eEG_T)$
eEP_T = total electrical energy purchased from the grid and consumed by the Plant (KWhrs)
= can be –ve if power is exported to grid rather than consuming it for the plant
eEG_T = total electrical energy generated within the plant using a mix of fuels (KWhr)
reE_T = ratio of generated electrical power to consumed electrical power
= eEG_T / eE_T
= can be >1 if generation is more than consumed and it is sold back to the grid.
esE_T = specific electrical energy consumption KWHr /unit of production
= eE_T / Q_T
tsE_T = specific thermal energy consumption KJ/unit of production
= $tEG_T \times teffy_T / Q_T$
K = conversion factor for converting KWHr to KJ (KJ/KWHr) = 3600

tEG_T = total thermal energy produced in the plant KJ, by burning fuel in a generation plant

$teffy_T$ = efficiency of consumption of thermal energy within the plant – could be 1 in cases where energy is directly consumed in a process (such as coal feed to a kiln in a Cement plant) or where it is difficult to measure consumptions; therefore thermal energy generated by fuel combustion is assumed as a measure of total consumption

= total thermal energy consumed in the plant/(Calorific value of fuel burned for thermal

energy tCV_T x fuel quantity tQ_T)

= >1 if the generation plant used energy recovered from process flue gases etc; can reach infinity if no fuel is required to be burnt.

$eeffy_T$ = efficiency of generation of electrical energy within the plant
= total electrical energy produced in the plant (KWhr)●K//(Calorific value of fuel burned for electrical energy generation eCV_T x fuel quantity eQ_T)

Can be >1 if electrical power generation uses recovered gases; can reach infinity if no fuel is used to generate power everything being produced from recovered energy.

$eFEF_T$ = emission factor for fuel mix used for in-house electrical power generation
= $eFEF_0$ (the value for the fuel mix prior to project as fuel mix change is not part of the analysis). Can be obtained from the baseline scenario
calculations

$tFEF_T$ = emission factor for fuel mix used for thermal power generation
= $tFEF_0$ (the value for the fuel mix prior to project as fuel mix change is not part of the analysis). Can be obtained from the baseline scenario
calculations

EF_T = Emission factor of the grid (Kgs of Carbon di-oxide emission /KWHr of power generated)
= will be same as EF_0 (as the project doesn't impact change of grid)

TD_T = average transmission and distribution losses for grid power
= will be same as TD_0 (as the project doesn't impact change of grid)

Hence

$TEF_{T,0}$ = total emission factor of specific energy consumed as tested post project implementation (kg of co2/unit of production)

$= (esE_T \bullet ((1-reE_T)\bullet EF_0 / (1-TD_0) + reE_T/ eeffy_T \bullet eFEF_0 \bullet K) + tsE_T/ teffy_T\ tFEF_0)$

<u>Actual performance for a period t after project implementation</u>

t = period
Q_t = quantity of production (of the main product) by the plant – capacity production
eE_t = total electrical energy consumed in the plant
= $(eEP_t + eEG_t)$
eEP_t = total electrical energy purchased from the grid and consumed by the Plant (KWhrs)
= can be –ve if power is exported to grid rather than consuming it for the plant
eEG_t = total electrical energy generated within the plant using a mix of fuels (KWhr)
reE_t = ratio of generated electrical power to consumed electrical power
= eEG_t / eE_t
= can be >1 if generation is more than consumed and it is sold back to the grid.
esE_t = specific electrical energy consumption KWHr /unit of production
= eE_t / Q_t
tsE_t = specific thermal energy consumption KJ/unit of production
= tEG_t x $teffy_t / Q_t$
K = conversion factor for converting KWHr to KJ (KJ/KWHr) = 3600

tEG_t = total thermal energy produced in the plant KJ, by burning fuel in a generation plant

$teffy_t$ = efficiency of consumption of thermal energy within the plant – could be 1 in cases where energy is directly consumed in a process (such as coal feed to a kiln in a Cement plant) or where it is difficult to measure consumptions; therefore thermal energy generated by fuel combustion is assumed as a measure of total consumption

= total thermal energy consumed in the plant/(Calorific value of fuel burned for thermal energy tCV_t x fuel quantity tQ_t)

= >1 if the generation plant used energy recovered from process flue gases etc; can reach infinity if no fuel is required to be burnt.

