Ref : GPIL/VT/2007-08
Date : 08 August 2008

To
Project Registration Team Member
UNFCCC

Sub. : **Request for Review Project No. 1719 WHR CDM CPP**

Dear Sir

We are pleased to submit hereby reply for the review points for your kind consideration.

Thanking you & With regards

[L.Prasad]

Point No:1
Further clarification is required how the investment comparison analysis has been validated by the DOE, in particular the appropriateness of comparing a 25 MW coal based power plant with 95% PLF with the project activity with 80% PLF.

REPLY:
For, calculating the profitability and cost of production of any system it is important to know the likely production from the system in a given scale of time, which is normally considered per year (per annum). To assess the quantum of likely production the following input are important:

1) Installed capacity of the plant.
2) Normal operating efficiency (production efficiency) of the plant in given circumstances i.e. average operating plant load factor, during working time.
3) Number of working hours in a day.
4) Number of working days in year.
5) Total likely production in a year.

With the above parameters the most "likely production" during a year is projected for the sake of financial calculations. Based on the "likely production" the quantum of input raw material, fuel etc is worked out and the value of finished goods or likely sales realization is worked out.

Thus the operating plant load factor actually designates the percentage production level from the system during the operating time. For example we have considered 80% "operating plant load factor" (OPLF) for the 25 MW WHRB (project activity) plant and have considered that it would operate for 300 days, for 24 hours every day. Hence at this operating PLF of 80% the annual power generation works out to 144000 MWh.

This likely generation of power in a year from WHRB is fixed to determine all other cost and revenue. If this generation is expressed in terms of annual PLF then it has to be calculated in the following ways:

$$\frac{25\ \text{MW} \times 24\ \text{Hours} \times 300\ \text{days} \times 0.80\ \text{Operating Plant Load factor}}{25\ \text{MW} \times 24\ \text{Hours} \times 365\ \text{days}}$$

$$= 0.6575$$

or say = 66%

Similarly for coal based AFBC, the operating PLF (OPLF) is considered as 95% and the operating days are considered as 350 days hence the annual generation is found 199500 MWh, hence if the operating PLF of 95% is converted to annual then PLF it is found as 91.1%.

Thus the difference of "operating PLF" and "annual achieved PLF" is made clear with the above.

The investment comparison analysis was checked and verified by a qualified Chartered Accountant and all the parameters used for the investment comparison analysis were provided also to the DOE, which are also verified and certified by the Chartered Accountant, which is already webhosted along with request for registration of PDD. The justification regarding plant load factor is given as below:

P.L.F.= Plant load factor is average capacity utilization (http://en.wikipedia.org/wiki/Plant_Load_Factor) of the power plant. Plant load factor is calculated as average percentage of power generation during a year in proportion to the designed power generation capacity during the year, for example in any project possible designed power generation can be for 365 days 24 hours and multiplied by installed capacity in MW. As against this if the power is produced in lower quantum; then this is divided by designed annual quantum to arrive at PLF.

In the development of PDD the term PLF has been utilized for the following purpose:

1) In case of WHRB it has been first assessed as how many working days the Sponge Iron Plants is likely to operate. In this case we have considered 300 working days for the sponge iron plant likely to operate
2) During the operational days of sponge iron plants what is likely to be the best average operating plant load factor possible, in this case for WHRB we have considered 80% PLF (on daily basis) level during the operational days.
3) By multiplying the number of operational days and installed capacity of WHRB power plant and then multiplying by the expected capacity utilization i.e. 80% the total generation possible during a year has been calculated, which works out to 144000 MWh in case of WHRB.
4) In case of AFBC it has been first assessed as how many working days the Power Plants is likely to operate. In this case we have considered 350 working days for the power plant likely to be operate
5) During the operational days of power plants what is likely to be the average plant load factor possible, in this case for AFBC we have considered 95% PLF (on daily basis) level during the operational days.
6) By multiplying the number of operational days and installed capacity of WHRB power plant and then multiplying by the expected capacity utilization i.e. 95% the total generation possible during a year has been calculated, which works out to 199500 MWh in case of AFBC.
7) The above PLF are indicating the percentage generation level at which the WHRB or AFBC will operate during any working day and based on this level possible power generation quantum has been arrived to calculate the cost, profits and returns.
8) If the total power generation by WHRB or AFBC is calculated on equal 365 days X 24 hours time scale factor then the annual average PLF will work out at 65.75% for WHRB and 91% for AFBC**.**
9) The annual average PLF for WHRB is supported with the actual power generation recorded by another project activity of the company having, 7 MW 10 MW two WHRB and one 11 MW AFBC based power capacity whose generation details are given at **Annex-I** which shows 50% & 52% PLF based on 365 days and 61% & 64% PLF based on 300 days. The 11 MW AFBC based on coal has achieved 107% PLF based on 350 days and 103% based 365 days.

