



CDM Executive Board

UNFCCC Secretariat

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29th May 2009

Re: Request for review of the request for registration for the CDM project activity “GHG emission reductions through waste gas based power generation at Visa Steel Limited” (Ref. no.2369).

Dear CDM Executive Board,

SGS has been informed that the request for registration for the CDM project activity “GHG emission reductions through waste gas based power generation at Visa Steel Limited” (Ref. no.2369) is under consideration for request for review because three requests for review have been received from members of the Board.

The request for review is based on the reasons outlined below. SGS would like to provide a response to the issue raised by the request for review:

Request for Review Comments 1 – 3:

Request for Review, Issue 1:

Further clarification is required on how the DOE has validated the investment costs, including the costs for the waste heat recovery system.

SGS' Response to Issue 1:

DOE hereby wishes to clarify that the investment costs for both the baseline option and project option have been provided by a third party renowned power plant consultant, M/s. Development Consultants Private Limited (DCPL) based on standard industrial practices and norms (*the report has already been submitted to UNFCCC; refer to 'Appendix-2: Project Financial Analysis'*). The vast credential of DCPL in power plant designing and pioneer status in many new power plant technologies in India and abroad were found well evident through the detail information available at their company's web portal (*details of the same are available at http://dcpl.net.in/domains_pg.html*). This justifies the credibility of the investment costs for both the baseline option and project option considered for project investment analysis. However, additionally the DOE has validated the investments costs based on publicly available information. The same is elaborated below for further clarification:

Scenario	Initial Investment	Justification
<u>Baseline Scenario</u> - 115 MW Coal based Power Plant	INR 4599.1 Million	This is based on an assumption of installation cost of INR 40 Million/MW for coal based power plant. The same has been validated with installation cost as published in http://www.hinduonnet.com/businessline/2003/08/05/stories/2003080501650200.htm .
<u>Project Scenario</u> - Waste Gas based Power System (43.7MW) supplemented with CFBC Boiler based Power Generation System (31.1MW) and grid import	INR 3600 Million (INR 2357.1 Million for Waste Gas based Power Generation System and INR 1242.9 Million for the CFBC Boiler based Power Generation System)	<p>i) The installation cost for waste gas based power generation system is found to be approximately 1200 USD/kW (assuming 1 USD = INR 45). The same is validated with the installation cost of around (USD 600-USD 1800)/kW i.e. an average of USD 1200/kW for waste heat recovery based power generation system as published in Pg/-16 of the Report published in the 'Industrial Energy Technology Conference-2007' available at http://www.wowenergies.com/images/IETC_May_2007.pdf. The installation cost of CFBC boiler based power generation system is based on an assumption of installation cost of INR 40 Million/MW for coal based power plant. The same has been validated with installation cost as published in http://www.hinduonnet.com/businessline/2003/08/05/stories/2003080501650200.htm.</p> <p>ii) Furthermore, to check the ground reality, the actual initial investment in the project scenario i.e. INR 3600 Million has also been cross validated with the audited actual and planned expenditure of Visa Steel Limited on the power plant project till 31st December 2008 which is around INR 3690 Million. The audited expenditure has been enclosed for reference (refer annexure 1 of this letter).</p>

Request for Review, Issue 2:

Further clarification is required on how the DOE has validated the investment cost comparison, in particular, (a) how the project activity scenario (consisting of the project activity, a 31.1MW coal based captive plant, import from the grid), was determined as well as the 115 MW power plant and imports from the grid as alternative investment options, and (b) why a levelized cost analysis was not used to calculate the unit cost of each alternative.

SGS' Response to Issue 2:

The unit power cost for all the identified alternatives have been provided by a third party renowned power plant consultant-M/s. Development Consultants Private Limited (*the report has already been submitted to UNFCCC; refer to 'Appendix-2: Project Financial Analysis'*). Additionally the DOE has cross validated the assumptions used in unit power cost computation with publicly available data, same has been detailed under response to comment no. 1 above and CAR-07 of the Validation Report submitted during request for registration.

With regards to the concern of the Executive Board of UNFCCC on (a) Project scenario determination and Alternative Selection, (b) Levelized Cost Computation, the DOE would like to provide the following clarifications:

(a) Project scenario determination and alternative selection

Visa Steel Limited is in the process of setting up an integrated iron and steel plant consisting of Sponge Iron Kilns, Coke Ovens, Blast Furnace, Steel Melting Shop, Rolling Mills, Ferro Chrome unit and other ancillary facilities. The current project activity is being installed in parallel to the new integrated iron and steel plant of Visa Steel Limited. The determination of project scenario and baseline power generation alternatives is based on the most realistic approach to meet the annual electrical energy requirement of integrated iron and steel plant facility of Visa Steel Ltd. The total annual electrical energy requirement for all these facilities would be around 869225 MWh (*the details of power requirement have already been provided to UNFCCC; refer to the 'Power Requirement' worksheet of 'Appendix-13: Visa Steel Power Cost'*). Therefore all the alternatives for catering to the power requirement of Visa Steel Limited were envisaged with the consideration of supplying a net electrical energy output of 869225 MWh per annum. With this consideration, Visa Steel Limited has envisaged the following three alternatives:

Alternatives for Catering to the Power Requirement of Visa Steel Limited	
Alternative	Description
Alternative-1: Generation of power in a coal based captive power plant	This alternative entails installation of an 115MW coal based captive power. After catering to the auxiliary power requirement of the captive power plant, the same will be able to supply 869225MWh of electrical energy per annum to the operational facilities of Visa Steel Limited.
Alternative-2: Import of power from the grid	This alternative entails import of entire 869225MWh of electrical energy per annum from the grid to cater to the electrical energy requirement of all the operational facilities of Visa Steel Limited.
Alternative-3: Project Activity	<p>This alternative entails utilization of the heat content of the by-product gases (such as DRI kiln gas, Blast Furnace Gas (BFG) and Coke Oven Gas (COG)) for generation of around 43.7MW of gross power <i>i.e.</i> equivalent to a net electrical energy output of 295766MWh per annum after catering to the auxiliary electricity requirement of the power plant equipments.</p> <p>This will be supplemented with an additional 31.1MW power generation with steam from a CFBC boiler (which would be primarily based on the Coal Fines and Coal Char available in the plant along with the minimum quantity of coal necessary for proper operations) <i>i.e.</i> equivalent to a net electrical energy output of 234900MWh per annum after catering to the auxiliary electricity requirement of the power plant equipments.</p> <p>Hence with these in-house power generation facilities, the project proponent would be able to supply $(295766 + 234900) = 530666$MWh of net electrical energy per annum to the operational facilities of Visa Steel Limited. Therefore with the project option in place, the project proponent would require to import the balance power <i>i.e.</i> $(869225 - 530666) = 338559$MWh of net electrical energy per annum from the grid.</p>

The above explanation clearly explains that all the alternatives (*i.e.* Alternative-1, Alternative-2 and Alternative-3), identified for catering to the power requirement of the integrated iron and steel plant of Visa Steel Limited, will have a net power output equivalent to 869225MWh of electrical energy per annum (*i.e.* alternatives with similar output). Hence all these alternatives can be considered as alternate investment options for the project proponent to cater to their electrical energy requirement. Therefore an investment cost comparison amongst all these alternatives in terms of their respective unit power costing would be

appropriate to determine the most economically attractive alternative (*i.e.* the baseline scenario) and assess additionally of the project activity under consideration.

(b) Levelized Cost Computation

The additionality of the project activity has been demonstrated through an investment comparison analysis following the guidance of the 'Tool for the demonstration and assessment of additionality (Version 05.2)'. As per 'Sub-step 2b: Option II. Apply investment comparison analysis' of this tool, the project proponent is required to "*Identify the financial indicator, such as IRR, NPV, cost benefit ratio, or unit cost of service (e.g., levelized cost of electricity production in \$/kWh or levelized cost of delivered heat in \$/GJ) most suitable for the project type and decision-making context.*"

In accordance with this guidance, the project proponent has selected the unit power cost as the indicator for assessment of economical attractiveness of all the above mentioned alternatives. The justification for the choice is explained below:

The levelized power cost is primarily calculated to capture the fluctuation in prices of the basic parameters required for unit power cost computation over a reasonable period of time. In case the price fluctuation of the basic parameters is found to be insignificant over that period, the unit power cost would reasonably represent the power costing of the project activity and all its alternatives over that period.

For the project activity under consideration and its alternatives, the unit power cost is found to be sensitive with respect to coal price, grid power purchase cost and net power generated with waste gases. However the project proponent has already applied for a long term coal linkage (refer annexure 2 of this letter) which is over the lifetime of the project and hence the coal price is not expected to fluctuate much over the lifetime (25 years) of the project activity. So far as grid power purchase is concerned, there is a marginal increase in grid power purchase cost (refer annexure 3 of this letter) over the last five years (an increase of around 4%). However it is to be noted that with an increase in grid power purchase cost, the unit power cost in the project scenario would increase while that of the baseline scenario would remain same as there is no grid power import in the baseline scenario. Therefore this would make the project activity even more unviable. This is also to be noted that the unit power cost in the project scenario has been computed based on a realistic assumption of waste gas availability from all the operational units like DRI kilns (refer annexure 4 of this letter), Mini Blast Furnace (refer annexure 5 of this letter) and Coke Ovens (refer annexure 6 of this letter) which is not expected to increase significantly. Therefore power generation with waste gases is also not expected to increase further over the lifetime of the project activity.

