UNFCCC Secretariat
Martin-Luther-King-Strasse 8
D-53153 Bonn
Germany

Kind Attention : CDM Executive Board

Re : Response to request for review " Biomass based Hot Air Generation at Fertilizer Unit of Tata Chemicals Ltd., Haldia, West Bengal (1890)"

Dear Members of the CDM Executive Board,

We enclose the initial response to requests for review on the above project.

As requested, we provide below the answers to your comments. The DOE have turned in their replies separately. We appreciate your questions and have done our best to provide you with answers that have been substantiated by third party sources wherever required. Should you need to contact us for any clarification, please do not hesitate to call us.

The Context of the project activity:

The Haldia Unit of Tata Chemicals Limited is into the fertilizer and chemicals manufacturing business. The project proponent requires hot air for the purpose of evaporating the moisture content in the final product (fertilizer and STPP) to the desired level. As a current practice the unit fires furnace oil (FO) in the Hot Air Generator (HAG) to generate hot air but the unit decided to switch to a cheaper fuel option. Coal was the natural choice to the proponent since:

1. There is no availability constraint to use coal as a fuel
2. Coal is the cheapest fuel available in the region

However, keeping in view the global concern on climate change, Tata Chemicals decided to switch over to a climate neutral fuel that would avoid green house gas emissions. Based on above decision, the next choice was rice husk – the discarded biomass residue produced by rice mills during production of rice.

The following are the clarifications requested by the EB with responses from our end:

1. The DOE is requested to further clarify the unit cost of energy, in particular, cost of coal and biomass representing the actual price at the time of investment decision.

Response:
The calculations were based on the following parameters:

Fuel	Parameter	Value
Coal	Cost in Rs/MT	2468
Biomass	Cost in Rs/MT	3500
Coal	Average Calorific value	3527
Biomass	Average Calorific value	2400

The cost of coal and biomass per MT was collected from the local suppliers in the region for the financial work-out of the project.

Tata Chemicals Limited, Haldia financially approved the project on 19th January, 2006. Prior to this investment decision, TCL assessed both coal and biomass option. Initially TCL collected quotation for coal as on dated 05.06.2004 and 28.10.2004 respectively. Further to this, TCL also explored the biomass option as fuel considering the carbon neutrality nature of the biomass and during that time, TCL has collected quotation from biomass suppliers such as I.K. Enterprises Engineering on 8th August 2005 and Shyamal Kumar Das on 9th August 2005 respectively. The invoices are enclosed as Exhibit 1- 4 respectively.

2. The DOE is requested to provide further clarification on how it has been validated that coal-fired-HAG is the baseline scenario and not the furnace oil, used previously.

Response:
The unit cost of fuels per unit of energy produced has been calculated based on the details provided by the respective fuel suppliers. Coal would have been the obvious choice in absence of the project, since coal is the cheapest fuel available to the project proponent and hence coal fired HAG has been considered as the baseline scenario instead of the current practice of using furnace oil fired HAG. A comparison of fuel costs at the time of investment decision is given below:

Fuel	Unit Cost (Rs./Gcal)
Furnace oil	2136.84
Coal	736.49
Biomass	1535.09

The unit cost calculation is enclosed as Excel sheet named as Exhibit 5.

3. The DOE is requested to further explain not meeting the methodology requirements, in particular, (a) baseline emissions not calculated as required; and (b) the validation of the technology's efficiency for the baseline based on only one supplier's technical information.

Response (a):
(a) As mentioned in the methodology the baseline emission is expected to be calculated as per equation

$$BE_y = HG_y * EF\,CO2\,/\eta th$$

Where,

BE_y the baseline emissions from steam/heat displaced by the project activity during the
          year y in tCO_2e.
HG_y the net quantity of steam/heat supplied by the project activity during the year y in TJ.
EF_{CO2} the CO_2 emission factor per unit of energy of the fuel that would have been used in
          the baseline plant in (tCO_2 / TJ), obtained from reliable local or national data if
          available, otherwise, IPCC default emission factors are used.

η_{th} the efficiency of the plant using fossil fuel that would have been used in the absence of the project activity.