(a) **Justification for the considering the 80% PLF for WHRB based power plant:**

In case of WRHB 80% OPLF has been considered, because in WHRB the steam generation is totally depended and only depended on the waste heat source i.e. flue gas coming from Sponge Iron Kiln, there is no possibility and no provision to fire any additional fuel to improve the heat input, therefore enormous fluctuation in heat input is recorded which can be as low as 0% to as high as 100%, the duration of fluctuation also can be between hour to hour of operations. Hence the average "operating PLF" for WHRB is estimated to be around 80% on optimistic side for the sake of conservative estimates. This has been worked, out of practical experience which is also evidenced with the actual production data of the Project activity as enclosed (**Annex-I**) which reveals that the OPLF fluctuation in some months is at 45% to 84% in some months, in addition generation recorded by a number of sponge iron plants who have set up the

WHRB power plant also confirm the adopted PLF levels. The two other project activities setup by the company have also recorded upto 61% to 64% PLF (Based on 350 days).

(b) Whereas in AFBC the operating PLF can even be achieved to more than 100%. As the plant has the technical freedom to fire as much of fuel as required to generate required steam. The boiler and turbine are normally designed to operate up to 10% excess overload level. However as a conservative approach we have considered only 95% PLF for the financial comparison. We enclose herewith the validated data, verified by the DOE for issuance of CER' S for our registered project activity (**Annex-II**). In which it is established that the AFBC has been able to achieve upto 100% & above PLF. Whereas the WHRB was able to achieve only upto 64% PLF.

(c) If these "OPLF" are calculated on total calendar year time, then the total generation in the year is divided by considering the total likely generation at 100% PLF in the year. Thus this annual PLF level comes down than the "operating PLF". In general the PLF is expressed only in this term of annual PLF only. Therefore any annual PLF of about 90% also is considered as 100% for the sake of PLF.

(d) The "operating PLF" can be reverse calculated by multiplying the "annual PLF" from the total calendar time in a year and then by dividing it by the actual operating time during which the plant has worked or operated **(refer Annex-I)**.

(e) Reasons for low capacity utilization in WHRB: The poor capacity utilization of a Sponge Iron Plant is the first and major reason for the lower capacity utilization for WHRB power plant. Because the power generation in WHRB power plant is directly linked to the Sponge Iron Plant operation and capacity utilization. Whereas the AFBC power plant has the total freedom to operate as per the requirement. The WHRB power plant also faces a number of barriers which influence the generation of power in WHRB (Refer to the PDD – Page No. 26 to 32) whereas the coal based AFBC has no such barriers. Hence the normal capacity utilization with WHRB, without CDM support would be around 60 to 65% in most of the Kilns having productivity level of 100 TPD to 350 TPD. Hence 66% PLF (350 days basis) is normally considered for the sake of financial comparison for WHRB based levelized cost of power generation.