$eeffy_t$ = efficiency of generation of electrical energy within the plant
= total electrical energy produced in the plant (KWhr)●K//(Calorific value of fuel burned for electrical energy generation eCV_t x fuel quantity eQ_t)

Can be >1 if electrical power generation uses recovered gases; can reach infinity if no fuel is used to generate power everything being produced from recovered energy.

$eFEF_t$ = emission factor for fuel mix used for in-house electrical power generation
= $eFEF_0$ (as fuel mix changes are not part of the analysis). Can be obtained from baseline scenario calculations.
$tFEF_t$ = emission factor for fuel mix used for thermal power generation
= $tFEF_0$ (as fuel mix changes are not part of the analysis). Can be obtained from baseline scenario calculations.

EF_t = emission factor of the grid (Kgs of Carbon di-oxide emission /KWHr of power generated); based on most recent available information about the grid for the region/country

TD_t = average transmission and distribution losses for grid power; based on most recent available information about the grid for the region/country

$TEF_{,t}$ = total emission factor based on actual performance of the plant in period t (Kg of Co2/unit of production) $= (esE_t \bullet ((1-reE_t)\bullet EF_t / (1-TD_t) + reE_t / eeffy_t \bullet eFEF_0 \bullet K) + tsE_t / teffy_t \bullet tFEF_0)$

Total emission factor based on tested specific energy consumption just after project implementation, but all other factors changing to those relating to period t:

$TEF_{T,t} = (esE_T \bullet ((1-reE_t)\bullet EF_t / (1-TD_t) + reE_t / eeffy_t \bullet eFEF_0 \bullet K)+ tsE_T / teffy_t \bullet tFEF_0)$

Adjustment for Product Mix Changes

If product mix has changed substantially from period 0 to t and if product mix has a substantial impact on energy consumption, the specific electrical energy consumption and specific thermal energy consumptions need to be adjusted as given in Section E1.

The same approach has to be used for adjusting $tsE_{t,}$ $esE_{T,}$ $tsE_{T,}$.

Specific carbon emission attributable to the Project, in period t
This will be maximum of the estimates based on performance just after project implementation and those based on the actual performance in period t

$TEF_{a,t}$ = ((MAX($TEF_{T,t}$, TEF_t)

This formulation ensures that specific energy consumption improvements beyond those that were validated after Project Implementation are excluded as well as any deterioration in performance thereafter is penalized.

I = as measured prior to Project Implementation; A = as measured at the time of validation of CERs

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
I -01-(01…n)[4]	*Q- quantity of saleable products produced*	*Production records*	*Tons*[5]	*m*	*Annual, Once*	*100%*	*Electronic*	
I -02	*EG- electricity generated in the plant*	*Record of generating stations – energy meter*	*KWHrs*	*m*	*Annual, once*	*100%*	*Electronic*	
I -03 (01….n[6]*)*	*eQ – quantity of fuel(s) consumed for generation of electricity*	*Records of generating station*	*Kgs*	*m*	*Annual, once*	*100%*	*Electronic*	
I- 04(01….n)	*eCV- calorific value of fuels (HCV) consumed for generation of electricity*	*Laboratory records or certificates of supplier*	*KJ/Kg*	*C*	*Annual, once*	*100% of the lots(same supply source, same lot) consumed*	*Electronic*	*Calculation of this value is simple average of monthly samples for each lot, undertaken by the labs or wtd average of supplier certified calorific values wtd with qty consumed during the month.*

[4] No in the bracket indicates values for different product categories which have different energy consumption intensities, produced by the Plant

[5] Could be Litres, Nos, or other relevant units as well, depending on the nature of Industry.

