UNFCCC Secretariat
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Att: CDM Executive Board

Your ref.:	Our ref.:	Date:
CDM Ref 2127	KCHA/PETMO/BRINKS	13 August 2009

Response to request for review "Waste Gas based Power Generation Project at Ankit Metal & Power Limited" (2127)

Dear Members of the CDM Executive Board,

We refer to the requests for review raised by three Board members concerning DNV's request for registration of the "Waste Gas based Power Generation Project at Ankit Metal & Power Limited" (2127) and would like to provide the following initial response to the issues raised by the requests for review.

Comment 1:
Further clarification is required on how the DOE has validated the economic comparison analysis, in particular, why electricity imports from the grid in the project activity are significantly higher (92,030.4 MWh/annum) compared to that in the baseline scenario (79,992 MWh/annum).

DNV Response:
The project proponent M/s Ankit Metal & Power Limited had decided for the implementation of the project activity on 15 January 2004 to meet the power requirement of integrated iron and steel plant at Bankura district in West Bengal of India **(Appendix – I)**. At the time of investment decision the project proponent looked at the alternatives which could cater the total power requirement of 26 MW (i.e. 165 528 MWh/annum considering total capacity utilization factor of all the process) for the integrated iron & steel plant. Based on this power requirement the project proponent sent the work order to M/s Consultant & Engineers Private Limited on 5 January 2004 for unit cost analysis of all alternatives. M/s Consultant & Engineers Private Limited had provided the unit cost analysis which is attached as (**Appendix – II)**.

DNV would like to state that, in line with the "Tool for the demonstration and assessment of additionality" (Version 5.2), the output levels of services for the baseline and project scenario have been considered the same at 165 528 MWh/annum.

DNV would also like to state that, the electrical energy load of the integrated iron and steel plant are classified into two categories i.e. 'kicking load power requirement' & 'stable load power requirement'. The electricity requirement of the induction furnaces of the steel melting shop as well as the rolling mill are very high in magnitude and are instantaneous in nature **(Appendix – III),** that is there is an instantaneously large requirement of energy during start ups and shutdown

of the induction furnaces and the rolling mills. Due to this nature of load requirement and to ensure the safety of the captive power plant generation set, the kicking load is met from the grid power. There are three induction furnaces in the plant, one with power requirements of 7 MVA and two other furnaces of 4 MVA each. The power requirement of the 7 MVA induction furnace alone accounts for almost 60% of the power generation from the CPP. Since induction furnaces operate in batches and during unloading of a batch from this 7 MVA furnace, the load of the CPP would have been reduced instantaneously by 60%. This sudden lowering of load will lead to turbine over-speed. Also during charging of a new batch, there would be a sudden upsurge of the load requirement. If this load is catered by the captive power plant, due to sudden load upsurge, steam header pressure will drop. To control the turbine over-speed, the steam flow to the turbine or boiler steam pressure needs to be lowered instantaneously to avoid tripping of the turbine and mechanical damage to the turbine blades. However, lowering the boiler steam pressure instantaneously is not a practically feasible option in a situation where there is a sudden load fluctuation to the extent of 60% of the total capacity of the power plant. Similarly in case of sudden upsurge of load the steam pressure in the turbine will drop which might lead to steam condensation in the turbine resulting in high vibration and mechanical damage to turbine blades due to 'pitting'. Thus sudden load variations due to the kicking loads will lead to tripping of turbine due to over-speed, over frequency or steam header pressure drop. This may also cause breakage of turbine blades and other associated complications. **(Appendix - IV)**. Thus these loads are referred to as kicking load power requirement of an integrated iron and steel plant. It is to be noted that these problems are associated only with the rolling mills and the 7 MVA induction furnace. The other two furnaces having much smaller capacity accounts for only 30% of the power generation from the CPP and can be operated on a load sharing basis, *i.e.* the load of one furnace is increased while decreasing the load of the other. Also since these furnaces accounts for 30% of the power generation from the CPP, the CPP can absorb the variation in the load and operate without hampering the normal plant operations or leading to mechanical damages to the turbine.

