CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-PDD)
Version 03 - in effect as of: 28 July 2006

CONTENTS

Annexes

List of Appendices

SECTION A. General description of project activity

A.1 Title of the project activity:

Waste Gas based Power Generation Project at Ankit Metal & Power Limited

Version: 04

Date: 22/01/2009

A.2. Description of the project activity:

Ankit Metal & Power Limited (AMPL) has been established by Shri.S.K.Patni & others with an objective to set up an integrated steel plant in Eastern India. The same group has also set up Rohit Ferro Tech Limited which has achieved excellence in the field of Ferro Chrome manufacturing. Impex Metal & Ferro Alloys Private Limited, another Group Company and a renowned trading unit for over 16 years, is involved with the manufacturing of varied Ferro Alloys. The project developer has got an extensive background in the field of iron and steel manufacturing which is backed up by a dedicated team of highly qualified professionals having experiences in technical, administrative, finance and marketing fields.

The integrated steel plant of AMPL is set up at Jorehira in the district of Bankura in West Bengal. The steel plant primarily comprises the following units:

- Sponge Iron unit of 105,000 TPA[1] capacity
- Steel Melting unit of 60,100 TPA capacity which will be further enhanced to 100,000 TPA capacity
- Rolling Unit of 100,100 TPA capacity
- High Carbon Ferro Manganese plant of 12,000 TPA capacity and
- A Power Plant of 12 MW generation capacity

The project proponent is going to exploit the inherent synergies within the current value chain and will operate as an end-to-end manufacturer of steel. The steel plant will fully integrate AMPL over the entire value chain *i.e.* the process starts from the raw material (iron ore/coal) to value added finished steel.

One of the principal components of the integrated steel plant of AMPL, as indicated above, is the sponge iron manufacturing unit. Sponge iron is manufactured in the unit in a 350tpd[2] Direct Reduction Iron (DRI) kiln[3]. The process of sponge iron manufacturing generates waste gas (DRI kiln gas) with substantial heat value. In absence of the project activity the DRI kiln gas did not have any utilization in the integrated steel plant and therefore the same was combusted and emitted into the atmosphere thereby wasting its thermal energy potential. The project activity aims at effective utilization of the heat content

[1] Tonnes per annum.

[2] Tonnes per day.

of the DRI kiln gas for generation of stem and subsequently power in a Captive Power Plant[4] (CPP) to be installed within the plant premise. Therefore the primary objective of the project activity can be summarized as:

- Conservation of energy through preventing the wastage of useful energy
- Effective utilization of the same for generation of steam and power
- Catering partially to the in-house power requirement of the integrated steel plat of AMPL

Furthermore, in absence of the project activity, the power demand of the integrated steel plant would have been catered by generating power in a captive coal based power plant[5]. Therefore the project activity will replace an equivalent quantum of power generation from a more carbon intensive source (*i.e.* coal based captive power plant) resulting in an overall reduction of Greenhouse Gas (GHG) emissions.

With an expected 270 days of annual operation of the power plant with the DRI kiln gas, the project activity will generate around 45.6192 GWh of net electrical energy per annum and will partially meet the electrical energy requirement of the integrated steel plant. In absence of the project activity the same electrical energy would have been generated by a coal based captive power plant. Therefore the project activity will replace generation of around 45.6192 GWh of electrical energy per annum (*i.e.* 456.192 GWh over the entire crediting period of 10 years) from the coal based captive power plant and will eliminate emission of 26808 tonnes of CO_2 per annum amounting to a total of about 268080 tonnes of CO_2 over the entire crediting period of 10 years.

Project's Contribution towards sustainable development

Besides the direct benefits, the project activity will also lead to sustainable development in and around the area of its influence and broadly in the region and in the host country-India. The sustainability aspects of the project activity are furnished below:

[3] Commissioned in October'2005

[4] Commissioned in January'08

Table-A.1: Project's Contribution to Sustainable Development	
Social well-being	The project activity will be implemented within the plant premise of AMPL without causing any dislocation of the local population. Furthermore the project activity will lead to manpower employment during its construction, operation and maintenance phase. Hence there will be an increase in the local employment in the area of skilled and semi-skilled jobs. In a rural area like Bankura, it will therefore provide an impetus to the social status of the local people to some extent.
Economical well-being	Power generation with heat content of the DRI kiln gas will have a direct impact on reducing the dependency of the project proponent on a scarce natural resource-Coal. Indian economy is highly dependent on coal since it is the primary fuel for both thermal and electrical energy generation. Therefore the project activity will positively contribute towards reduction in use of finite natural resource coal, minimizing depletion or else increasing its availability to other important processes. Furthermore the project activity will also generate business opportunities for consultants, contractors, suppliers erectors *etc.* thereby benefiting them economically.
Technological well-being	The project activity entails power generation through inception of an environment friendly technology. Furthermore power generation with the heat content of the DRI kiln gas is a steep diversification from AMPL's core business area *i.e*. production of steel. So the employees of AMPL will be getting acquainted with the new power plant technology. In addition to this, power is the most essential input for industrialisation and it is indeed the fulcrum on which the future growth and development of the country rests. The demand for power continues to grow at a rapid rate outstripping the availability and hence the project activity holds the promise of narrowing the ever widening gap.
Environmental well-being	In absence of the project activity, the DRI kiln gas would have been emitted to the atmosphere, thus creating thermal pollution of the local environment. The project activity will reduce the thermal load of the local environment to a great extent by recovering and effectively utilizing the heat content of the DRI kiln gas. Furthermore it will replace fossil fuel based power generation thereby reducing the emissions of SO_x, NO_x and particulates. The project activity is a GHG abatement project which will reduce the generation of Greenhouse Gases (primarily CO_2) resulting from fossil fuel based power generation and hence is an initiative to combat global warming.

[5] Please refer to Section B.4 of the Project Design Document for details on identification of baseline scenario.

A.3. Project participants:

Name of the party involved((host) indicates a host party)	Private and/or public entity(ies) Project participants (as applicable)	Kindly indicate if the party involved wishes to be considered as project proponent(Yes/No)
Ministry of Environment and Forests, Government of India	Ankit Metal & Power Limited	No

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

A.4.1.1. Host Party(ies):

India

A.4.1.2. Region/State/Province etc.:

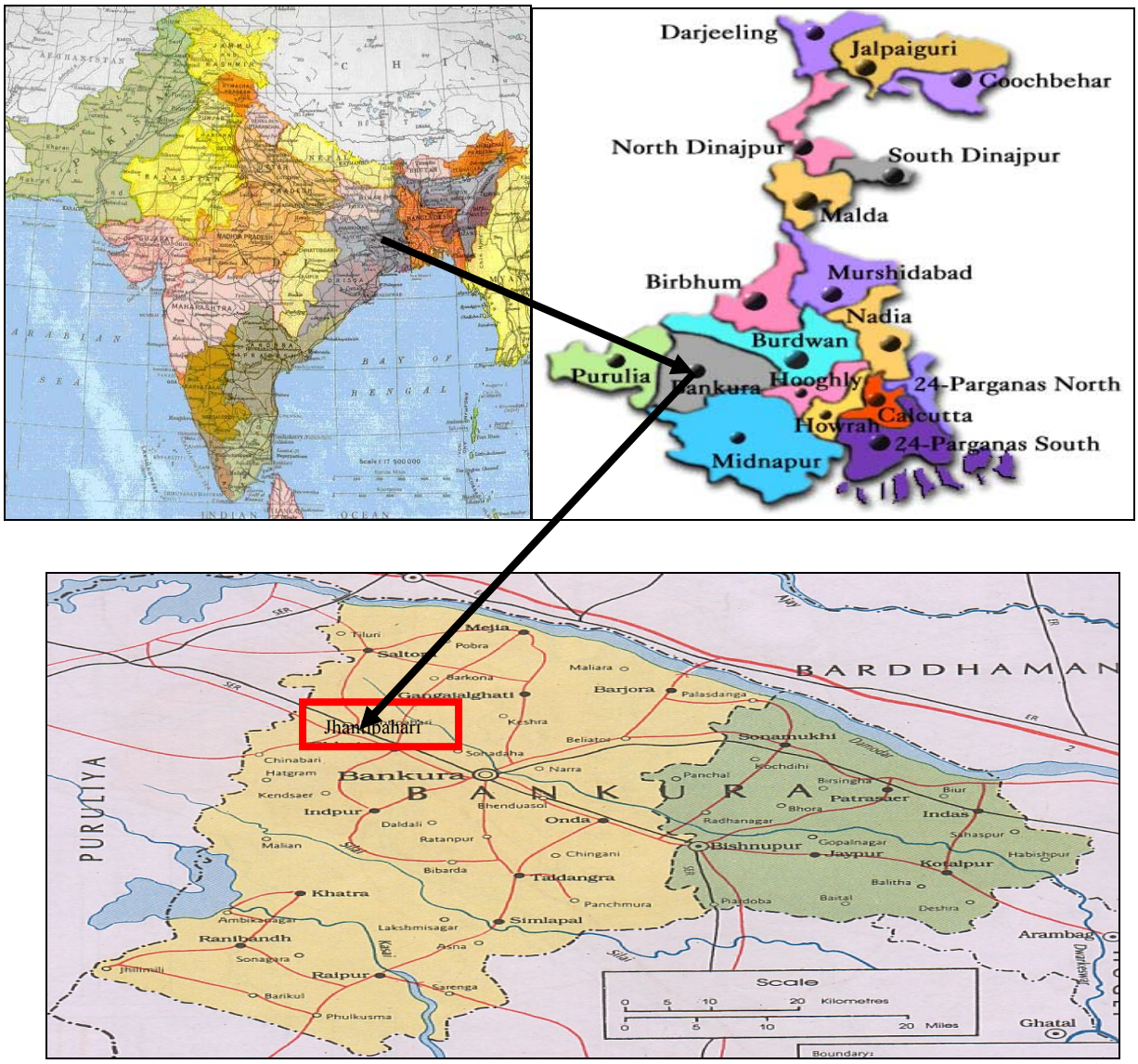
Eastern India/West Bengal/Bankura

A.4.1.3. City/Town/Community etc:

Jorehira

A.4.1.4. Detail of physical location, including information allowing the unique identification of this project activity (maximum one page):

The project activity site is located in Jorehira in the district of Bankura in the state of West Bengal. The District Bankura is bounded by latitude 23.14^0 N and longitude 87.07^0 E. The district is well connected to Kolkata, the state captital, both by rail and road. It is approximately 176.5 km away from Kolkata. The nearest railway station is Jhantipahari which is about 10 km from the site. Nearest airport as well as seaport is located in Kolkata.



