BUREAU VERITAS CERTIFICATION has conducted the validation of the CDM Project Activity ***"Installation of Top-Pressure Recovery Turbine at Blast Furnace -4"***. The request for registration was completed on 21/12/2012. The reference number of the project activity is UNFCCC00009006.

Subsequently, there have been 3 requests for review.

We give below our response to the queries raised in the request for review

Query No. 1

The DOE shall further substantiate the suitability of input values, in particular the escalation rate of O&M costs (4%) and the escalation rate of tariff (1.2% in average). Please refer to VVM version 1.2, paragraph 111 (a).

BVCH's response :

The decision to invest in the project activity (TRT) was taken by the Project participant on 03-April-2007. This was followed by the resolution of the Company's Board of Directors for expansion of the production capacity JSW, Vijaynagar works from 7 MTA to 10 MTA

The decision for the TRT (i.e. the project activity) was based on the Detailed Project Report prepared by independent consultants DESCON. The Board, while taking their decision to set up the TRT, also took as an input, the Approval Note[1] dated 03-April-2007 that was presented before the Board. The Approval Note includes financial data and workings[2] that had been prepared for the review of the Board for the meeting and the investment decision that followed. The input parameter "rate of tariff escalation" is evident from the financial working sheet that forms part of the above said approval note presented to the Board. The tariff starts with INR 1.53/kWh for the first year of start of operation of the project activity and escalates annually to a final value of INR 1.92/kWh in the final year of the analysis. The average of the annual tariff escalation is then 1.23% over the investment timeframe, viz., 20 years. The same tariff values have been applied in the investment analysis by the Project participant. The same values have also been considered by SBI (State Bank of India), lenders to the capacity expansion project and project activity, in the financial analysis they conducted for the debt syndication for 10 MTPA expansion project.

[1] Annexure 1: Approval note dated 03.04.2007, financial workings, Board Note No. 1072 & Board Resolution extract

[2] The Approval Note has mentioned an IRR value of 10.74% presented to the Board. The same value was also mentioned in the webhosted version of the PDD. However, during the course of validation of the Project participant's investment analysis, in response to the validation team's findings, the Project participant revised the IRR value from 10.74% to 6.45%. This is stated in section 3.4 of the validation report v01

The escalation rate of O&M costs @4% is a normative assumption that is considered in the investment analysis by the Project participant and is supported by CERC (Central Electricity Regulatory Commission) tariff regulations[3] dated 26.03.2004 that have stipulated the annual escalation on O&M to be @4% for power generation plants. This was accepted by the validation team as a broad assumption for cost escalation in the O&M cost. The same was also cross-checked against the actual costs incurred by the Project participant in 2011-12 and 2012-13. The actual cost figures are available from the account statements[4] prepared by the Project participant that indicate the costs for these two years as follows :

Financial year 2011-12 : O&M cost INR 49.55 million

Financial year 2012-13 : O&M cost INR 52.99 million

Thus it is seen that the actual increase in the O&M cost during the first two years of the operation of the project activity since its date of commissioning is almost 7%. The assumption of 4% in the investment analysis is therefore acceptable as a more conservative estimate.

The validation report version 1 dated 10.12.2012 did not justify the assumption of these two input parameters in detail. The report has been revised to version 2, with the justification for the consideration of these inputs added to the report.

Tariff values were also cross-checked against the investment model of the project activity submitted to and appraised by State Bank of India Capital (SBI CAP) whom the Project participant had approached for funding support for the project activity. The validation team of BVCH has referred to the SBI CAP letter [5] and confirmed that the same values were also stated therein.

Query No 2

The DOE shall further substantiate how it has validated the appropriatness of using annex 1 of ACM0012 to assess the extent of use of waste energy from the waste energy generation facilities in the absence of the CDM project activity given the fact that there appears to have less tna five similar facilities without including the facilities with CDM projects. In doing so,

[3] http://cercind.gov.in/28032004/finalregulations_terms&condition.pdf

[4] Annexure 2a : Statement of actual O&M costs incurred during the financial year 2011-12 & Annexure 2b: Statement of actual O&M costs incurred during the financial year 2012-13, prepared by the project and operations personnel of Jindal Steel & Power Ltd. and certified by the Accounts Department of the Company

[5] Annexure 3: Letter from State Bank of India (SBI CAP) dated 28/09/2011

please also be notified that option 1 is applicable only if at least five facilities are analysed to arrive at "reference facility" practice. Please refer to ACM0012 version 4, annex 1.