Hence it is the common operational philosophy for small integrated steel plant with small CPPs to source the kicking loads (electricity requirements) from the electrical grid which has virtually infinite capacity and can absorb sudden upsurges and fluctuations in load.

On the other hand, the electrical energy requirement of the sponge iron and ferro-manganese facilities is quite uniform in nature and hence stable. Therefore they are termed as stable load power requirement of the plant and these loads are catered by the CPP.

The calculations (done by the consultants M/s Consultant & Engineers Private Limited) for the unit cost of generation for the entire power requirement of the plant, had adopted the same operational philosophy for calculating the power demand-supply scenario in the project case and the baseline case. Thus approximately 79 992 MWh/annum corresponding to the kicking loads of the plant has been assumed to be sourced from the electricity grid in both project and baseline case **(Appendix IV)**.

DNV, as a part of the validation, had ascertained that, in case of 'Alternative-1: Generation of power in a coal based captive power plant' *i.e.* the baseline alternative, the project proponent would have generated around 85 536 MWh/annum of net electrical energy from their coal based captive power plant to cater to the stable load requirement. This is supplemented with import of 79 992 MWh/annum of electrical energy from the eastern regional electricity grid of India to cater to their kicking load power requirement. The Board is requested to note that the power generation from the coal based power plant is not dependent on the operation of the sponge iron kiln and irrespective of the operation of the sponge iron kiln the same amount of power would always be available from the coal based power plant.

However in case of 'Alternative-3: Project Activity', the in-house power generation depends primarily on operation and subsequent availability of waste gas from the DRI kiln. With any disruption in DRI kiln operation; there will be shortage in waste gas supply leading to a lower

power generation from the WHRB based captive power plant. As evidenced from the operational records of the DRI kiln for the financial year 2006-2007, 2007-2008, and 2008-2009 up to October 2008, the annual average operational days for the DRI kiln were around 124 days, 145 days, and 265 days per annum, respectively. During the initial start-up period there were technical problems resulting in less operating days. The plant finally achieved stable operation end of 2007. Thus annual operation of about 270 days per annum for the DRI kilns and hence the WHRB has been deemed appropriate and realistic (**Appendix -V**). Considering the normal operation of the DRI kiln (at approximately 270 days), the power generation from the 8 MW WHRB is calculated to be around 45 619.2 MWh/annum. This is further supplemented by the 4 MW coal based AFBC (operating for 330 days irrespective of kiln operation) which generate 27 878.4 MWh/annum. Thus the combined power generation from the CPP in the project scenario is 73 497.6 MWh/annum and would not meet the stable load demand. Therefore in the project scenario, the balance power of 12 038.4 MWh/annum (*i.e*. 85 536 – 73 497.6) is required to be imported from the grid, which is additional from the baseline scenario.

As stated earlier in the response, 79 992 MWh/annum corresponding to the kicking loads of the plant has been assumed to be sourced from the electricity grid in both project and baseline case. The additional power being sourced from the grid in the project scenario is to make up for the shortfall in the stable load demand due to low captive generation arising from shortage of waste gases (kiln failures etc, which has been verified from the operating data of years 2006-2007, 2007-2008, and 2008-2009 up to October 2008, the annual average operational days for the DRI kiln were around 124 days, 145 days, and 265 days per annum, respectively).

Comment 2:

Further clarification is required on the appropriateness of the operational barrier due to inconsistent power generation from the waste heat in the context of this specific project activity.

DNV Response:

It has been evidenced from the annual production record of DRI Kiln **(Appendix – V)** the DRI kiln load factor varies from 11% to 94% and average load factor of the DRI kiln is 42% excluding first six months production due to teething issues after commissioning. DNV has verified the annual production record of DRI Kiln during the validation site visit. As mentioned in the previous response the annual average operational days of the DRI kiln in the years 2006-2007, 2007-2008, and 2008-2009 up to October 2008 were around 124 days, 145 days, and 265 days per annum, respectively Thus annual operation of about 270 days per annum for the DRI kilns and hence the WHRB has been deemed appropriate and realistic It has also been evidenced from the letters of Ankit Metal and Power Limited’s to the S.E. & Circle Manager that the grid supply in the region suffers from grid fluctuation, power cut for 8 to 10 times in a day and also from low voltage **(Appendix – VI).** Hence, sudden load on the grid supply which may occur due to non-availability of power from the WHRB could disturb entire plant’s normal operation due to non-availability of power from both the WHRB as well as the grid. On the other hand, for the base case coal based power plant, power generation from the plant remains almost constant and hence grid dependency will be predetermined and planned for.