A.4.2. Category(ies) of project activity:

As per the "Sectoral scopes related to approved methodologies and DOEs, the recommended Sectoral scope for the project activity is

(1) Energy industries (renewable -/ non-renewable sources)

A.4.3. Technology to be employed by the project activity:

The project activity entails utilization of the heat content of the DRI kiln gas for generation of power in a waste heat recovery based power plant. The power generated by the project activity will partially meet the electrical energy requirement of the integrated steel plant of Ankit Metal & Power Limited. The project activity will be facilitated as explained below:

Recovery of heat content of the DRI kiln gas

Under normal operational condition, an estimated 90,000 m^3/hr of DRI kiln gas will be available from the DRI kiln. As per the conventional sponge iron manufacturing process, the gas emanating from DRI kiln is introduced into an After Burning Chamber (ABC) to ensure complete combustion. In the project scenario, the DRI kiln gas, after complete combustion in the ABC, will be introduced into the Waste Heat Recovery Boiler (WHRB) where the heat content of the DRI kiln gas will be extracted and utilised for generation of steam. The steam generated will be used for generation of power. In the process of heat extraction and its utilization, the DRI kiln gas will be cooled to a temperature of around 170°C which will then be introduced into the ESP and finally released to the atmosphere

Utilisation of the heat content of the DRI kiln gas in Waste Heat Recovery Boiler

The DRI kiln gas, after complete combustion in the ABC, will attain a temperature of around 950^0C. The same will then be introduced into a Waste Heat Recovery Boiler (WHRB) for generation of steam. The project activity involves installation of a single drum, natural circulation-cum-radiant furnace type Waste Heat Recovery Boiler, provided with water cooled membrane walls, for generation of steam with the heat content of the DRI kiln gas. Proper arrangements for integral piping and flue gas ducting will also be designed in the WHRB. The following table provides the technical specifications of the WHRB.

Table-A.2: Technical specifications of WHRBs

Parameter	Unit	Value
Steam output maximum continuous rating (MCR)	Tonnes per Hour (TPH)	38
Steam pressure at super heater outlet	kg/cm^2	67
Steam temperature at super heater outlet	^{0}C	485
Feed water temperature at economizer inlet	^{0}C	130
Waste Gas inlet conditions, Gas flow	m^3/hr	90,000
Gas temperature	^{0}C	950
Dust Content at outlet of ESP	mg/m^3	50
Exit Temperature of DRI kiln gas from WHRB	^{0}C	170
MAKE	CETHAR VESSELS	

Generation of power in Steam Turbo-Generator

The steam generated in the WHRB will be fed into a common steam header. Steam from Atmospheric Fluidised Bed Combustion (AFBC) boiler will also be fed to the common steam header. Then the steam will be fed to a 12MW Single Extraction-cum-Air Cooled type Steam Turbo Generator set for the purpose of generation of power. The technical specifications of the steam turbo-generator set are provided herein:

Table-A.3: Technical specifications of Steam Turbo-Generator		
Parameter	Unit	Value
Rated capacity of turbine	kW	12,000
Steam conditions at turbine inlet: Pressure Temperature	 kg/cm^2 ^0C	 64 480
Condenser pressure	kg/cm^2	0.1
Designed air temperature at inlet of Air Cooled Condenser	^0C	42
MAKE	TEIL-Mysore	

A.4.4 Estimated amount of emission reductions over the chosen crediting period:

Years	Annual estimation of emission reductions in tonnes of CO_2 e
2009 – 2010	26808
2010 – 2011	26808
2011 – 2012	26808
2012 – 2013	26808
2013 – 2014	26808
2014 – 2015	26808
2015 – 2016	26808
2016 – 2017	26808
2017 – 2018	26808
2018 – 2019	26808
Total estimated reductions(tonnes of CO_2 e)	**268080**
Total number of crediting years	10
Annual average over the crediting period of estimated reductions (tonnes of CO_2 e)	**26808**

A.4.5. Public funding of the project activity:

No public funding from parties included in Annex-I is available to the project activity.

SECTION B. Application of a baseline and monitoring methodology

B.1. Title and reference of the approved baseline and monitoring methodology applied to the project activity:

Title: Consolidated baseline methodology for GHG emission reductions for waste gas or waste heat or waste pressure based energy system.

Reference: Approved consolidated baseline methodology ACM0012/Version 02 Sectoral Scope 1 and 4

B.2 Justification of the choice of the methodology and why it is applicable to the project activity:

As per the applicability conditions of the Approved Consolidated Baseline Methodology-ACM0012/Version 02,

"The consolidated methodology is for project activities that utilize waste gas and/or waste heat as an energy source for:

- *Cogeneration; or*
- *Generation of electricity; or*
- *Direct use as process heat source; or*
- *For generation of heat in element process (e.g. steam, hot water, hot oil, hot air);*

The consolidated methodology is also applicable to project activities that use waste pressure to generate electricity."

The project activity entails recovery of the heat content of the waste gas generated from DRI kiln, utilization of the same in Waste Heat Recovery Boiler for generation of steam and subsequently electricity. Therefore the project activity meets the above applicability condition of the methodology.

Apart from the key applicability condition depicted above, the project activity is also required to meet the following applicability conditions in order to apply the baseline methodology:

"If project activity is use of waste pressure to generate electricity, electricity generated using waste gas pressure should be measurable" - The project activity does not involve the usage of waste pressure to generate electricity. Therefore this applicability condition is not applicable for the project activity under consideration.

"Energy generated in the project activity may be used within the industrial facility or exported outside the industrial facility." – The net electricity generated from the project activity (*i.e.* after catering to the auxiliary power demand of the power plant equipment) will entirely be used to meet the in-house power requirement within the industrial facility.

"The electricity generated in the project activity may be exported to the grid"- As stated above; the net electricity generated from the project activity (*i.e.* after catering to the auxiliary power demand of the power plant equipment) will entirely be consumed in-house and will not be exported to the grid. Therefore this condition is not applicable for the project activity under consideration.

"Energy in the project activity can be generated by the owner of the industrial facility producing the waste gas or by a third party within the industrial facility." – Waste gas with substantial heat content will be generated from the sponge iron manufacturing process at Ankit Metal & Power Limited. Electrical energy will be generated utilising the heat content of the waste gas by the owner of the integrated steel manufacturing facility *i.e.* Ankit Metal & Power Limited.

"Regulations do not constrain the industrial facility generating waste gas from using the fossil fuels being used prior to the implementation of the project activity."– There is no national or state-level regulation which would have prevented the integrated steel plant of Ankit Metal & Power Limited from using fossil fuel for electricity generation.

"The methodology covers both new and existing facilities. For existing facilities, the methodology applies to existing capacity. If capacity expansion is planned, the added capacity must be treated as a new facility." –The project activity will be undertaken in the integrated steel plant of Ankit Metal & Power Limited and the waste gas, used in the project activity, is emitted from the DRI kiln which is operating in the facility site.

"The waste gas utilized in the project activity was flared or released into the atmosphere in the absence of the project activity at existing facility." – The waste gas produced does not have any other use in the integrated steel plant of Ankit Metal & Power Limited. The same can be demonstrated with Energy Bills for the entire unit or through on-site verification at the facility site. Therefore the waste gas utilized in the project activity is surplus and will be flared in absence of the project activity.

"The credits are claimed by the generator of energy using waste gas/heat/pressure. In case the energy is exported to other facilities an agreement is signed by the owner's of the project energy generation plant (henceforth referred to as generator, unless specified otherwise) with the recipient plant(s) that the emission reductions would not be claimed by recipient plant(s) for using a zero-emission energy source."- Ankit Metal & Power Limited is implementing the project activity to utilize the heat content of the waste gas generated from their DRI kiln for generation of power. The emission reduction credits will solely be claimed by the project proponent *i.e.* Ankit Metal & Power Limited. Furthermore the entire power generated by the project activity will be consumed in-house without any export of power. Therefore there will be no other consumer who can claim for any emission reduction credits for using zero-emission electrical energy sources.

"For those facilities and recipients, included in the project boundary, which prior to implementation of the project activity (current situation) generated energy on-site (sources of energy in the baseline), the credits can be claimed for minimum of the following time periods:

(a) the remaining lifetime of equipments currently being used; and

(b) credit period."

- Ankit Metal & Power Limited was not involved with power generation before the implementation of the project activity. The project activity will be implemented as a part of the integrated steel plant project of Ankit Metal & Power Limited. Therefore this condition is not applicable for the project activity under consideration. However all the equipments to be installed under the project activity will have a minimum lifetime of 20 years and the project proponent will claim the emission reduction credits for a fixed crediting period of 10 years.

"Waste gas that is released under abnormal operation (emergencies, shutdown) of the plant shall not be accounted for." – The project proponent will not consider waste gas that will be released under abnormal operation (emergencies, shut down) of the plant for estimation of emission reductions.

"Cogeneration of energy is from combined heat and power and not combined cycle mode of electricity generation."- The project activity does not entail cogeneration of heat and power. Therefore this condition is not applicable for the project activity under consideration.

From the above explanation, it is established that the project activity under consideration meets all the applicability conditions of the Approved Consolidated Baseline Methodology- ACM0012/Version 02. This justifies the appropriateness of the choice of the methodology in view of the above project activity.

B.3. Description of the sources and gas included in the project boundary

As per the methodology, the geographical extent of the project boundary shall include the following:

1. *The industrial facility where waste gas/heat/pressure is generated (generator of waste energy);*

2. The facility where process heat in element process/steam/electricity is generated (Generator of process heat/steam/electricity). Equipment providing auxiliary heat to the waste heat recovery process shall be included within the project boundary; and

3. The facility/s where the process heat in element process/steam/electricity is used (the recipient plant(s)) and/or grid where electricity is exported, if applicable.

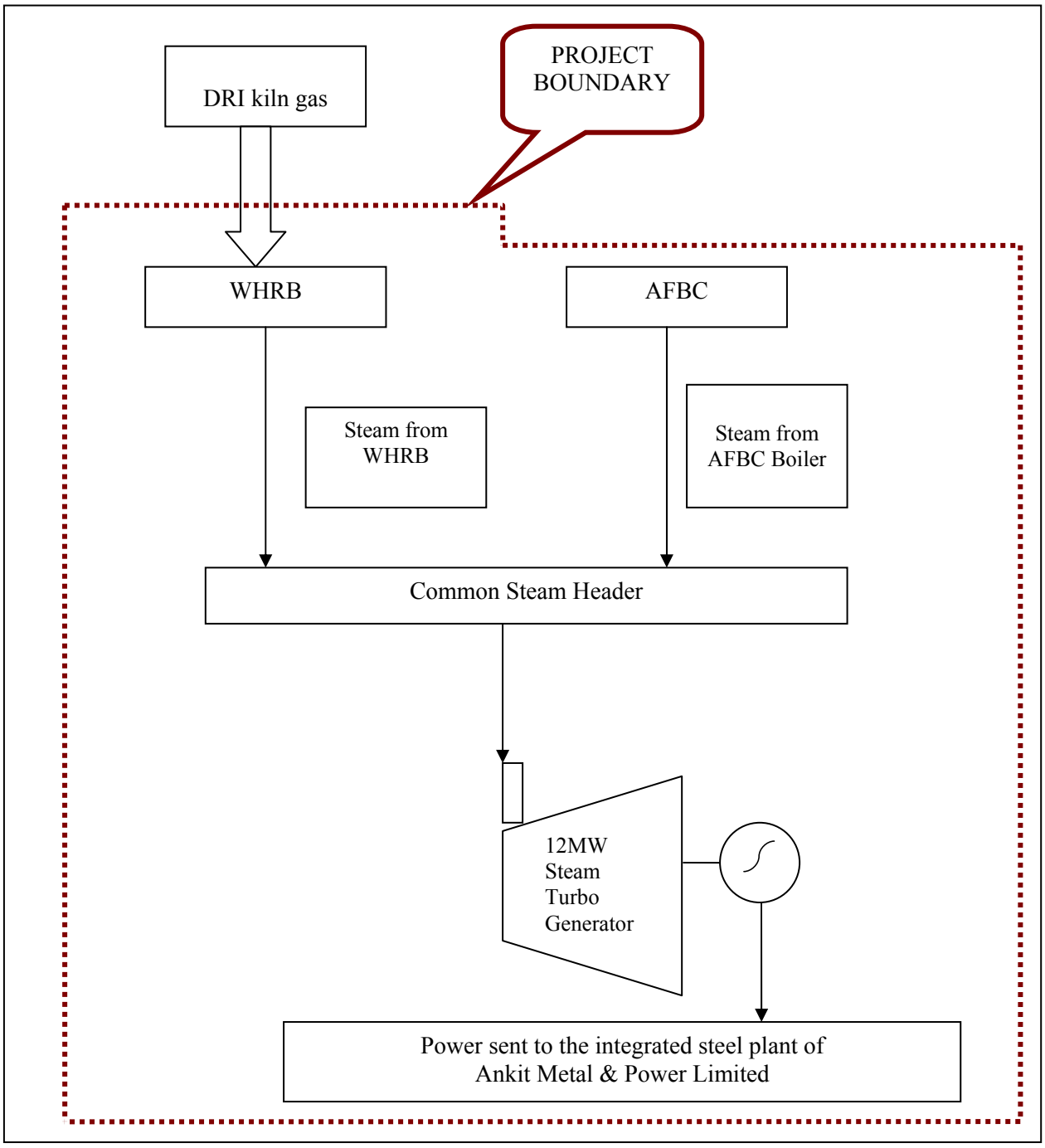
In accordance with the guidance of the methodology, the project boundary will include:

1. The source of waste gas *i.e.* the project boundary will extend from the outlet of the After Burning Chamber (ABC) of the DRI kiln of AMPL and will also include the ducting system for transportation of waste gas from the ABC outlet to the Waste Heat Recovery Boiler (WHRB) in the power plant;

2. The power plant equipments where the heat content of the waste gas will be utilized for generation steam and subsequently power. This will also include the equipment required to cater to the auxiliary power demand of the power plant; and

3. The integrated steel plant of AMPL where the electricity will be consumed.

The following figure provides a diagrammatic representation of the project boundary:


DRI kiln gas
PROJECT BOUNDARY
WHRB
AFBC
Steam from WHRB
Steam from AFBC Boiler
Common Steam Header
12MW Steam Turbo Generator
Power sent to the integrated steel plant of Ankit Metal & Power Limited

In accordance with the methodology, the following emission sources are considered for the purpose of determination of baseline emissions and project emissions and hence the emission reductions resulting from the project activity:

Table-B.1: Overview on emission sources included in or excluded from the project boundary				
	Source	Gas	Included	Justification/ Explanation
Baseline	Electricity generation, grid or captive source	CO_2	Included	Main emission source.
		CH_4	Excluded	Excluded for simplification. This is conservative.
		N_2O	Excluded	Excluded for simplification. This is conservative.
	Fossil fuel consumption in boiler for thermal energy	CO_2	Excluded	Not applicable since the project activity will not cater to the thermal energy requirement of the integrated steel plant of AMPL.
		CH_4	Excluded	
		N_2O	Excluded	
	Fossil fuel consumption in cogeneration plant	CO_2	Excluded	Not applicable since the project activity does not entail installation of a cogeneration plant. *(Please refer to Section B.4 of the PDD)*.
		CH_4	Excluded	
		N_2O	Excluded	
	Baseline emissions from generation of steam used in the flaring process, if any	CO_2	Excluded	Not applicable since there is no steam requirement in the flaring process of the waste gas. *(Please refer to Section B.4 of the PDD)*.
		CH_4	Excluded	
		N_2O	Excluded	
Proposed project activity	Supplementary fossil fuel consumption at the project plant	CO_2	Included	There will be no provision for auxiliary/supplementary fuel firing within the project boundary. However the same will be monitored during the proposed crediting period and emissions from the same will be deducted.
		CH_4	Excluded	Excluded for simplification.
		N_2O	Excluded	Excluded for simplification.
	Supplementary electricity consumption	CO_2	Excluded	Any electricity consumption by power plant equipments in the project scenario will be catered from the power generated with waste gas under normal operating condition. Power consumption under emergency situation by the power plant equipments will anyway be accounted as auxiliary consumption. Therefore there will be no additional unaccounted emission from consumption of supplemental electricity in the project scenario.
		CH_4	Excluded	
		N_2O	Excluded	
	Project emissions from cleaning of the gas	CO_2	Excluded	No additional cleaning of waste gas will be required in the project scenario than that in the baseline scenario. Therefore there will not be any additional energy consumption due to cleaning of waste gas in the project scenario. Hence there will not be any additional emissions.
		CH_4	Excluded	
		N_2O	Excluded	

B.4. Description of how the baseline scenario is identified and description of the identified baseline scenario:

The methodology requires the project proponent to identify all the realistic and credible alternatives available to Ankit Metal & Power Limited in absence of the project activity. Realistic and credible alternatives have been identified individually for:

- Utilization of the heat content of the waste gas in absence of the project activity
- Power generation in absence of the project activity

In accordance with the guidance of the methodology, the project proponent has excluded alternatives which

- Do not comply with legal and regulatory requirements; or
- Depend on fuels (used for generation of power) that are not available at the project site

The following section will elaborate on selection of baseline scenario for the project activity under consideration:

Step1: Define the most plausible baseline scenario for the generation of heat and electricity using the following baseline options and combinations[6]

As per the guidance of the methodology,

"*The baseline candidates should be considered for following facilities:*

- *For the industrial facility where waste gas/heat/pressure is generated; and*
- *For the facility where the energy is produced; and*
- *For the facility where the energy is consumed"*

The project proponent has identified and evaluated all the realistic and credible alternatives for utilisation of the heat content of the waste gas and generation of power. The analysis of all the alternatives has been presented below:

[6] The project activity does not entail generation of heat. Therefore realistic and credible alternatives for generation of heat energy in absence of the project activity have not been considered.

Table-B.2: Potential alternatives for waste gas use and power generation			
Option	Description	Credibility	Conclusion
Utilization of the heat content of the waste gas			
W1	Waste gas is directly vented to atmosphere without incineration	As per the legal requirement, the waste gas is required to be combusted completely before the same can be discharged into the atmosphere. Therefore direct venting of waste gas to the atmosphere without incineration is not a feasible option for the project proponent in absence of the project activity.	Cannot be a part of the baseline
W2	Waste gas is released to the atmosphere after incineration	In absence of the project activity, the project proponent could have flared (*i.e.* releasing after complete combustion) the waste gas into the atmosphere. In such a situation, the entire heat energy content of the waste gas would have been lost. This alternative is in compliance with all the legal and regulatory requirements and can be a part of the baseline. Therefore this alternative is considered further for determination of baseline scenario for the project activity under consideration.	May be a part of the baseline
W3	Waste gas is sold as an energy source	This alternative can not be considered as a realistic and credible alternative for the project proponent in absence of the project activity. There is no potential purchaser for the waste gas in the vicinity. Furthermore transportation of the waste gas over a long distance is hazardous considering its composition and high dust content level.	Cannot be a part of the baseline
W4	Waste gas is used for meeting energy demand	In absence of the project activity, the heat content of the waste gas could have been utilized for generation of energy. However this alternative would have faced all the investment related risks and barriers that the project activity is facing *(please refer to Section B.5 of the Project Design Document for details)*. Therefore in absence of CDM revenue, this alternative can not be considered as a realistic and credible alternative for the project proponent.	Cannot be a part of the baseline
Power generation			
P1	Proposed project activity not undertaken as a CDM project activity	In absence of the project activity, the project proponent could have utilized the heat content of the waste gas for generation of power. However this alternative would have faced all the investment related risks and barriers that the project activity is facing *(please refer to Section B.5 of the Project Design Document for details)*. Therefore in absence of CDM revenue, this alternative can not be considered as a realistic and credible alternative for the project proponent.	Cannot be a part of the baseline
P2	On site or off site existing/new fossil	The project proponent does not have any requirement for steam. Therefore installation of a fossil fuel fired	Cannot be a part of

Table-B.2: Potential alternatives for waste gas use and power generation			
Option	Description	Credibility	Conclusion
	fuel powered cogeneration plant	cogeneration plant in absence of the project activity is not a realistic and credible alternative for the project proponent.	the baseline
P3	On site or off site existing/new renewable energy based cogeneration plant	The project proponent does not have any requirement for steam. Therefore installation of a renewable energy based cogeneration plant in absence of the project activity is not a realistic and credible alternative for the project proponent. Furthermore, renewable energy based energy generation system is not a prevailing practice in the region because of limited availability of renewable resources.	Cannot be a part of the baseline
P4	On site or off site existing/ new fossil fuel based existing captive or identified plant.	In absence of the project activity, the project proponent could have installed a fossil fuel fired captive power plant for generation of electrical energy equivalent to that generated in the project activity. This alternative is in compliance with all the legal and regulatory requirements and can be a part of the baseline. Therefore this alternative is considered further for determination of baseline scenario for the project activity under consideration.	May be a part of the baseline
P5	On site or off site existing/new renewable energy based existing captive or identified plant.	This alternative is not a realistic and credible alternative for the project proponent in absence of the project activity considering limited availability of renewable resources in the eastern region of the country where the project activity plant is situated.	Cannot be a part of the baseline
P6	Source Grid connected power plants	In absence of the project activity, the project proponent could have chosen not to generate any power. Under such a situation, electrical energy equivalent to that generated in the project activity would have been generated at power plants connected to the grid where the project activity power plant is connected. This alternative is in compliance with all the legal and regulatory requirements and can be a part of the baseline. Therefore this alternative is considered further for determination of baseline scenario for the project activity under consideration.	May be a part of the baseline

Table-B.2: Potential alternatives for waste gas use and power generation			
Option	Description	Credibility	Conclusion
P7	Captive electricity generation from waste gas (if project activity is captive generation with waste gas, this scenario represents captive generation with lower efficiency than the project activity)	As discussed above, utilization of the heat content of the waste gas for power generation is not a realistic and credible alternative for the project proponent considering the investment related risks and barriers associated with the project activity *(please refer to Section B.5 of the Project Design Document for details)*. In absence of the project activity, the waste gas would have been flared without utilizing it for generation of electrical energy. Therefore the project activity does not entail any efficiency improvement in power generation from that in the baseline scenario and this alternative is not a realistic and credible alternative for the project proponent.	Cannot be a part of the baseline
P8	Cogeneration from waste gas (if project activity is cogeneration with waste gas, this scenario represents captive generation with lower efficiency than the project activity)	The project activity is not a cogeneration activity. Therefore this alternative is not a realistic and credible alternative for the project proponent.	Cannot be a part of the baseline

From the above evaluation, it can be concluded that in absence of the project activity, the project proponent could have opted for the following two alternatives:

Table-B.3: Potential alternatives available to Ankit Metal & Power Limited in absence of the project activity

Alternative	Baseline Alternatives		Description of Alternative
	Waste Gas	Power	
1	W2	P4	With this alternative in place, the waste gas generated from the DRI kiln at AMPL would have been flared and the heat energy content of the waste gas would have been wasted. Power, equivalent to that generated in the project activity, would have been generated in a fossil fuel fired captive power plant. As stated above, this alternative is in compliance with all the legal and regulatory requirements and can be a part of the baseline. Therefore this alternative is considered further for determination of baseline scenario for the project activity under consideration.
2	W2	P6	With this alternative in place, the waste gas generated from the DRI kiln at AMPL would have been flared and the heat energy content of the waste gas would have been wasted. Power, equivalent to that generated in the project activity, would have been generated at power plants connected to the grid where the project activity power plant is connected. As stated above, this alternative is in compliance with all the legal and regulatory requirements and can be a part of the baseline. Therefore this alternative is considered further for determination of baseline scenario for the project activity under consideration.