[6] The numbers in brackets identify different fuels used by the Plant

I -05(01…n)	*eCF- carbon content of fuels consumed for generation of electricity*	*Laboratory records or certificates of supplier*	*%*	*C*	*Annual once*	*100% of the lots consumed.*	*Electronic*	*- same as above-*
I -06 (01….n)	*tQ – quantity of fuel(s) consumed for generation of thermal energy*	*Records of generating station/ Consuming process*	*Kgs*	*m*	*Annual-once*	*100%*	*Electronic*	
I- 07 (01….n)	*tCV- calorific value of fuels (HCV) consumed for generation of thermal energy*	*Laboratory records or certificates of supplier*	*KJ/Kg*	*C*	*Annual*	*100%*	*Electronic*	*Calculation of this value is by wtd average value of fuel lots received and consumed (as per FIFO accounting method; wtd with weight consumed)*
I -08(01…n)	*tCF- carbon content of fuels consumed for generation of thermal energy*	*Laboratory records or certificates of supplier*	*%*	*C*	*Annual*	*100% of the lots consumed.*	*Electronic*	*- same as above-*
I -09	*eEP-purchased electrical energy from the grid*	*Electricity Meter for the Project Boundary*	*KWHr*	*m*	*Annual*	*100%*	*Electronic*	*Can be negative if the plant has been next exporter of the energy*
I -10	*EF- emission factor of the grid*	*Published statistics by National Electricity Authority or other such body*	*T of Co2/KWHr generated*	*e*	*Annual*	*--*	*Electronic*	*Estimation method is given in baseline methodology document; however if this statistic is available directly as an estimate for the relevant region, it could be used*
I- 11	*TD- transmission and distribution losses*	*Published statistics by National Electricity Authority or other such body*	*%*	*e*	*Annual*	*--*	*Electronic*	

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

>> Initial emission levels from the Plant

Q_0 = quantity of production (of the main product) by the plant

eE_0 = total electrical energy consumed in the plant

= $(eEP_0 + eEG_0)$

eEP_0 = total electrical energy purchased from the grid and consumed by the Plant (KWhrs)

= can be –ve if power is exported to grid rather than consuming it for the plant

eEG_0 = total electrical energy generated within the plant using a mix of fuels (KWhr)

reE_0 = ratio of generated electrical power to consumed electrical power

= eEG_0 / eE_0

= can be >1 if generation is more than consumed and it is sold back to the grid.

esE_0 = specific electrical energy consumption KWHr /unit of production

= eE_0 / Q_0

tsE_0 = specific thermal energy consumption KJ/unit of production

= tEG_0 x $teffy_0$ /Q_0

K = conversion factor for converting KWHr to KJ (KJ/KWHr) = 3600

tEG_0 = total thermal energy produced in the plant KJ, by burning fuel in a generation plant

$teffy_0$ = efficiency of consumption of thermal energy within the plant – could be 1 in cases where energy is directly consumed in a process (such as coal feed to a kiln in a Cement plant) or where it is difficult to measure consumptions; therefore thermal energy generated by fuel combustion is assumed as a measure of total consumption

= total thermal energy consumed in the plant/(Calorific value of fuel burned for thermal energy tCV_0 x fuel quantity tQ_0)

= >1 if the generation plant used energy recovered from process flue gases etc; can reach infinity if no fuel is required to be burnt.

$eeffy_0$ = efficiency of generation of electrical energy within the plant

= total electrical energy produced in the plant (KWhr)●K//(Calorific value of fuel burned for electrical energy generation eCV_0 x fuel quantity eQ_0)

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Can be >1 if electrical power generation uses recovered gases; can reach infinity if no fuel is used to generate power everything being produced from recovered energy.

eCF_0 = average effective carbon content of fuel mix for generating Electrical Power within the Plant (T of C/T of fuel mix); bio-mass used taken as carbon content of zero

eCV_0 = wtd average Calorific Value of fuel used for generation of electricity in the plant KJ/kg

$eFEF_0$ = emission factor for fuel mix used for in-house electrical power generation

= $G \bullet eCF_0 / eCV_0$

G = conversion factor for converting carbon to carbon-di-oxide weight =44/12 = 3.667

tCF_0 = average carbon content of fuel mix for Thermal Energy in the plant (T of C/T of fuel mix); bio-mass used taken as carbon content as zero

tCV_0 = wtd average Calorific Value of fuel used thermal energy generation in the plant KJ/Kg

$tFEF_0$ = emission factor for fuel mix used for thermal power generation

= $G \bullet tCF_0 / tCV_0$

<u>Grid Related Factors</u>

EF_0 = Emission Factor of the grid based on 'approximate operating margin' approach for the region/country where plant is located (Kgs of Carbon di-oxide emission /KWHr of power generated). Most recent available for the region/country.

TD_0 = average transmission and distribution losses for grid power (most recent estimate available for the region/country); can be assumed to be zero if the net power is exported to grid.