In the PDD, the calculation methodology followed for ex-ante projection is:

$$BEy = \left[\left(Q_B \times \frac{NCVb}{NCVc} \right) \times \frac{\eta_{HA}}{\eta c} \right] \times EEFc$$

Where,
BEy = Baseline emission in the year y (tCO2e)
Q_B = Quantity of biomass utilised (tonne)
NCVb = Net Calorific value of Biomass (Kcal/kg)
NCVc = Net Calorific value of coal (Kcal/kg) (Average value of supplier's data that has been supported by external test report)
η_{HA} = Efficiency of the Hot Air Generator used in project scenario (%)
η_c = Efficiency of the coal based Hot Air Generator used in baseline scenario (%) (this is actually the efficiency of the plant using fossil fuel that would have been used in the absence of the project activity).
EEFc = Effective Emission factor of coal (tCO$_2$/tonne of Coal)
EEFc can be calculated as follows:
EEFc = EFc x OXc x (44/12) x (NCVc x 4.186/10^6)
Or, EEFc, tones CO2/tones of coal = 26.2 x 1 x (44/12) x (3527 x 4.186/10^6) = 1.41833038
Where,
EFc = IPCC Default carbon content of coal, Kg/GJ
OXc = IPCC Default Oxidation factor of coal
The IPCC Default values applied is taken from Revised 2006 IPCC Guidelines for National Greenhouse Gas Inventories.

In other words, in the project case HGy has been calculated as follows:

HGy = QB x NCVb x ηHA ……………………………………………………1

Considering,
QB = Quantity of biomass utilised (tonne)
NCVb = Net Calorific value of Biomass (Kcal/kg)
ηHA = Efficiency of the Hot Air Generator used in project scenario (%)

Similarly, EF CO$_2$ in tCO2/TJ is calculated as:

EF CO$_2$ = EEFc/ NCVc………………………………………………………………2

Considering,
EEFc = Effective Emission factor of coal (tCO2/tonne of Coal)
NCVc = Net Calorific value of coal (Kcal/kg) (Average value of supplier's data that has been supported by external test report)
EEFc can be calculated as follows:
EEFc = EFc x OXc x (44/12) x (NCVc x 4.186/10^6)
Where,
EFc = IPCC Default carbon content of coal, Kg/GJ
OXc = IPCC Default Oxidation factor of coal
The IPCC Default values applied is taken from Revised 2006 IPCC Guidelines for National Greenhouse Gas Inventories

And **ηth** is represented as **ηc,** the efficiency of the coal based Hot Air Generator used in baseline scenario (%)…………………………………………………………………..3

Hence, in line with the methodology, the equation is presented as follows:

BEy = HGy * EF CO2 /ηth

$$= \text{Equation 1 * Equation 2/ Equation 3}$$

= [QB x NCVb x ηHA] * [EEFc/ NCVc]/ [ηc]

$$= \left[\left(QB \times \frac{NCVb}{NCVc}\right) \times \frac{\eta_{HA}}{\eta c}\right] \times EEFc$$

The calculations were done in line with the methodology only as evident from the detailed calculation procedure. We are enclosing the excel sheet as Exhibit No. 6

However, the thermal energy generated has been calculated in the project scenario as follows:

$HGy = m_{HA} \times Sp \times \Delta T$

where,

m_{HA} = mass of hot air generated (will be calculated based on flow rate and density of hot air generated)

Sp = Specific heat of hot air

ΔT = temperature difference between ambient air and hot air generated

HGy = quantity of thermal energy generated

All the parameters used here in the calculation of thermal energy generated are included in the monitoring plan.

The thermal energy generation calculation in the project scenario has been incorporated in section B.6.1 of the PDD.

Response (b):

(b) Technical specification for efficiency of the HAG in the baseline scenario i.e**.** ηc is taken from the vendor who is supplying the technology in the project activity; however, the specification provided by the supplier is as per the standard statistical data available.

Two suppliers' specifications have been taken into consideration. The documents are enclosed as Exhibit 7.

4. The monitoring plan should include parameters that are required as per the monitoring methodology (eg. consumption of coal calculated ex-ante; and thermal energy generated)

Response:

We thank EB for pointing out this point. We have incorporated the three parameters, such as Specific fuel consumption of biomass per unit of thermal energy from the HAG and Specific fuel consumption of coal per unit of thermal energy from the HAG in the section B.6.2.