Step 2: Identify the fuel for the baseline choice of energy source taking into account the national and/or sectoral policies as applicable

Amongst the two alternatives identified above, Alternative-1 entails generation of power in a fossil fuel fired captive power plant. With this alternative in place, the project proponent would have set up a fossil fuel fired captive power plant. Coal is considered as the most plausible fossil fuel option since it is available in abundance in the eastern region of the country where the project activity plant is situated. Furthermore the other options like,

- Diesel based electricity generation is highly expensive and is primarily used for emergency purposes; and

- Natural gas based electricity generation is not a feasible option for the project proponent considering the locational disadvantages *i.e.* non-availability of natural gas in the eastern region of the country where the project activity plant is situated.

Therefore in case of Alternative-1, the project proponent would have set up a coal based captive power plant to generate electrical energy equivalent to that generated in the project activity.

Alternative-2 entails generation of power at power plants connected to the grid where the project activity power plant is connected. Grid power consists of power generated with different fuels like fossil fuels (*e.g.* coal, diesel, natural gas *etc.*), renewable resources (*e.g.* hydro, wind, biomass *etc.*), nuclear power *etc*

.The availability of the fuels at the respective power plants connected to the grid will always be ensured by the respective power producers for their own sustenance.

Step 3: Step 2 and/or step 3 of the latest approved version of the "Tool for the demonstration and assessment of additionality" shall be used to identify the most plausible baseline scenarios by eliminating non-feasible options

In accordance with the guidance of the methodology, AMPL has carried out a complete economical analysis among the realistic and credible alternatives (as mentioned above) with unit cost of electricity generation as the financial indicator. The same is presented below:

Table-B.4: Economic analysis of all the realistic and credible alternatives available with Ankit Metal & Power Limited in absence of the project activity[7]

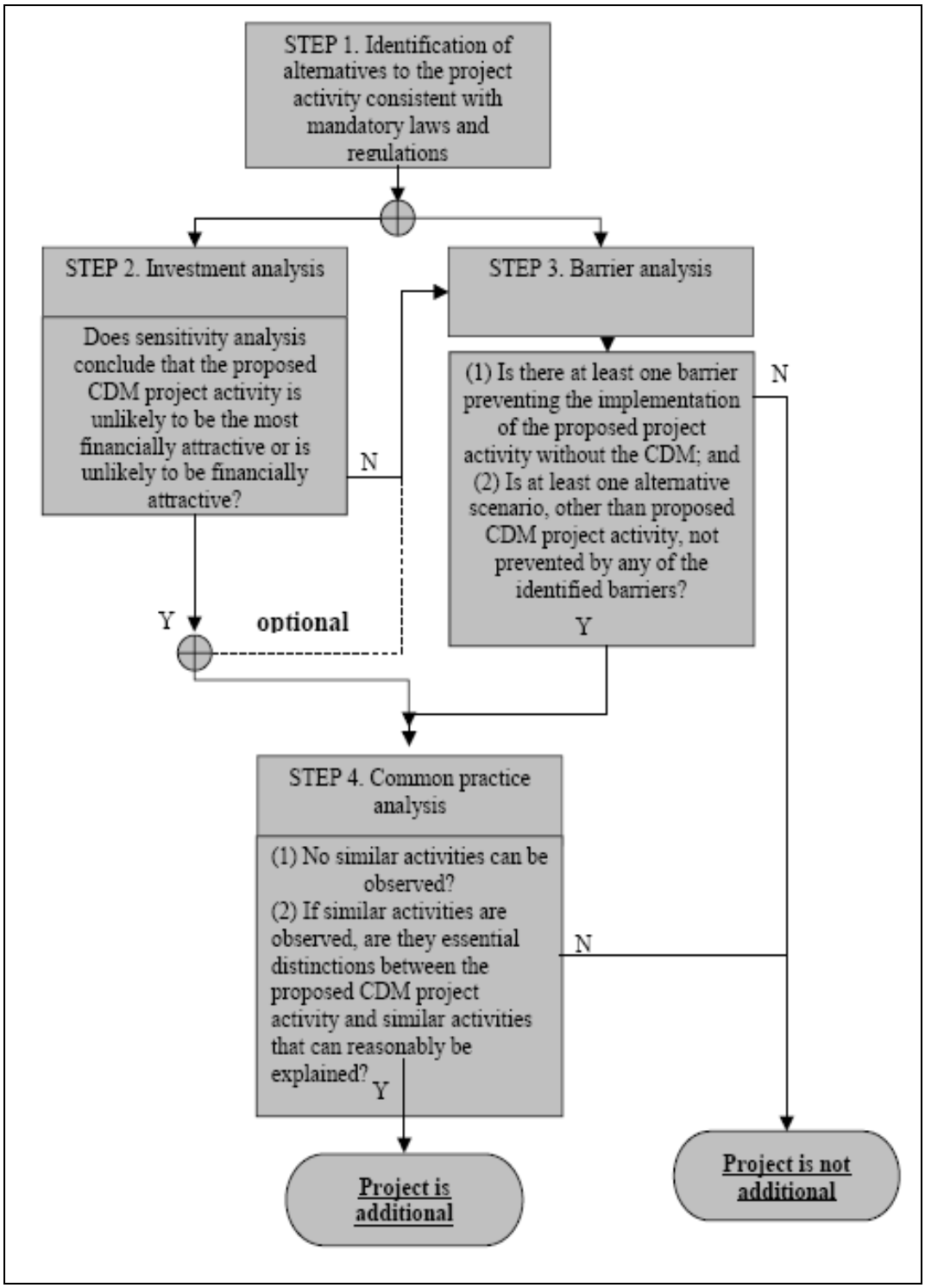
Parameters	Alternative-1: Generation of power in a coal based captive power plant	Alternative-2. Import of power from the grid
Generation Cost (INR/kWh)	2.48	3.50
Comments on financial aspects	1. Higher capital investment, (*i.e.* fixed cost is higher) hence some financial assistance will be required from banks/ financial institutions. 2. The generation cost (*i.e.* operating cost) is low.	1. No capital investment (*i.e.* fixed cost is nil) required. Electricity could be procured immediately. 2. The power purchase cost (*i.e.* operating cost) is very high.
Other aspects	Reliable power supply can be ensured all throughout which is an essential requirement of an integrated steel plant like AMPL.	Disruptions in power supply, power outages are encountered more frequently which may hamper the smooth operation of an integrated steel plant like AMPL.
Conclusion	Considering all the points mentioned above, "Alternative-1: Generation of power in a coal based captive power plant" was found to be the most economically attractive option available to AMPL in absence of the project activity and therefore, as per the methodology, this alternative option is the baseline scenario.	

[7] Determination of unit cost of electricity generation for Alternative-1 and Alternative-2 has been elaborated in Section B.5 of the Project Design Document.

B.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered CDM project activity (assessment and demonstration of additionality) : >>

As per the decision 17/cp.7 para 43, a CDM project activity is additional if anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in absence of the registered CDM project activity. The methodology requires the project proponent to determine its additionality based on the "Tool for the demonstration and assessment of additionality (Version 05)", agreed by the CDM Executive Board.

The flowchart presented in below provides a step-by-step approach to establishing additionality of the project activity:


STEP 1. Identification of alternatives to the project activity consistent with mandatory laws and regulations
STEP 2. Investment analysis
Does sensitivity analysis conclude that the proposed CDM project activity is unlikely to be the most financially attractive or is unlikely to be financially attractive?
N
Y
optional
STEP 3. Barrier analysis
(1) Is there at least one barrier preventing the implementation of the proposed project activity without the CDM; and (2) Is at least one alternative scenario, other than proposed CDM project activity, not prevented by any of the identified barriers?
Y
N
STEP 4. Common practice analysis
(1) No similar activities can be observed?
(2) If similar activities are observed, are they essential distinctions between the proposed CDM project activity and similar activities that can reasonably be explained?
Y
N
Project is additional
Project is not additional

The project activity was approved by the Board of Directors of M/s. Ankit Metal & Power Limited on 15th January 2004. Subsequent to the approval, the Management has proceeded with the implementation of the project activity as a climate change initiative. However the Management has faced a lot of hurdles in sourcing water which is an essential component of an integrated steel plant operation and DRI kiln operation. With the tremendous uncertainty of securing a reliable water source, the integrated steel plant operation could not be initiated and the whole process got delayed.

The chronology of events justifying the same is elaborated below:

Progress of the project in a six month phase wise time interval	Events	Date	Remarks/Comments (if any)	Reference Document attached as an appendix to the Project Design Document
During the 1st phase & 2nd phase after the board approval much progress could not take place since there was no certainty about the water supply scheme for the project activity. No response was received from the Chief Engineer, Public Health Engineering Department, Government of West Bengal for over a period of one year from the receipt of the letter sent from the project proponent to Public Health Engineering Department, Government of West Bengal	Management Approval for the project activity	15.01.2004		Appendix 1:Minutes of the meeting of the Board of Directors dated 15.01.2004
	Letter to the Chief Engineer, Public Health Engineering Department, Government of West Bengal regarding water supply scheme to the factory	23.04.2004	The letter highlighted the problems faced by the project proponent regarding the water supply scheme.	Appendix 2: Reference: ASWPL/077/04-05
During the 3rd phase the 1st purchase order for the project activity was placed and immediately after that the 1st CDM consultant was considered to be appointed. But still the water supply scheme was not finalized, though some action took place from the Public Health Engineering Department, Government of West Bengal but it could not be finalized which made the project proponent uncertain about the implementation of the project.	Contract between the Turbo-generator supplier & M/s Ankit Metal & Power Limited	04.05.2005		Appendix 3: Reference: AMPL-CPP-CONTRACT-02
	Consideration for Appointment of the 1st CDM consultant	19.07.2005		Appendix 4: Reference: Agreement No: 10029
	Letter from Chief Engineer, Public Health Engineering Department, Government of West Bengal to the Chief Engineer, Western Zone, P.H.E Dept regarding water supply to AMPL	29.07.2005	Response from Chief Engineer, Public Health Engineering Department, Government of West Bengal to the Chief Engineer, Western Zone, P.H.E Dept regarding the water supply scheme.	Appendix 5: Reference: PHE/2076/S/1(1)
During the 4th phase further steps were taken from the side of M/s Ankit Metal & Power Limited in sorting out the water supply scheme for the integrated iron &	Letter to the Chief Environment Officer, Environment Department, Govt of West Bengal for clearance from the Environment Department	01.12.2005	The project proponent also escalated the issue through a letter to the Chief Environment Officer,	Appendix 6: Reference: AMPL/CPP/0508/05-06