BVCH's response :

The assessment of the extent of use of WECM, required by Annex 1 of ACM 0012 is dealt with in Annex 3 of the PDD version 5, as per the criteria defined in the methodology. The number of facilities that meet these criteria is 5; however, 1 of these facilities is an already registered CDM project activity (Tata Steel Blast Furnace H), while another 3 facilities are under validation for CDM. This leaves only one facility (Bhushan Steel) for the analysis of the assessment of use of WECM.

For the use of Option 1, it is necessary that at least five facilities are analyzed to arrive at reference facility practice. The number of facilities analyzed (only one) is therefore insufficient for the assessment to be carried out as per Annex 1 of ACM 0012. The validation team accepts the issue raised by this query in the Request for Review.

The Project participant, however, was also in a position to furnish a letter[6] from the manufacturer of the project facility, M/s. Siemens in which it is confirmed by the manufacturer that utilization of the pressure energy from the off gases of the blast furnace through a recovery turbine (TRT) is the only known process available on blast furnace plants to utilize waste pressure energy and in the absence of the TRT, the pressure energy inherent in the blast furnace gases would be lost. The letter from M/s. Siemens effectively states that there is no alternative design possible for the use of WECM other than the TRT that is used in the project activity.

M/s. Siemens has also stated in their letter that in conventional blast furnaces, the pressure energy is not recovered unlike the project activity, but dissipated in valves. Thus, it is confirmed by the manufacturer of the project equipment that wastage of the pressure energy of the top gases exiting the blast furnace in such conventional blast furnaces is the only possible alternative to the project activity and hence, inferred as the baseline scenario.

The Project participant has analyzed and concluded the baseline alternative in section B.4 of the PDD to be W2 (i.e. the wastage of pressure energy without utilization). This alternative for the use of WECM in the baseline is therefore coincident with the inference that can be drawn from the letter of M/s. Siemens as explained above. In the baseline scenario, with no utilization of the WECM and no power generation taking place from the same, the power needs for the expansion would be supplied entirely by the 300 MW Captive Power Plant (CPP-4) to be set up to meet the requirement of power for the capacity expansion from 7 MTPA to 10 MTPA.

[6] Annexure 4: Letter dated 30th Jan 2011 from Siemens, manufacturer of the Blast Furnace and TRT

The baseline use of WECM is already inherent in the investment analysis conducted and presented in the PDD. The revenue for the project activity is saving of equivalent variable cost of power generation through baseline 300MW CPP.

The investment analysis is based on costs that would have been incurred by the Project participant in case project activity not been set up (the power generated by the project activity would then be generated by the identified captive power plant (CPP) of 300 MW) and the cost of power generation by the 300 MW CPP, is included as the cost saved by the project activity, and therefore the revenue component of the investment analysis. The investment analysis through the use of IRR as a financial indicator has demonstrated that investment in the project activity would realize an IRR that is lower than the WACC benchmark and therefore, investment in the project activity is not a more viable proposition for the Project participant than not to invest at all, viz., a continuation of the baseline scenario.

Thus, the investment analysis establishes conclusively that the baseline practice was not to utilize the waste energy, as demonstrated in line with the requirement in Option 2 of annex 1 of ACM 0012 and hence, the baseline practice factor $f_{practice}$ is taken as 0 (i.e. the existing practice is of no other use of the WECM) by the Project participant.

The Project participant has revised the PDD to include the assessment of the use of WECM through Option 2 (rather than Option 1) of Annex 1. BVCH also has revised its validation report to include its substantiation of the same.

Query No 3

The DOE shall further substantiate how it has validated the appropriateness of the identified baseline scenario given the fact that it is not clear whether the project paricipant has included all potential baseline alternatives while identifying the baseline scenaio, in particular, the internal grid of the facility that consists five power plants (CPP1, CPP2, CPP3, SBU I and SBU II). Please refer to VVM version 1.2, paragraph 84.

BVCH's response :

To substantiate the analysis of the baseline scenario for the project activity, BVCH begins by presenting below the power demand and supply scenario that existed at the stages of expansion of production capacity of Jindal Steel's plant.

A) Ist stage (Capacity 4 MTA)

JSW Steel Vijaynagar facility had become a 4 MTPA capacity steel plant in year 2006 due to commissioning of blast furnace BF-1..

The power requirement for this capacity was 270.34 MW which was served through the generation by CPP-I (100 MW) & CPP-2 (130 MW) power units of the Project participant, based on blast furnace gas and corex gas.