(f) The reasons for low capacity utilization in sponge iron industry are as below:

i. 3 to 4 major shut down of kiln needs to be taken in year due to accretion build up inside the kiln. This needs to be cleaned and refractory work is to be repaired for smooth operation of the plant.

ii. After a shut down, to start the Kiln, it takes about seven days to reach the peak capacity and at the end of campaign again the kiln has to be slowed down, resulting into low production and consequently low generation of waste heat gases.

iii. During the normal plant operation also the consistency can not be maintained because of fluctuation in the quality of raw material. It would be evident from production and capacity utilization details provided at website of SIPB (Govt. of Chhattisgarh) attached as **Annex-III**, in which average capacity utilization in the state is found at about 58%.

iv. Registering a low PLF is amply borne out by enclosed certified statement on the operation of WHRB 25 MW plant for the period from August 2007 to July 2008 shows an average PLF of 57.79% on annualized basis **(Annex-IV)**. However on going through the monthly PLF it may be observed that in October 2007, PLF up to 82.77% was achieved, whereas in February 2008, PLF as low as 23.57% achieved. The 80% OPLF was considered by us in view of the possible good PLF during good operating days as achieved in October 2007 evident from "G Form" submitted to State Government Authority attached as **Annex-X**.

(g) However the proposed WHRB power plant is installed on 2 Nos. of 500 TPD each capacity Kiln, which would produce 1000 TPD sponge iron if 350 days are considered for production then the annual capacity would be around 350000 tonnes if 300 days are considered then the annual capacity will be 300000 tonnes at 100% capacity utilization, against which we have considered 240000 tonnes per annum capacity utilization which works out to 68.57% based on 350 days capacity and 80% based on 300 operating days.

Hence the capacity & PLF (OPERATING PLF @ 80%) considered for WHRB power plant is fully justified.

(h) The State Pollution Control Board and Ministry of Environment and Forest also have given permission for only 260000 tonnes per annum sponge iron production (**Annex-V**) , which on calculating works out to 74.29% capacity utilization based on 350 days and 86.66% based 300 operating day. However while calculating the installed capacity of WHRB boiler only 300 days have been estimated therefore the capacity utilization shown as 80% is equivalent to about 68.57% (based on 350 days) against 95% of coal based AFBC. Thus the level considered is practicable level.

(i) Justification for consideration of 95% PLF for coal based power plant:
The coal based captive power plant of this size have no Technological and other barriers, hence they can be operated easily up to 95% & above PLF. Hence, the considered PLF is most appropriate for the sake of making economic comparison between the two scenarios. On going through a number of publicly available disclosure also it will be revealed that it is comfortably possible to achieve more than 95% PLF in coal based thermal power plant.

(j) This may be appreciated that in a coal based captive power plant of this size (25 MW) the boiler would have higher steam generation capacity of 102 tph than the full load steam requirement of 95 tph and also where the turbine and generators design allow to generate upto 10% excess power than the design level thus at several moments plant is able to operate even at 104% or higher load (**Annex VI**). Also in the coal based power plant there is no crisis of raw material as well there is no crisis of consumption of generated power or evacuation of generated power. Therefore the capacity utilization is also not hampered due to this. The 95% PLF has been calculated based on 350 working days only whereas the captive power plant can also operate for 355 days. Therefore, it is easily possible to generate power with 95% PLF in coal based AFBC (**Annex VII**).

The groups experience in operation of the coal based captive power plant also confirmed that it is possible to easily achieve up to 100% PLF on annualized basis, whereas, it is not possible to have more than 60 to 65% PLF (350 days basis) with WHRB Power Plant which is already experienced by the company on it's 2 nos. of ongoing project, as explained above.

Appropriateness of Comparison: As it is stated in the PDD & also established through the calculations that in absence of the project activity the 25 MW coal based captive power plant only would have been implemented, hence it is most appropriate to compare the project activity with the baseline capacity level only. As regards the PLF comparison we have stated that the actual annualized PLF in WHRB is found even much below 60%,(350 days basis) which would be equivalent to about 70%OPLF on 300 days basis. Against which we have considered the OPLF at 80% for WHRB (300days basis). This is most optimistic for WHRB to give the better economic returns to compare with Coal based AFBC. As by considering the lower OPLF with WHRB the unit cost of power from WHRB will still be higher. Whereas in case of AFBC we have already demonstrated that one of the operating AFBC power plant of company having 11MW capacity has performed more than 100% capacity. The other evidence provided also prove this contention. Hence the considered 95% PLF(based on 350 days) is most conservative. Since the operating level differences (PLF) are because of the Technology barriers faced by WHRBs operating with Sponge Iron plant, hence the comparison made with different PLF is appropriate. Since the source for meeting out the gap of power due to enormous fluctuation (from WHRB) is only from Grid, whose per unit tariff cost is still higher than the calculated unit cost of power from WHRB, thus any further comparison to work out the cost of energy at equal level (MWh /annum) between both the scenarios will only increase the unit cost of power from WHRB option. Hence also the comparison made is quite appropriate.