steel plant. After much deliberation from both sides the water supply scheme was finally sorted on 10.02.2006. Immediately after this M/s Ankit Metal & Power Limited considered the appointment of the 2nd CDM consultant.			Environment Department, Govt of West Bengal for clearance regarding the water supply scheme from the Environment Department	
	Letter to Honorable Ministry –in-charge, Commerce & Industry, Government of West Bengal regarding water supply to the integrated iron & steel plant of AMPL	15.12.2005	The project proponent then escalated the problems regarding the water supply scheme to the Honorable Ministry –in-charge, Commerce & Industry, Government of West Bengal due to delay in obtaining the clearance for the water supply scheme.	Appendix 7: Reference: AMPL/0527/05-06
	Letter to the P.S of Ministry –in-charge, Commerce & Industry, Government of West Bengal regarding water supply and land related problems to the integrated iron & steel plant of AMPL	05.01.2006	The project proponent also provided letter to the to the P.S of Ministry –in-charge, Commerce & Industry, Government of West Bengal regarding water supply and land related problems to the integrated iron & steel plant of AMPL	Appendix 8: Reference: AMPL/0563/05-06
	Letter to the Engineer in Chief, Public Health Engineering Department, Government of West Bengal for the implementation of the water scheme	30.01.2006		Appendix 9: Reference AMPL/0619/05-06
	No-Objection Letter from Engineer-in-Chief Public Health Engineering Department, Government of West Bengal for the implementation of the water	10.02.2006	The clearance for the supply scheme was received but only after repeated communications as stated above, after 22	Appendix 10: Reference: PHE/356/S

	scheme		months from the date of first communication.	
	Consideration for the Appointment of 2nd CDM consultant	25.05.2006	Immediately after the water supply scheme was fixed AMPL considered the appointment of CDM consultant	Appendix 11: Mail communication from another CDM consultant
During the 5th phase finally the present CDM consultants were appointed but an approved methodology for the project activity was unavailable. The present CDM consultants started developing the methodology for some other project which would be also applicable for this project. The methodology NM 0179 was submitted on 21.06.2006. The 1st recommendation came from the meth panel on 30.03.2007.	Award for CDM consultancy services to the present CDM consultants	21.06.2006		Appendix 12: CDM Consultancy award to present CDM consultants
	Submission of the methodology NM 0179 (Waste Gas and/ or Waste Heat Utilization for 'Process Steam' generation or 'Process Steam and Power' generation in an industrial facility") for approval	22.06.2006	The present CDM consultants were already working on the methodology for some other project which was applicable for the project activity under consideration also. [Source: http://cdm.unfccc.int/methodologies/PAmethodologies/publicview.html?single=1&OpenNM=NM0179]	
	Preliminary recommendation from the ,meth panel	30.03.2007	Source: http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_DISLLMKU7W2BH3ZA4JQF8RLLZML5OO	
The methodology ACM 0012/Version 01 was approved on 06.07.2007 and then subsequently revised to ACM 0012/Version 02. The project was submitted to MoEF, Government of India	Approval of the methodology ACM 0012/Version 01	06.07.2007		
	Proposal sent by DOE to AMPL	05.09.2007		
	Subsequently revision to ACM 0012/Version 02	02.11.2007		

for Host Country Approval (HCA). DOE appointment was also considered.	Submission of Project Design Document to Ministry of Environment & Forests, Government of India	19.12.2007		
	Appointment of DOE	15.01.2008		
The project was presented to the MoEF and subsequently HCA was obtained in March'2008. The project was then immediately uploaded for Global Stakeholder Consultation.	Presentation to the DNA (Ministry of Environment & Forests, Government of India)	13.02.2008		
	Receipt of Host Country Approval	03.03.2008		
	Uploading of Project Design Document for the Global Stakeholder Consultation	20.03.2008		

Step 1- Identification of alternatives to the project activity consistent with current laws and regulations

In Sub-step 1a (Define alternatives to the project activity) and Sub-step 1b (Consistency with mandatory laws and regulations), Ankit Metal & Power Limited is required to identify the realistic and credible alternative(s) that will provide output or services comparable with the project activity. These alternatives are required to be in compliance with all applicable legal and regulatory requirements.

The identification of alternatives for waste gas utilisation and power generation as well as their compliance with the current laws and regulations has been dealt in details in Section B.4 of the Project Design Document. Both the alternatives (*i.e.* "Alternative-1: Generation of power in a coal based captive power plant" and "Alternative-2. Import of power from the grid") as well as the project option are in line with the current laws and regulations those are enforced in the host country-India. Therefore Ankit Metal & Power Limited could have implemented either of the two alternatives (*i.e.* Alternative-1 or Alternative-2) or the project activity. However implementation of either Alternative-2 or the project activity without CDM revenue is not a feasible alternative for the project proponent. The same has been illustrated below through 'Step 2: Investment Analysis' and 'Step 3: Barrier Analysis'.

Step 2. Investment analysis

As per the investment analysis, the project proponent is required to determine whether the project activity is economically or financially less attractive than other alternatives without the revenue from the sale of Certified Emission Reductions (CERs). To conduct the investment analysis, Ankit Metal & Power Limited is required to use the following sub-steps:

Sub-step 2a. Determine appropriate analysis method

The project activity will generate electricity for in-house consumption and has financial implications other than those related to CDM. Therefore 'Option-I: Simple cost analysis' would not be an appropriate analysis method.

Amongst the other two options *i.e.* 'Option-II: Investment comparison analysis' and 'Option-III: Benchmark analysis', Ankit Metal & Power Limited has adopted the investment comparison analysis wherein the financial indicator(s) of the project activity (*i.e.* Recovery and utilisation of the heat content of the waste gas of the DRI kiln for power generation) is compared with other alternatives (*i.e.* "Alternative-1: Generation of power in a coal based captive power plant" and "Alternative 2. Import of power from the grid"). If at least one of the alternatives has a better indicator (*e.g.* higher project IRR / lower unit cost of service), then the project activity can not be considered as the most financially attractive option.

Sub-step 2b. Option II. Apply investment comparison analysis

Ankit Metal & Power Limited conducted an investment comparison analysis for both the alternatives (*i.e.* Alternative-1 and Alternative-2) that were available with them in absence of the project activity and the project activity without CDM benefit.

The unit cost of electricity generation has been used as the financial indicator for the investment comparison analysis. The unit cost of electricity generation is calculated taking into consideration both fixed and variable cost. All relevant assumptions used for the investment comparison analysis have been provided below and the financial computations on the unit cost of electricity generation for the alternatives have been provided to the DOE.

Sub-step 2c. Calculation and comparison of financial indicators

Ankit Metal & Power Limited has computed the power generation cost for Alternative-1, Alternative-2 and project scenario without CDM benefit based on the total power requirement of the integrated steel plant. Computation of the same is provided below:

Unit cost of electricity generation for "Alternative-1: Generation of power in a coal based captive power plant"

The unit cost of electricity generation in case of Alternative-1 is computed based on the following assumptions & calculations:

Baseline Alternative			
Description	**Units**	**AFBC-12MW**	**Grid**
Power generation capacity	MW	12	
Auxiliary consumption	%	10	
Working days / annum	days/annum	330	
Gross power generation	kWh/annum	95040000	
Auxiliary power consumption	kWh/annum	9504000	
Net power generation-power available for the steel plant	kWh/annum	85536000	79992000
Power Generation Cost			
Determination of Fuel Cost			
Design Station Heat Rate	kCal/kWh	2457	
Heat energy input through fuel mix (Coal-Char mix)	kCal/annum	233526857143	
Quantity of Coal in the fuel mix (Coal-Char mix)	%	40	
Quantity of Char in the fuel mix (Coal-Char mix)	%	60	
Gross Calorific Value of Coal	kCal/kg	2400	
Gross Calorific Value of Char	kCal/kg	2000	
Gross Calorific Value of fuel mix (Coal-Char mix)	kCal/kg	2160	
Quantity of fuel mix (Coal-Char mix) consumed	MT/annum	108114	
Quantity of Coal in the fuel mix (Coal-Char mix)	MT/annum	43246	
Quantity of Char in the fuel mix (Coal-Char mix)	MT/annum	64869	
Coal Cost	Rs/MT	800	
Char Cost	Rs/MT	0	
Total Fuel Cost	**Rs/kWh**	**0.40**	
Determination of O&M Cost			
Salary & Wages			
Salaries	Rs/MW/month	150000	
No. of months	months/annum	12	
Total salaries to be paid for power generation	**Rs/kWh**	**0.25**	
Maintenance Charges			
Maintenance Charges	Rs/MW/month	25000	
No. of months	months/annum	12	
Total Maintenance Charges	**Rs/kWh**	**0.04**	
Utility Cost- Water & Other Lubricants	**Rs/kWh**	**0.05**	
Administrative Expenses			
Administrative Expenses	Rs/MW/month	25000	
No. of months	months/annum	12	
Total Administrative Expenses	**Rs/kWh**	**0.04**	
Depreciation			
Building (Depreciation @ 3.34%)	Rs/annum	2104200	
Plant & Machineries & other miscelleneous expenses (Depreciation @ 5.28%)	Rs/annum	18849600	
Total Depreciation	**Rs/kWh**	**0.24**	
Interest			
Total Project Cost	Rs	420000000	
Rate of Interest	%	10%	
Total Interest	**Rs/kWh**	**0.49**	
Unit Cost for Power Generation	**Rs/kWh**	**1.53**	**3.50**
Unit cost of power in the Project Scenario	**Rs/kWh**	**2.48**	

Unit cost of electricity generation for "Alternative-2: Import of power from the grid"

The unit cost of electricity generation in case of Alternative-2 is computed based on the following assumptions:

Alternative-2: Import of power from grid		
Power Purchase Cost	Rs/kWh	3.5
Capital Investment	INR Lacs	NIL
Unit cost of electricity generation in case of Alternative-2 is INR 3.50/kWh		

Unit cost of electricity generation in the project scenario

The unit cost of electricity generation in case of project activity is computed based on the following assumptions & calculations:

Project Alternative				
Description		**AFBC-4MW**	**WHRB-8MW**	**Grid**
Power generation capacity	MW	4	8	
Auxiliary consumption	%	12	12	
Working days / annum	days/annum	330	270	
Gross power generation	kWh/annum	31680000	51840000	
Auxiliary power consumption	kWh/annum	3801600	6220800	
Net power generation-power available for the steel plant	kWh/annum	27878400	45619200	9203040
Power Generation Cost				
Determination of Fuel Cost				
Design Station Heat Rate	kCal/kWh	2457		
Heat energy input through fuel mix (Coal-Char mix)	kCal/annum	77842285714		
Quantity of Coal in the fuel mix (Coal-Char mix)	%	40		
Quantity of Char in the fuel mix (Coal-Char mix)	%	60		
Gross Calorific Value of Coal	kCal/kg	2400		
Gross Calorific Value of Char	kCal/kg	2000		
Gross Calorific Value of fuel mix (Coal-Char mix)	kCal/kg	2160		
Quantity of fuel mix (Coal-Char mix) consumed	MT/annum	36038		
Quantity of Coal in the fuel mix (Coal-Char mix)	MT/annum	14415		
Quantity of Char in the fuel mix (Coal-Char mix)	MT/annum	21623		
Coal Cost	Rs/MT	800		
Char Cost	Rs/MT	0		
Total Fuel Cost	**Rs/kWh**	**0.41**	**0.00**	
Determination of O&M Cost				
Salary & Wages				
Salaries	Rs/MW/month	150000	150000	
No. of months	months/annum	12	12	
Total salaries to be paid for power generation	**Rs/kWh**	**0.26**	**0.32**	
Maintenance Charges				
Maintenance Charges	Rs/MW/month	25000	50000	
No. of months	months/annum	12	12	
Total Maintenance Charges	**Rs/kWh**	**0.04**	**0.11**	
Utility Cost- Water & Other Lubricants	**Rs/kWh**	**0.05**	**0.05**	
Administrative Expenses				
Administrative Expenses	Rs/MW/month	25000	25000	
No. of months	months/annum	12	12	
Total Administrative Expenses	**Rs/kWh**	**0.04**	**0.05**	
Depreciation				
Building (Depreciation @ 3.34%)	Rs/annum	801600	1803600	
Plant & Machineries & other miscelleneous expenses (Depreciation @ 5.28%)	Rs/annum	7180800	16156800	
Total Depreciation	**Rs/kWh**	**0.29**	**0.39**	
Interest				
Total Project Cost	Rs	160000000	360000000	
Rate of Interest	%	10%	10%	
Total Interest	**Rs/kWh**	**0.57**	**0.79**	
Unit Cost for Power Generation	**Rs/kWh**	**1.67**	**1.71**	**3.50**
Unit cost of power in the Project Scenario	**Rs/kWh**	**2.70**		

As Per the above investment comparison analysis of the financial indicator for the project activity and the project alternatives, it is found that "Alternative-1: Generation of power in a coal based captive power plant" has the best financial indicator (*i.e.* it has the lowest unit cost of electricity generation) amongst all plausible alternatives including the project activity without CDM revenue. As per the "Tool for the demonstration and assessment of additionality (Version 05)", *"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"*. It may therefore be concluded that the project activity can not be considered as the most financially attractive proposition.

Sub step 2d. Sensitivity analysis

The value of the unit cost of electricity generation is found to be sensitive to the following parameters:

- Coal price
- Grid power purchase cost
- Net power generated with waste gas

The sensitivity analysis has been conducted for scenarios with variations in each one of the above-mentioned key factors and for scenarios with variations in different combinations of the above-mentioned key factors simultaneously in order

- ✓ to assess whether the conclusion regarding the financial attractiveness (of Alternative-1) is robust to reasonable variations in the critical assumptions.
- ✓ to assess whether the conclusion that the project activity is unlikely to be the most financially attractive is robust to reasonable variations in the critical assumptions

Table B-4. Sensitivity Analysis					
Sl. No.	Parameters	Variation	Unit Cost of Service (INR/kWh)		Comment
			Alternative- 1	Project Activity	
1.	Coal price	+10%	2.50	2.70	In both the situations, the unit cost of electricity generation in the project scenario is higher than that for Alternative-1.
		-10%	2.46	2.69	
2.	Grid power purchase cost	+5%	2.57	2.79	In both the situations, the unit cost of electricity generation in the project scenario is higher than that for Alternative-1.
		-5%	2.40	2.60	
3.	Net power generated with waste gas	+10%	2.48	2.60	In both the situations, the unit cost of electricity generation in the project scenario is higher than that for Alternative-1.
		-10%	2.48	2.79	
4.	Combination of parameters 1 and 2	1→ +10% 2→ -5%	2.42	2.61	In both the situations, the unit cost of electricity generation in the project scenario is higher than that for Alternative-1.
		1→ -10% 2→ +5%	2.54	2.79	
5.	Combination of parameters 1 and 3	1→ +10% 3→ +10%	2.50	2.61	In both the situations, the unit cost of electricity generation in the project scenario is higher than that for Alternative-1.
		1→ -10% 3→ -10%	2.46	2.79	
6.	Combination of parameters 2 and 3	2→ +5% 3→ -10%	2.57	2.89	In both the situations, the unit cost of electricity generation in the project scenario is higher than that for Alternative-1.
		2→ -5% 3→ +10%	2.40	2.51	
7.	Combination of parameters 1, 2 and 3	1→ +10% 2→ +5% 3→ -10%	2.59	2.90	In both the situations, the unit cost of electricity generation in the project scenario is higher than that for Alternative-1.
		1→ -10% 2→ -5% 3→ +10%	2.38	2.50	
8.	Combination of parameters 1, 2 and 3	1→ +10% 2→ -5% 3→ +10%	2.42	2.52	In both the situations, the unit cost of electricity generation in the project scenario is higher than that for Alternative-1.
		1→ -10% 2→ +5% 3→ -10%	2.54	2.89	

The results of the sensitivity analysis conducted substantiate that the unit cost of electricity generation in case of Alternative-1 is lower and therefore Alternative-1 is financially more attractive than the project activity.

Hence, it may be concluded that

(a) 'the project activity without CDM revenue is not the most financially attractive option' is robust to reasonable variations in the critical assumptions and that

(b) the CDM revenue the project activity would obtain through sale of the emission reductions has been one of the most important determinants for Ankit Metal & Power Limited to opt for the project activity which is financially less attractive than Alternative-1.

Step 3.Barrier Analysis

Ankit Metal & Power Limited also proceeds to establish the project activity additionality by conducting 'Step 3: Barrier Analysis'. The project proponent is required to determine whether the project activity faces barriers that:

(a) Prevent the implementation of this type of proposed project activity; and

(b) Do not prevent the implementation of at least one of the alternatives.

All the barriers that prevail for the project activity are detailed in Sub-step 3a.

Sub-step 3a. Identify barriers that would prevent the implementation of type of the proposed project activity

The project activity has its associated barriers to successful implementation, which are being partially overcome by Ankit Metal & Power Limited to bring about additional green house gas emission reductions. The barriers are detailed below:

Operational barrier due to inconsistent power generation

Waste gas availability and consistency of waste gas parameters[8] are the most important aspects that can affect the performance of the project activity. Any non-availability of waste gas or inconsistency of key waste gas parameters and WHRB failure[9] will result in inadequate steam and power generation. Waste gas from the DRI kiln is the only major source of heat energy for the project activity and its insufficiency will completely hamper the power generation process. Non-availability of waste gas may occur due to DRI kiln shut downs, power cuts, functional disturbances in the DRI kiln or due to any kind of network failure. And since AMPL plant operations will be significantly dependent on the project activity for electricity, disruption in power generation will have a detrimental effect on entire plant operations. Under

[8] Waste gas parameters include temperature, pressure and flow rate.

[9] The waste gases entering the WHRB are abrasive in nature and the boiler tubes are highly susceptible to damage.

such situations, AMPL will need to meet its electricity requirements through importing power from the grid. Power is imported at AMPL through a 33kV feeder. However the supply voltage keeps on fluctuating frequently since the supply voltage at the nearest grid sub-station is on an average of 27 kV. In addition to this, AMPL is also facing frequent power interruption which is as high as 8-10 times a day on a regular basis.[10] Even after repeated requests to the WBSEB, these problems are not being solved. Inconsistent power supply and voltage fluctuations have severe adverse impacts on the life of the plant machineries. In order to protect the equipment from such damages, they will need to be tripped frequently which ultimately will lead to production downtime and subsequent financial losses of AMPL.

Sub-step 3 b. Show that the identified barriers would not prevent the implementation of at least one of the alternatives (except the proposed project activity):

It has been observed in Sub-step 3a that the project activity has its associated operational barriers to successful implementation which is attributed to insufficient power generation resulting from inadequate availability of waste gas and inconsistency in waste gas parameters. The baseline alternative (*i.e.* Alterative-1) has also been evaluated with respect to the operational barrier being faced by the project activity. However, since coal would have been used as the fuel source in the baseline scenario, consistent steam generation and consequently power generation could be ensured throughout. Therefore the baseline alternative (*i.e.* Alterative-1) would not have been exposed to the barrier being faced by the project activity.

Step 4. Common practice analysis

The project proponent is further required to conduct the common practice analysis as a credibility check to complement the investment analysis (Step 2) and the barrier analysis (Step 3). The project proponent is required to identify and discuss the existing common practice through the following sub-steps:

Sub-step 4a. Analyze other activities similar to the proposed project activity:

Sub-step 4b. Discuss any similar options that are occurring:

The common practice scenario discussed below further substantiates the fact that the project activity faces barriers to implementation and is therefore not a widespread proposition for similar manufacturing sectors under similar socio-economic environment in India.

India has been witnessing tremendous growth in the sponge iron sector over the past two decades[11].The domestic average growth rate has been 21% in the last three years while the global growth rate stands at 10%. So the project proponent with such an insight vested in setting up the sponge iron unit at Jorehira in the district of Bankura in West Bengal. Among the 32 sponge iron plant in West Bengal almost all plant

[10] Communications to the WBSEB have been provided to the Validator.

[11] http://www.projectsmonitor.com/detailnews.asp?newsid=9773&secid=147

with equivalent capacity of AMPL consume power from grid. Only 13 plants have own WHRB for power generation among them 12 plant has considered CDM benefit to implement the project[12].. Hence it can be concluded that there are very few sponge iron plants which have set up or in the process of setting up waste heat recovery based power generation facility in order to cater to their in-house power requirement[13]. All of these plants have considered the CDM revenue that may be availed under the Kyoto Protocol-Clean Development Mechanism. Therefore the initiative undertaken by Ankit Metal & Power Limited is one of the first few initiatives in the sponge iron manufacturing sector in West Bengal which will entail utilization of the heat content of the waste gas of the DRI kiln for generation of power to partially meet the in-house power requirement.

Therefore the common practice scenario demonstrates that there is a poor penetration of this technology in the Indian sponge iron manufacturing sector which can be attributed to the various investment risks or barriers associated with the project activity implementation.

From the above discussion, it can be established that the project activity is not a feasible option for the project proponent considering all the financial risks and barriers associated with its implementation. The Management of Ankit Metal & Power Limited has been appraised about all these direct financial risks and barriers which even have the potential to make the project proposal completely unviable. Furthermore the failure of the project activity could ultimately lead to a production downtime and subsequently into loss of revenues. However the Management of Ankit Metal & Power Limited could realize the potential of the CDM revenue that can be made available once the project activity is commissioned and registered with UNFCCC. With immense confidence on Kyoto Protocol-Clean Development Mechanism, the Management of Ankit Metal & Power Limited has finally decided to implement the project activity as a climate change initiative.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

As per the selection of the baseline scenario conducted in Section B.4 of this PDD, 'Alternative-1: Generation of power in a coal based captive power plant' is found to be the baseline scenario. Therefore following the guidance of the methodology, the baseline emissions is computed by quantifying the emissions related to flaring of waste gas (if any) and the emissions related to generation of power (equivalent to the net power generated in the project activity) at the coal based captive power plant.