TEF_0 = total emission factor of specific energy consumed (Kg of C02/unit Q of products) prior to project implementation

= emission factor for electrical energy supplied from grid + emission factor for electrical energy generated within the plant+ emission factor for thermal energy produced within the plant

$= (esE_0 \bullet ((1\text{-}reE_0) \bullet EF_0 / (1\text{-}TD_0) + reE_0 / eeffy_0 \bullet eFEF_0 \bullet K) + tsE_0 / teffy_0 \bullet tFEF_0)$

<u>Emission baseline for future</u>

$TEF_{b,t} = TEF_0$ unless there are new mandates for using technology which set a minimum limit on plant performance. In that case work out TEFt using esE and tsE norms based on regulatory norms.

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

>> This option is not being used.

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.):

>>

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

>> No significant leakages are expected from the plan. Hence no monitoring mechanism is being suggested.

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.):

>>

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.):

>> aQ_t = Quantity of production which should be accounted for as the effect of the Project Activity
= $MIN(Q_T, Q_t)$

Specific Emission reduction

$\Delta sE_t = MIN\left((\mathbf{TEF_{b,t}} - \mathbf{TEF_{a,t}}), 0\right)$ **(9)**

Total GHG Emission reduction

ΔGE_t = Total GHG émission reduction
= $aQ_t \bullet \Delta sE_t$ **(10)**

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

>> The key assumptions are:

- Product mix remains same for all estimates pre and post project implementation (including for estimating industry specific energy consumptions). A correction method has been suggested in the baseline methodology

- The published estimates of Emission Factor of the grid and Transmission and Distribution losses approximate the performance of the grid in the year (the published figures normally come out with a phase-lag). It is recommended that we use the latest figures.
- The energy consumption for production is variable – it can be assumed to be so in most cases but some approximation is involved.
- The effects of fuel mix changes on emission (should be a separate project), transportation changes (when a fuel mix changes), effect of emissions while fuels are mined/produced, effect of methane and nitrous oxide emissions are ignored.

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.
A 01-(01…n) : Q	*L*	*These measures are very accurate in a manufacturing plant, directly coming from financial accounts.*
A 02 : EG	*L*	*This is normally measured by very accurate meters in generating plants*
A 03 (01….n) :eQ	*L*	*These may need correction for product mix changes- If different products use significantly different levels of energy. The correction procedure is described in baseline methodology*
A 04(01….n) :eCV	*L*	*Since actual values are being measured (either by Project Proponent) or by the supplier of fuels, this is likely to be more accurate than standard IPCC default values.*
A 05(01…n) :eCF	*L*	*Since actual values are being measured (either by Project Proponent) or by the supplier of fuels, this is likely to be more accurate than standard IPCC default values.*
A 06 (01….n): tQ	*L*	*These may need correction for product mix changes- If different products use significantly different levels of energy. The correction procedure is described in baseline methodology*
A 07 (01….n) :tCV	*L*	*Since actual values are being measured (either by Project Proponent) or by the supplier of fuels, this is likely to be more accurate than standard IPCC default values.*
A 08(01…n) :tCF	*L*	*Since actual values are being measured (either by Project Proponent) or by the supplier of fuels, this is likely to be more accurate than standard IPCC default values.*
A 09 :eEP	*L*	*This is normally measured by very accurate meters*
A 10 : EF	*M*	*Although published reports may be late (by 1-2 yrs), it is better to stick to these reports, as the data may be more authentic than a survey based data, apart from being in-expensive. In any case while building a series for a long period (7-21 yrs), the estimation incorrectness by delayed availability of data may not result in too much of correction.*
A 11 :TD	*M*	*-same as-above*
I -01-(01…n): Q	*L*	*Same as for A -01*
I -02 :EG	*L*	*Same as for A-02*
I -03 (01….n):eQ	*L*	*Same as for A-03*
I- 04(01….n) :eCV	*L*	*Same as for A-04*

I -05(01…n) :eCF	*L*	*Same as for A-05*
I -06 (01….n) :tQ	*L*	*Same as for A-06*
I- 07 (01….n) :tCV	*L*	*Same as for A-07*
I -08(01…n) :tCF	*L*	*Same as for A-08*
I -09 :eEP	*L*	*Same as for A-09*
I -10 : EF	*M*	*Same as for A-10*
I- 11 :TD	*M*	*Same as for A-11*

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

>> Being applied for analyzing Energy Efficiency Improvement in a Cement plant.