DNV would also like to state that the baseline scenario for the project activity is the generation of power in the captive coal based power plant to meet the stable load requirements, with the kicking load being sourced from the grid. The project scenario envisages the sourcing of a part of the stable load demand (~7.2% of the entire integrated iron and steel plant power demand) from the grid power to make up for the shortfall in the captive generation. The kicking load is anyway sourced from the grid. DNV accepts that the grid related problems would affect both the baseline scenario and the project scenario since the plant is partially dependent on the grid in both cases. However, since the project scenario additionally depends on the grid power to the tune of ~7.2% due to low

captive generation arising from shortage of waste gases, the instability of the grid affects the project scenario more adversely than it affects the baseline scenario. Thus inconsistent power generation from the WHRB with grid instability causes operational barrier to the project activity.

Comment 3:
The DOE is requested to further substantiate the conclusion that coal based captive power plant would have been constructed in the absence of the project activity as: (a) the steel plant had been exporting electricity from the grid in the absence of the project activity, and (b) in the project scenario the imported electricity still covers 58% of the total electricity demand of the integrated steel plant.

DNV Response:

The Board is requested to note that the primary purpose of the project proponent was to define alternatives that could cater to the total power requirement of the integrated iron & steel plant activity at the lowest cost. The project proponent had three options to cater to the power requirement of the steel works. As demonstrated earlier during the request for registration, the cost of power generation is the lowest in case of ‘Alternative-1: Generation of power in a coal based captive power plant’ (INR 2.48/kWh) followed by ‘Alternative-3: Project Activity’ (INR 2.7/kWh) whereas consumption of power from the grid is the costliest option (INR 3.5/kWh). Thus it is logical to conclude that in the absence of the project activity, the project proponent would have opted for the least cost option of generating power from the coal based power plant. However since it was decided to implement the WHRB based power plant considering CDM benefits which would take some time for commissioning, in the meantime the power was sourced from the grid to keep the plants operational and also because there were no other available source of power. It is also to be noted that the steel plant was yet to be installed completely at this time and the power requirement of the plant was ~4-5 MW during this period.

As explained earlier in the response to query 1, while the primary aim of installing a CPP remains the reduction in power cost, and meet the stable operation load of the plant as due to operational reasons the entire power requirement of the steel plant cannot be met from the power plant, 79992 MWh/annum corresponding to the kicking load requirement will be met from the grid. As noted by the Board, the project used to consume power from the grid in the pre-project scenario and will also consume ~56% (*i.e.* 92 030.4/165 528) power from the grid in the project scenario. In the baseline scenario, this represents 48% (*i.e.* 79 992/165 528) of the total power requirement of the plant. Thus it can be concluded that actually ~7.2% of the power requirement to cater to the stable loads of the steel plant are met through grid imports in the project scenario which is attributed to the low availability of waste heat based power generation as compared to coal based power generation.

The above discussion establishes that:

a) The project proponent had already decided to implement the CPP, and minimal grid power was consumed for the time being till the power plant became operational,

b) The least cost option available to the project proponent was coal base generation with kicking loads being met from the grid, and

c) Under all circumstances the kicking loads of the steel plant will be met from the grid. The higher percentage of grid import in the project scenario as compared to the baseline scenario is due to the lower power generation from the WHRB

Thus to cater to the power requirement of the steel plant without affecting the flexibility and operability of the steel plant, combination of coal based power generation with imports from the

grid is the most economically attractive option available to the project proponent. Hence this option has been considered as the baseline for the project.

We sincerely hope that the Board accepts our aforementioned explanations.

Yours faithfully
for DET NORSKE VERITAS CERTIFICATION LTD

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