[12] Relevant supporting documents have been provided to the validator.

[13] Source: "Survey of Indian Sponge Iron Industry" prepared by Joint Plant Committee

Project emissions are applicable only if auxiliary fuels are fired for supplementing the heat content of the waste gas and in case of electrical energy consumption for waste gas cleaning prior to its utilization for power generation. The methodology does not require the project proponent to consider any leakage emissions. Therefore the emission reduction resulting from the project activity is computed as a difference between the baseline emissions and the project emissions.

Computation of Baseline Emissions

As per the baseline scenario (*i.e.* Alternative-1), power, equivalent to the net power generated in the project activity, would have been generated in a coal based captive power plant. Therefore following the guidance of the methodology, the baseline emission will be computed as:

$$BE_y = BE_{En,y} + BE_{flst,y}$$

Where:

BE_y = Baseline emissions during the year y (in tonnes of CO_2)

$BE_{En,y}$ = Baseline emissions from electrical energy generated by project activity during the year y (in tonnes of CO_2)

$BE_{flst,y}$ = Baseline emissions from generation of steam, if any, using fossil fuel, that would have been used for flaring the waste gas in absence of the project activity (in tonnes of CO_2).

'y' is any year within the proposed crediting period of the project activity.

However, as stated above in Section B.3 of the PDD, there would not be any steam requirement in order to flare the waste gas generated from the DRI kiln at AMPL in absence of the project activity *i.e.,*

$$BE_{flst,y} = 0$$

Therefore the baseline emissions resulting from the project activity can be considered as:

$$BE_y = BE_{En,y}$$

In accordance with the guidance provided in the methodology *(please refer to 'Baseline emissions for Scenario 1')*, the baseline emissions from electrical energy generated by the project activity will be computed as:

$$BE_{En,y} = BE_{Elec,y} = f_{cap} \times f_{wg} \times \sum_j \sum_i \left(EG_{i,j,y} \times EF_{Elec,i,j,y} \right)$$

Where:

$BE_{En,y}$ = Baseline emissions from electrical energy generated by project activity during the year y (in tonnes of CO_2)

$BE_{Elec,y}$ = Baseline emissions from electricity during the year y (in tonnes of CO_2)

$EG_{i,j,y}$ = Quantity of electricity supplied to the recipient *j* by generator which in the absence of the

project activity would have been sourced from the i^{th} source (*i.e.* the coal based captive power plant) during the year y (in MWh)

$EF_{elec,i,j,y}$ = CO_2 emission for the electricity source *i* (*i.e.* the coal based captive power plant), displaced due to the project activity during the year y (in tonnes CO_2/MWh)

f_{WG} = Fraction of total electricity generated by the project activity using waste gas, calculated as given below

f_{cap} = Energy that would have been produced in project year y using waste gas generated in base year expressed as a fraction of total energy produced using waste gas in year y, determined as given below.

'y' is any year within the proposed crediting period of the project activity.

Determination of f_{wg}

For the project activity under consideration,

- Steam generated with waste gas of the DRI kiln and
- Steam generated from the Atmospheric Fluidized Bed Combustion Boiler

will be fed to a common steam header and there from to the steam turbo-generator set for generation of power. Therefore f_{WG} will be determined following the guidance of the methodology *(please refer to Situation 2 of "Calculation of the energy generated in units supplied by waste gas/heat and other fuels")* as given below:

$$f_{wg} = \frac{ST_{whr,y}}{ST_{whr,y} + ST_{other,y}}$$

Where:

f_{WG} = Fraction of total electricity generated by the project activity using waste gas of the DRI kiln

$ST_{whr,y}$ = Energy content of the steam generated in Waste Heat Recovery Boiler with the heat content of the waste gas of the DRI kiln and fed to turbine via common steam header (in kCal)

$ST_{other,y}$ = Energy content of steam generated in other boilers fed to turbine via common steam header (in kCal)

'y' is any year within the proposed crediting period of the project activity.

Determination of f_{cap}

In accordance with the guidance of the methodology *(please refer to Method 2 of "Capping of baseline emissions")*, the baseline emissions will be capped at the maximum quantity of waste gas that would have

been generated before the implementation of the project activity. With this consideration, f_{cap} will be determined as given below:

$$f_{cap} = \frac{Q_{WG,BL}}{Q_{WG,y}}$$

Where:

$Q_{WG,BL}$ = Quantity of waste gas generated prior to the start of the project activity calculated as given below

(m^3)

$Q_{WG,y}$ = Quantity of waste gas used for energy generation during year y (m^3)

'y' is any year within the proposed crediting period of the project activity.

The quantity of waste gas that would have been generated prior to the start of the project activity *i.e.* $Q_{WG,BL}$ will be calculated as:

$$Q_{WG,BL} = Q_{BL,product} \times q_{wg,product}$$

Where,

$Q_{WG,BL}$ = Quantity of waste gas generated prior to the start of the project activity (m^3)

$Q_{BL,product}$ = Production by process that most logically relates to waste gas generation in baseline (in tonnes)

$q_{wg,product}$ = Amount of waste gas the industrial facility generates per unit of product generated by the process that generates waste gas (m^3/ton)

Determination of $EF_{elec,i,j,y}$

The CO_2 emission for the coal based captive power plant which otherwise would have been set up in absence of the project activity will be calculated following the guidance of the methodology as given below:

$$EF_{Elec,is,j,y} = \frac{EF_{CO2,is,j}}{n_{Plant,j}} \times 3.6 * 10^{-3}$$

Where,

$EF_{elec,i,j,y}$ = CO_2 emission for the electricity source *i* (*i.e.* the coal based captive power plant), displaced due to the project activity during the year y (in tonnes CO_2/MWh)

$EF_{CO2,is,j}$ = CO_2 emission factor per unit of energy of the fossil fuel (coal) used in the baseline generation source i (in tCO_2 / TJ), obtained from reliable local or national data if available, otherwise, taken from the country specific IPCC default emission factors

$n_{Plant,j}$ = Overall efficiency of the existing plant that would be used by j^{th} recipient in the absence of the project activity

Efficiency of the power plant ($n_{.plant,j}$) will be determined following Option (ii) of the methodology *i.e.* highest of the efficiency values provided by two or more manufacturers for power plants with specifications similar to that which would have been required to supply the recipient with electricity that it receives from the project activity.

Computation of Project Emissions

As per the guidance of the methodology, project emissions will include:

- Emissions from consumption of auxiliary fuel to supplement the heat content of the waste gas and
- Emissions from consumption of electrical energy for cleaning of waste gas prior to its utilization for generation of electrical energy

Therefore following the methodological guidance, the project emissions will be computed as:

$$PE_y = PE_{AF,y} + PE_{EL,y}$$

Where:

PE_y = Project emissions during the year y (in tonnes of CO_2)

$PE_{AF,y}$ = Project activity emissions from on-site consumption of fossil fuels by the power plant, in case they are used as supplementary fuels, due to non-availability of waste gas to the project activity or due to any other reason (in tonnes of CO_2)

$PE_{EL,y}$ = Project activity emissions from on-site consumption of electricity for gas cleaning equipment (in tonnes of CO_2)

'y' is any year within the proposed crediting period of the project activity.

However, as stated above in Section B.3 of the PDD, no additional waste gas cleaning will be required in the project scenario than that in the baseline scenario. Therefore there will not be any additional energy consumption due to cleaning of waste gas in the project scenario and hence

$$PE_{EL,y} = 0$$

Therefore,

$$PE_y = PE_{AF,y}$$

The project emissions from on-site fossil fuel consumption will be computed following the guidance of the methodology as given below:

$$PE_{AF,y} = \sum FF_{i,y} \times NCV_i \times EF_{CO2,i}$$

Where:

$PE_{AF,y}$ = Project activity emissions from on-site consumption of fossil fuels by the power plant, in case they are used as supplementary fuels, due to non-availability of waste gas to the project activity or due to any other reason (in tonnes of CO_2)

$FF_{i,y}$ = Quantity of fossil fuel type *i* combusted to supplement waste gas in the project activity during the year y, (in tonnes)

NCV_i = Net calorific value of the fossil fuel type *i* combusted as supplementary fuel, (in TJ/ton)

$EF_{CO2,i}$ = CO_2 emission factor per unit of energy of the fuel type i (in tonnes of CO_2/TJ)

'y' is any year within the proposed crediting period of the project activity.

For the project activity under consideration, there is no provision for auxiliary fossil fuel firing in the Waste Heat Recovery Boiler to supplement the heat content of the waste gas. Therefore no project emission is considered while computing the ex-ante emission reductions resulting from the project activity. However the same will be monitored during the proposed crediting period and in case of any consumption of auxiliary fuel for supplementing the heat content of the waste gas, emission from the same will be determined as given above and will be accounted for during the computation of emission reductions, annually on an ex-post basis.

Computation of Leakage Emissions

The methodology does not require the project proponent to consider any leakage emissions.

Computation of Emission Reductions

As per the methodology, the emission reductions resulting from the project activity will be computed as

$$ER_y = \left(BE_y - PE_y\right)$$

Where,

ER_y = Emission reductions resulting from the project activity during the year y (in tonnes of CO_2)

BE_y = Baseline emissions during the year y (in tonnes of CO_2)

PE_y = Project emissions during the year y (in tonnes of CO_2)

'y' is any year within the proposed crediting period of the project activity.

B.6.2. Data and parameters that are available at validation:

The following parameters, required for the computation of baseline emissions and project emissions (and hence emission reductions resulting from the project activity), are standard parameters which will not be monitored throughout the crediting period and will remain fixed for the entire crediting period. The same will be provided to the Validator during validation of the project activity.

Fixed parameters for the computation of Baseline Emissions

1. Parameters related to computation of f_{cap}

Data / Parameter:	$Q_{WG,BL}$
Data unit:	m^3
Description:	Quantity of waste gas generated prior to the start of the project activity
Source of data used:	Calculated based on Manufacturer's data
Value applied:	346715794
Justification of the choice of data or description of measurement methods and procedures actually applied :	The parameter is calculated based on: ▪ Production by process that most logically relates to waste gas generation in baseline ▪ Amount of waste gas the industrial facility generates per unit of product generated by the process that generates waste gas
Any comment:	The parameter is calculated based on two parameters of higher accuracy level (as described below). Therefore the reliability of the parameter is ensured.

Data / Parameter:	$Q_{BL,product}$
Data unit:	tonnes/annum
Description:	Production by process (*i.e.* sponge iron manufacturing) that most logically relates to waste gas generation in baseline
Source of data used:	Plant Records
Value applied	56181
Justification of the choice of data or description of measurement methods and procedures actually applied :	The parameter is monitored with a properly calibrated weighing system and the same will be audited by a third party statutory auditor.
Any comment:	Calibration of the weighing system and third party auditing will ensure the reliability of the parameter.

Data / Parameter:	$q_{wg,product}$
Data unit:	m^3/ton
Description:	Amount of waste gas the industrial facility generates per unit of product (*i.e.* DRI) generated by the process (*i.e.* sponge iron manufacturing) that generates waste gas
Source of data used:	Manufacturer's Data.
Value applied	6171
Justification of the choice of data or description of measurement methods and procedures actually	Manufacturer's Specification.

applied :	
Any comment:	Consideration of manufacturer's data will ensure the reliability of the parameter.