The unit cost of power worked out by us from 25 MW coal based AFBC captive power plant I.e. the baseline scenario was assessed at 1.36 Rs. per Kwh, whereas the unit cost of power for grid based Thermal Power Plants (i.e. Coal based) as determined by the CSERC in it's tariff order FY-05, has been assessed as 1.034 Rs/kWh only. Hence this comparison also is appropriate. (Enclosed copy of the tariff order-**Annex-XI**)

POINT No.2

The DOE is requested to provide further explanation for the delay in submitting the project for validation to show that CDM revenues were considered essential in the decision to invest in the project activity. The response should provide a detailed timeline of project implementation with relevant, preferably third-party evidences.

REPLY:

The company is already having complete knowledge about the benefits available from the CDM process as the company has already implemented 2 project activities which are registered vide registration reference No. 0264 and 0772. This project activity was implemented as a planned increase in the capacity expansion of the company and as per requirement of the methodology a new PDD was prepared for this independent project activity. The registered PDD of the project activity UNFCCC ref: 0772 at Page No. 2 & 3 , narrates that the company is in the process of expanding its activities and would be implementing the project activity as a new project activity. The economic comparison made by the company proves that the coal based AFBC captive power was found economically most attractive than WHRB or grid. Thus this also proves that the serious CDM revenue consideration was the only reason to implement the project activity.

The history of events is given below in chronological order which reveals that the company on deciding to implement the project activity with CDM support immediately appointed the project consultants for seeking CDM registration. The company parallely applied for seeking various legal clearances which are essential for the purpose of obtaining Host Country Approval. Therefore some delay was occurred due to these sanction of legal clearances.

Chronological History for Project

1	CDM Consideration	27/10/2004
2	Appointment of CDM consultants	27/10/2004
3	Purchase Order for WHRB Boiler to Thermax Ltd. 51 tph X 2 Nos.	29/10/2004
4	Supply agreement / Purchase Order for 25 MW TG with Greensol Power	14/12/2004
5	Application for seeking permission to establish from State Pollution Control Board	09/02/2005
6	Approval of Methodology for WHRB by UNFCCC	08/07/2005
7	Public Hearing / Public Consultation	06/08/2005
8	Application for Environment Clearance from Ministry of Environment and Forest submitted after Public Hearing.	07/09/2005
9	NOC issued by State Pollution Control Board	07/10/2005
10	Environment Clearance issued	02/03/2006
11	Permission to Establish received from State Pollution Control Board	04/05/2006
12	Validation proposal received from DOE	06/11/2006
13	Validator appointment done on.	15/11/2006
14	Webhosting of PDD for International Stake holders comments	03 Mar 07 - 01 Apr 07
15	Application for HCA to DNA	24/02/2007
16	letter received from DNA for submission of documents to establish serious CDM consideration, statutory clearances etc. (**Annex IX**)	16/03/2007
17	Commissioning of 12.5 MW (first Boiler) Power plant of Project	31/03/2007

	Activity	
18	Consent to Operate received from State Pollution Control Board	11/04/2007
19	Host Country Approval issued on	15/05/2007
20	Commissioning of 12.5 MW II Boiler, completion of implementation	03/08/2007

The documentary evidence of all the above are provided to the DOE.

After development of approved methodology ACM0004 on 8th July 2005 the consultants were working on development of PDD for this project also, as well as the other two projects activities process of validation & registration (UNFCCC Ref : 0264 and 0772) was going on. The finalization of the PDD for this project activity was delayed due to this reason as well as due to delay in receiving the permission to establish and Environment Clearance (Legal Clearance) the submission of PDD for validation and host country approval was delayed. The delay caused in the process was un-avoidable and beyond the control of the company. Hence we request to kindly pardon the delay.