The above explanation clearly justifies the unit power cost for all the identified alternatives, as computed, won't vary significantly over the lifetime of the project activity as the sensitive parameters won't fluctuate significantly over this period. This justifies the appropriateness of the choice of unit power cost as the financial indicator for investment comparison analysis for the identified alternatives instead of their levelized power cost. Furthermore the project proponent has performed a sensitivity analysis following the guidance of the additionality tool with respect to the sensitive parameters like coal price, grid power purchase cost, net power generated with waste gases and their suitable combinations. The result of the sensitivity analysis has been presented under 'Sub-step 2d: Sensitivity analysis' of Section-B.5 of the Project Design Document and in the validation report submitted during request for registration. In all the situations, the unit power cost in case of Alternative-3 (project scenario) is found to be higher than that of Alternative-1 (baseline scenario) which substantiates that results of levelized power cost analysis would have been similar as that of the unit power cost analysis amongst the identified alternatives.

However appreciating the concern of the CDM EB in this regard, the project participant computed the levelized power cost for the baseline alternatives and project scenario (*i.e.* Alternative-1, Alternative 2 and Alternative-3 respectively) to establish the further transparency (refer annexure 7 of this letter).

The results of levelized cost analysis are summarized below:

Summary of Levelized Power Cost for Alternatives available with Visa Steel Limited	
Alternative	Levelized Power Cost
Alternative-1	Rs. 2.51/kWh
Alternative-2	Rs. 5.17/kWh
Alternative-3	Rs. 2.97/kWh

All basic assumptions used for levelized cost of power generation are same as the assumptions used for unit power cost calculation as submitted during request for registration. The levelized cost of power generation has been calculated for 15 years and the salvage value of project assets has been added as project cash flow, this was found consistent with the guideline laid down by EB 41 Annex 45.

The above result establishes that the levelized power cost in case of Alternative-1 is the lowest *i.e.* Alternative-1 can be considered as the most economically attractive alternative. This is consistent with the analysis of unit power cost for all the alternatives as presented in the Project Design Document.

Request for Review, Issue 3:

Further clarification is required on how the DOE has validated that the project activity (waste heat recovery based power generation) is not a feasible baseline alternative and how the 115MW coal based captive power plant is a plausible baseline alternative for the project activity.

SGS' Response to Issue3:

As explained above under "Response to Review Comment-2(a): Project scenario determination and alternative selection", the project proponent has identified the following alternatives for catering to the electrical energy requirement of their integrated iron and steel plant:

Alternative-1: Generation of power in a coal based captive power plant of 115MW capacity

Alternative-2: Import of power from the grid

Alternative-3: Project Activity consisting of generation of around 43.7MW power with by-product gases supplemented with generation of around 31.1MW power with CFBC boiler based power generation system and remaining power being imported from the grid

Accordingly the project proponent has opted for an investment comparison analysis amongst all these alternatives based on their unit power cost for identifying the economically most attractive alternative. The investment comparison analysis was conducted by a third party renowned power plant consultant-M/s. Development Consultants Private Limited based on standard industrial practices and norms (*the report has already been submitted to UNFCCC; refer to 'Appendix-2: Project Financial Analysis'*). The result of the investment comparison analysis is summarized below:

Summary of Unit Power Cost for Alternatives available with Visa Steel Limited	
Alternative	Unit Power Cost
Alternative-1	Rs. 2.09/kWh
Alternative-2	Rs. 3.20/kWh
Alternative-3	Rs. 2.27/kWh

Computation of unit power cost by a third party renowned power plant consultant, which ensures the credibility of the above mentioned project investment analysis. However, additionally the DOE has validated the assumptions used in unit power cost computation with publicly available data. The same has been detailed under CAR-07 of the Validation Report.

The above result establishes that the unit power cost in case of Alternative-1 is the lowest *i.e.* Alternative-1 can be considered as the most economically attractive alternative. This is in accordance with the guidance provided in Point-10(a) under Sub-step: 2(c) of the 'Tool for the demonstration and assessment of additionality (Version 05.2)', which states that in case of investment comparison analysis, *"If one of the other alternatives has the best indicator (e.g. highest IRR), then the CDM project activity can not be considered as the most financially attractive."*

The robustness of the investment comparison analysis has been further substantiated with the help of sensitivity analysis following the guidance of the additionality tool with respect to the parameters like coal price, grid power purchase cost, net power generated with waste gases and their suitable combinations. The result of the sensitivity analysis has been presented under 'Sub-step 2d: Sensitivity analysis' of Section-B.5 of the Project Design Document. In all the situations, the unit power cost in case of Alternative-3 is found to be higher than that of Alternative-1 which substantiates that Alternative-1 is financially more attractive than Alternative-3.

The above explanation clearly justifies the consideration of 'Alternative-1: Generation of power in a coal based captive power plant of 115MW capacity' as the baseline alternative.

We apologize if the initial validation report has been unclear and hope that this letter and the attached information address the concerns of the members of the Board.

Ajoy Gupta (+ 91 99038 03700) will be the contact person for the review process and is available to address questions from the Board during the consideration of the review in case the Executive Board wishes.

Yours sincerely

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Enclosures

Annex 01: Actual Cost
Annex 02: Application for long term coal linkage
Annex 03: Grid electricity invoices
Annex 04: Waste gas availability from DRI Kilns
Annex 05: Waste gas availability from Mini Blast Furnace
Annex 06: Waste gas availability from Coke Ovens
Annex 07: Levelized Power Cost