B) IInd stage (Capacity increased from 4 MTA to 7 MTA)

In the year 2006, the Project participant had decided to increase the capacity from 4 MTA to 7 MTA, for which additional power of 204.88 MW was required. As the existing supply (230 MW together from CPP-1 & CPP-2) would be insufficient to meet the demand, a new captive generation facility (CPP-3) of 300 MW was planned and set up.

The blast furnace (BF-3) installed with incremented capacity of 3 MTA (7MTA – 4 MTA) also had a TRT system that could generate 12.4 MW of power (TRT-III). At the time of the decision to expand the manufacturing capacity from 7 MTA to 10 MTA, the power demand and supply position for the 7 MTA manufacturing facility was therefore as follows:

Demand	***Supply***	
1. 475.22 MW	1) CPP-1 & CPP-2	(230 MW)
	2) CPP-3 (new)	(300 MW)
	3) TRT-III (new)	(12.4 MW)

Total..		542.4 MW

C) IIIrd stage (Capacity increased from 7 MTA to 10 MTA)

A decision was taken by the Project participant in the year 2007 to further scale up its manufacturing capacity from 7 MTA to 10 MTA. The additional power demand for this expansion was 308.77 MW.

The augmented capacity (7 MTA to 10 MTA) would be met by blast furnace BF-4 equipped with a TRT that would produce 12.4 MW of power (i.e. the project activity itself). Just prior to the decision to expand the manufacturing capacity from 7 MTA to 10 MTA, the power demand and supply position was as shown above, viz.,

Total demand (7 MTA capacity)	: 475.22 MW
Total supply	: 542.4 MW

The available supply was enough to meet the production capacity of 7 MTA. However, it was clearly insufficient to meet the additional power demand created due to the capacity augmentation to 10 MTA. Hence, another new 300MW power plant CPP-4 was also required to be set up to cater to the new demand.

At the time of the Project participant's investment decision, therefore, the following scenario prevailed :

1. There was an existing capacity of 542.4 MW generating power; out of which 475.22 MW were already committed to the needs of the 7 MTA production capacity. Thus, only 67.18 MW was free to partially meet other requirements coming up.
2. Though there existed a free capacity of 67.18 MW from the combined generation of CPP-1, CPP-2 , CPP-3 & TRT –III, this surplus would first be utilized towards meeting the additional power requirements of the augmented capacity (10 MTA), in a natural utilization sequence. Hence, all the available capacity from existing Captive Power Plants (viz., CPP-1, CPP-2, CPP_3 & TRT-III) would first get booked to meet the power requirement of the augmented capacity of 10 MTA (though partially)
3. The power demand of the augmented production facility (10 MTA) was 783.99 MW and this demand could be met in total only by the proposed new captive generation plant (CPP-4) of 300 MW.
4. The additional power (12.4 MW) available through TRT-IV (i.e. the project activity) would therefore displace the power generated by the proposed new plant CPP_4 (300 MW) since the capacity of all the other power units would already be booked towards fulfilling the power needs of the combined 10 MTA production capacity. Had there been no project activity (i.e. in the absence of the 12.4 MW TRT based power plant), the utilization of the 300 MW CPP-4 plant would have been higher to the extent of the power generated by the TRT-IV plant.

BVCH therefore agrees with the baseline alternative P8 (Greenfield on-site /off-site fossil fuel based captive plant as the realistic and credible baseline alternative for power generation by the project activity power plant. Also, the project activity displaces only that power that would have been produced by the CPP-4 300 MW plant, as explained in the paragraphs above.

D) SBU-1 & SBU-2

The Project participant JSW Steel Ltd. has its group concern JSW Energy Ltd that was set up initially to cater to JSW Steel's power requirements. JSW Energy Ltd. has two power plants: SBU-I (2 x 130 MW) & SBU-II (2 x 300 MW).

In due course, however, JSW Steel Ltd installed its own captive power plants CPP-1 & CPP-2 to fulfill its power requirements and in the year 2006, an existing power purchase agreement between the two companies was terminated. Thereafter, JSW Energy Ltd. continued to be engaged in power generation and its sale to the grid in its capacity as an independent power producer. With the termination of the power purchase agreement, the option of drawing power from JSW Energy Ltd. on a regular basis, no longer existed for JSW Steel Ltd. This applied to JSW Energy's SBU-I plant and also to SBU-II, which anyway was set up much later[7], in 2009, post decision making date of the project activity and for which no Power Purchase Agreement of the Project participant with JSW Energy Ltd. ever existed.

[7] This was confirmed by the validation team from CERC Monthly Report of Broad Status of Thermal Power Projects in the Country May 2013 available on Page 9 of 65 at http://www.cea.nic.in/reports/proj_mon/broad_status.pdf

Therefore, the alternative P6 (On-site or off-site existing fossil fuel based existing identified captive power plant) also did not exist as a baseline alternative for the project activity.

E) Internal grid (comprising CPP-1, CPP-2, CPP-3 , CPP-4, TRT –III , SBU-I & SBU-II)

The individual power plants CPP-1, CPP_2 , CPP-3, CPP-4, all cater to the power needs of JSW Steel Ltd.'s combined manufacturing capacity of 10 MTA produced by 4 blast furnaces BF-1, BF-2, BF-3 & BF-4. However, to enable smooth and uninterrupted flow of power from all these plants as well as from the point of view of the ease of scheduling of power transfers, these plants are interconnected to form an internal grid that can be sourced by individual recipients of the steel manufacturing plant.

BVCH is of the opinion that though power injected into the internal grid of the JSW Steel manufacturing plant by all its captive power plants is available in the form of a pooled source and is indistinguishable in terms of which plant produced that power, it is in reality the power generated by the CPP-4 that is actually displaced by the project activity, as justified above in paragraph (C).

The internal grid of JSW Steel differs from a statewide or national power grid in the following respects:

1. A national or state grid comprises of a number of connected power plants. The number of plants that make up the internal grid is very small in comparison (only 6 plants)
2. The internal grid is no more than an interconnection between a limited number of captive power plants supplying power to the manufacturing facility. The term "grid" is applied loosely only for the sake of convenience in this case and its usage is not intended to be as rigorous as it would be for a national or statewide grid, the scope and boundaries of which are on a much wider scale.
3. ***It is possible to identify for the internal grid, which of the captive power plants the project activity would be displacing power from.*** In the present case, it has been justified in paragraph (C) above that the project activity displaces power from CPP-4. In this regard, the internal grid differs significantly from a national or state grid in whose case, it would not be possible to pinpoint any one specific power plant from which power would be getting displaced as a result of a renewable or waste energy recovery power generation plant.

Since it can be established that the project activity would displace power that in its absence would be generated by CPP-4, the validation team of BVCH is of the opinion that the baseline scenario for power (P8) is correctly assessed and is appropriate.
The baseline, therefore, is the green field on-site captive power plant CPP-4 rather than the internal grid, which is referred to in the validation report as a term for convenience, only to denote the interconnected captive power plants in JSW Steel's plant premises.

Query No 4

The DOE shall further substantiate how it has validated the appropriateness and conservativeness of the electricity emission factor of the baseline scenario, given that:

(a) the Greenfield 300MW coal based captive power plant (CPP4) has been identified as the baseline scenario of power generation, while the electricity emission factor of baseline scenario has been determined based on an internal grid that consists of five power plants (CPP1, CPP2, CPP3, SBU I and SBU II)).

BVCH's response Part (a) :

In its response to Query No. 3 in the above paragraphs, BVCH has sought to explain and justify why it has regarded the CPP-4 (300 MW) to be the power baseline for the project activity. It has been justified that at the time of the Project participant's investment decision, all the existing captive power plants were already committed towards meeting the power demand for the 10 MTA expansion and hence, the project activity could only displace power that would be generated by the 300 MW CPP-4 plant.

Thus, the alternative P8 does correspond to the power baseline, as assessed by the validation team of BVCH.

The manufacturing plant of JSW Steel will satisfy its power requirements by accessing the power generated by the consortium of captive power plants CPP-1, CPP-2, CPP-3, CPP-4. Together with the power plants SBU-I and SBU-II belonging to JSW Energy Ltd., these plants would form the internal grid supplying power to JSW Steel's manufacturing plant. An erstwhile Power Purchase Agreement (PPA) between JSW Steel Ltd. (the Project participant) and JSW Energy Ltd. for the purchase of power from SBU-I was terminated in 2006. There is also no PPA in existence for power from SBU-II. Hence, it can be concluded that no contractual arrangements were in place for JSW Steel to draw power from JSW Energy Ltd. for a pre-decided contracted demand.

Nevertheless, the validation team has observed during its site visit that provision exists for JSW Energy Ltd. to supply power to JSW Steel Ltd. as the infrastructure for the supply of power from JSW Energy Ltd. to JSW Steel Ltd. is set up and is still available for use. The Project participant has confirmed , however, that power from JSW Energy Ltd. would only be used on a need basis and ***such usage would be on a sporadic basis only and not on a regular basis*****.**

In the determination of the baseline emission factor, therefore, the Project participant has included the SBU-I and SBU-II plants also, as it is not unlikely that these plants would also

supply power to JSW Steel; although the occasions for such power imports by JSW Steel Ltd, would be essentially limited to those rare situations of breakdown or unavailability of any of these plants.

From a power balance presented in the PDD, it is clear that the project activity (TRT-IV) displaces the equivalent amount of power generated by it, from the 300 MW CPP-4. However, CPP-4 does not dedicatedly cater to Blast Furnace-4 (whereof TRT-4 is a part) but through an electrical network, referred to as the internal grid. Hence it would be inappropriate to compute the baseline emission factor as that corresponding to CPP-4 alone. Therefore, the Project participant has computed the electricity emission factor that corresponds to the so called internal grid, which takes into account the emissions and also the generation by each of the captive power plants of JSW Steel Ltd. as well as the off-site plants SBU-I & SBU-II of JSW Energy Ltd.

The purpose of including these plants within the emission factor computations is also to replicate, to the extent possible, both normal as well as abnormal situations that could be expected to occur during the operation of the project activity power plant and from which it would be possible to arrive at a value of the baseline emission factor that would be representative of real time operations of the steel plant.

The computation of the baseline emission factor was carried out in the PDD submitted along with the request for registration (RfR), without including the CPP-4 plant. The value of baseline emission factor calculated without including CPP-4 is worked out to 0.95 tCO_2/MWh. The CPP-4 was commissioned only in 2012 and hence, data pertaining to CPP_4, to work out the emission factor of the interconnected captive power plants, was insufficient at the time of completing the PDD for validation.

With the CPP-4 now commissioned and operational, actual data related to its working is expected to be available in the future for the computation of emission factor. This implies, in turn that the baseline emission factor for the internal grid as a whole also could be computed based on actual data of plant performance

BVCH believes that an ex-post computation would yield true values based on actual data that are readily acceptable without the necessity of having to check the conservativeness of those values, as the computation would be on the basis of actual data and not on any assumptions.

The Project participant has revised the PDD to compute the baseline emission factor as an ex-post monitored value for the cohort of power units CPP-1, CPP-2, CPP_3, CPP_4 and the JSW Energy SBU-I & SBU-II plants.

The revision is made in the PDD in section B.7.1 wherein $EF_{elec,i,j,y}$ is added as a monitored parameter. In the version 5 of the PDD that was submitted along with the Request for Registration, this parameter had been included in section B.6.2. In the revised PDD the same has been removed from B.6.2 and included under B.7.1.

BVCH therefore accepts that the ex-post computation of the baseline emission factor is more appropriate and satisfies the requirements for conservativeness of values considered.

(b) It is not clear whether the internal grid is isolated or connected with the national or regional grid; and if it is connected, how the DOE has validated that the electricity generated by the project activity would not replace the electricity that would be imported from the national/regional grid. Please refer to VVM version 1.2, paragraph 91.

BVCH's response Part (b) :

BVCH confirms that JSW Steel Ltd. is **not** connected to the Karnataka Power Transmission Corporation Limited (KPTCL) grid. Chronic power shortages in the KPTCL grid as well as other unavailability issues do not make it realistic for the Project participant to depend on the grid for the operation of a large scale integrated steel plant such as the JSW Steel plant. Assured reliable and uninterrupted power supply is necessary for the smooth working of the steel plant. Such reliable and continuous power supply cannot be ensured by the grid and can come only from dedicated captive power plants. Hence, JSW Steel Limited sources power from its own CPPs to maintain self sufficiency for its power needs. The Project participant has provided evidence[8] that clearly indicates that the power requirements of JSW Steel Ltd. are met in totality by in-house captive power plants and there is neither provision nor necessity for import of power from the grid.

Thus, it could be concluded that the internal grid is completely isolated from the state and national grid and hence, the possibility of displacement of electricity in these grids, by the Project participant, does not arise.

Conclusion

BVCH hopes that it has been able to satisfactorily clarify on the queries raised by the Registration & Issuance team, through the explanation offered in this response. Bureau Veritas Certification thus requests the registration of ***"Installation of Top-Pressure Recovery Turbine at Blast Furnace -4"*** as a CDM project activity.

[8] Annexure 5: Electrical Line Diagram for TRT-IV project confirming no provision to import power for the grid,

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Internal Technical Reviewer

Date : 12.07.2013 Mumbai

H B Muralidhar

Team Leader

Date : 12.07.2013, Bangalore