2. Parameters related to computation of f_{WG}

The parameter will be monitored during the proposed crediting period of the project activity. Please refer to Section B.7.1 of the PDD for further details.

3. Parameters related to computation of $EG_{i,j,y}$

The parameter will be monitored during the proposed crediting period of the project activity. Please refer to Section B.7.1 of the PDD for further details.

4. Parameters related to computation of $EF_{elec,i,j,y}$

Data / Parameter:	$n_{Plant,j}$
Data unit:	-
Description:	Overall efficiency of the existing plant that would be used by j^{th} recipient in the absence of the project activity
Source of data used:	Manufacturers Data
Value applied	0.35
Justification of the choice of data or description of measurement methods and procedures actually applied :	Efficiency of the power plant will be determined as the highest of the efficiency values provided by two or more manufacturers for power plants with specifications similar to that which would have been required to supply the recipient with electricity that it receives from the project activity.
Any comment:	Consideration of the highest efficiency will ensure reliability of the parameter.

Fixed parameters for the computation of Project Emissions

The parameters required for the computation of project emissions will be monitored during the proposed crediting period of the project activity. Please refer to Section B.7.1 of the PDD for further details.

B.6.3 Ex-ante calculation of emission reductions:

Ex-ante estimation of Baseline Emissions

The ex-ante computation of baseline emission for the project activity (please refer to 'Annex-3: Baseline Information' for detail computation) is tabulated below:

Sl. No.	**Operating Year**	**Baseline Emission (tonnes of CO_2 e)**
1.	2009 – 2010	26808
2.	2010 – 2011	26808

Sl. No.	Operating Year	Baseline Emission (tonnes of CO_2 e)
3.	2011 – 2012	26808
4.	2012 – 2013	26808
5.	2013 – 2014	26808
6.	2014 – 2015	26808
7.	2015 – 2016	26808
8.	2016 – 2017	26808
9.	2017 – 2018	26808
10	2018 – 2019	26808
Total		**268080**

Ex-ante estimation of Project Emissions

As described above in Section B.6.1 above, there will be no project emission from the project activity and hence the project proponent will not consider any project emission for ex-ante computation of emission reductions resulting from the project activity (please refer to 'Annex-3: Baseline Information' for detail computation). Therefore,

$PE_y = 0$

Where,

PE_y = Project Emissions in the year y (tCO_2)

However the combustion of fossil fuel during generation start up or in emergencies in the project activity will be monitored and the project emission will be computed on the basis of the fossil fuel combustion during any year within the proposed crediting period. The same will be up-dated annually on an ex-post basis.

Ex-ante estimation of Emission Reductions

The ex-ante computation of emission reductions resulting from the project activity (please refer to 'Annex-3: Baseline Information' for detail computation) is tabulated below:

Sl. No.	Operating Year	Emission Reduction (tonnes of CO_2 e)
1.	2009 – 2010	26808
2.	2010 – 2011	26808
3.	2011 – 2012	26808
4.	2012 – 2013	26808
5.	2013 – 2014	26808

Sl. No.	Operating Year	Emission Reduction (tonnes of CO_2 e)
6.	2014 – 2015	26808
7.	2015 – 2016	26808
8.	2016 – 2017	26808
9.	2017 – 2018	26808
10	2018 – 2019	26808
Total		**268080**

B.6.4 Summary of the ex-ante estimation of emission reductions:

Year	Estimation of Proposed project activity Emission reductions (tonnes of CO_2 e)	Estimation of baseline Emissions reductions (tonnes of CO_2 e)	Estimation of leakage (tonnes of CO_2 e)	Estimation of emission reductions (tonnes of CO_2 e)
2009 – 2010	0	26808	0	26808
2010 – 2011	0	26808	0	26808
2011 – 2012	0	26808	0	26808
2012 – 2013	0	26808	0	26808
2013 – 2014	0	26808	0	26808
2014 – 2015	0	26808	0	26808
2015 – 2016	0	26808	0	26808
2016 – 2017	0	26808	0	26808
2017 – 2018	0	26808	0	26808
2018 – 2019	0	26808	0	26808
Total (tonnes of CO_2 e)	**0**	**268080**	**0**	**268080**

B.7 Application of the monitoring methodology and description of the monitoring plan:

Title: Consolidated monitoring methodology for GHG emission reductions for waste gas or waste heat or waste pressure based energy system

Reference: Approved consolidated monitoring methodology ACM0012/Version 02, Sectoral Scope 1 and 4

B.7.1 Data and parameters monitored:

The approved consolidated monitoring methodology requires the project proponent to monitor the following parameters for the computation of baseline emissions, project emissions and hence the emission reductions resulting from the project activity. The parameters and the monitoring procedures are detailed below:

Parameters to be monitored for the computation of Baseline Emissions

1. Parameters related to computation of f_{cap}

Data / Parameter:	$Q_{WG,y}$
Data unit:	m^3
Description:	Quantity of waste gas used for energy generation during year y
Source of data to be used:	Plant Records
Value of data applied for the purpose of calculating expected emission reductions in section B.5	583200000 (assumed ex-ante based on waste volume of 90000 m^3/hr and 270 days of operation)
Description of measurement methods and procedures to be applied:	The parameter will be monitored continuously with flow meter. The same will also be available in the power plant Distributed Control System (DCS). The Head (Power Plant) will be responsible for regular calibration of the flow meter. The data will be archived both electronically and in paper for the entire crediting period and two years after.
QA/QC procedures to be applied:	Yes
Any comment:	The uncertainty level of the parameter will be low since the same will be monitored with calibrated meter.

2. Parameters related to computation of f_{WG}

Data / Parameter:	$ST_{whr,y}$
Data unit:	kCal
Description:	Energy content of the steam generated in Waste Heat Recovery Boiler with the heat content of the waste gas of the DRI kiln and fed to turbine via common steam header
Source of data to be used:	Plant Records and Steam Tables

Value of data applied for the purpose of calculating expected emission reductions in section B.5	$1.883x10^{11}$
Description of measurement methods and procedures to be applied:	The parameter will be determined based on ▪ Steam flow from the Waste Heat Recovery Boiler- The parameter will be monitored with flow meter and will be available in the power plant Distributed Control System (DCS). The Head (Power Plant) will be responsible for regular calibration of the flow meter. The data will be archived both electronically and in paper for the entire crediting period and two years after. ▪ Enthalpy of steam generated- The parameter will be determined based on temperature and pressure of steam generated from the Waste Heat Recovery Boiler using Steam Tables. The temperature of steam generated will be monitored with temperature gauge and the pressure of steam generated will be monitored with pressure gauge. The Head (Power Plant) will be responsible for regular calibration of the temperature and pressure gauges. The data will be archived both electronically and in paper for the entire crediting period and two years after.
QA/QC procedures to be applied:	Yes
Any comment:	The uncertainty level of the parameter will be low since the same will be determined with parameters monitored with calibrated meters.

Data / Parameter:	$ST_{other,y}$
Data unit:	kCal
Description:	Energy content of steam generated in other boilers fed to turbine via common steam header
Source of data to be used:	Plant Records and Steam Tables
Value of data applied for the purpose of calculating expected emission reductions in section B.5	$1.151x10^{11}$
Description of measurement methods and procedures to be applied:	The parameter will be determined based on ▪ Steam flow from other boiler- The parameter will be monitored with flow meter and will be available in the power plant Distributed Control System (DCS). The Head (Power Plant) will be responsible for regular calibration of the flow meter. The data will be archived both electronically and in paper for the entire crediting period and two years after. ▪ Enthalpy of steam generated- The parameter will be determined based on temperature and pressure of steam generated from other boiler using Steam

	Tables. The temperature of steam generated will be monitored with temperature gauge and the pressure of steam generated will be monitored with pressure gauge. The Head (Power Plant) will be responsible for regular calibration of the temperature and pressure gauges. The data will be archived both electronically and in paper for the entire crediting period and two years after.
QA/QC procedures to be applied:	Yes
Any comment:	The uncertainty level of the parameter will be low since the same will be determined with parameters monitored with calibrated meters.

3. Parameters related to computation of $EG_{i,j,y}$

Data / Parameter:	$EG_{i,j,y}$
Data unit:	MWh
Description:	Quantity of electricity supplied to the recipient *j* by generator which in the absence of the project activity would have been sourced from the i^{th} source (*i.e.* the coal based captive power plant) during the year y
Source of data to be used:	Plant Records
Value of data applied for the purpose of calculating expected emission reductions in section B.5	73498
Description of measurement methods and procedures to be applied:	The parameter will be measured continuously (online measurement) with energy meter and the same will be available in the plant's Distributed Control System (DCS). The Head (Power Plant) will be responsible for regular calibration of the energy meter. The data will be archived both electronically and in paper for the entire crediting period and two years after.
QA/QC procedures to be applied:	Yes
Any comment:	The uncertainty level of the parameter will be low since the same will be monitored with calibrated meter.

4. Parameters related to computation of $EF_{elec,i,j,y}$

Data / Parameter:	$EF_{elec,i,j,y}$
Data unit:	tCO_2/ MWh
Description:	CO_2 emission for the electricity source *i* (*i.e.* the coal based captive power plant), displaced due to the project activity during the year y
Source of data used:	Plant Records
Value of data applied	0.988

for the purpose of calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	The parameter will be calculated based on: ▪ CO_2 emission factor per unit of energy of the fossil fuel (coal) used in the baseline generation source i and ▪ Overall efficiency of the existing plant that would be used by j^{th} recipient in the absence of the project activity The data will be archived both electronically and in paper for the entire crediting period and two years after.
QA/QC procedures:	Yes
Any comment:	The parameter will be determined based on two parameters (as described above) with lower uncertainty levels. This will ensure the reliability of the parameter.

Data / Parameter:	$EF_{CO2,is,j}$
Data unit:	tCO_2 / TJ
Description:	CO_2 emission factor per unit of energy of the fossil fuel (coal) used in the baseline generation source i
Source of data used:	Plant Records/ National Sources/ 2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value of data applied for the purpose of calculating expected emission reductions in section B.5	96.1
Description of measurement methods and procedures to be applied:	The parameter will be determined following the standard testing practice. In absence of plant specific data, country specific data or IPCC default values will be used.
QA/QC procedures:	Yes
Any comment:	Determination of the parameter following the standard testing practice will ensure the reliability of the parameter. In absence of authentic plant specific data, country specific data or IPCC default values will be used to ensure reliability of the parameter.

Parameters to be monitored for the computation of Project Emissions

Data / Parameter:	FF_i
Data unit:	tonnes
Description:	Quantity of fossil fuel type *i* combusted to supplement waste gas in the project activity during the year y
Source of data to be used:	Plant Records
Value of data applied for the purpose of calculating expected emission	0

reductions in section B.5	
Description of measurement methods and procedures to be applied:	The parameter will be measured continuously (*i.e.* whenever auxiliary fuel will be consumed) with a properly calibrated flow meter/weighing system. The data will be archived both electronically and in paper for the entire crediting period and two years after.
QA/QC procedures to be applied:	Yes
Any comment:	Regular calibration of the flow meter/weighing system will ensure the reliability of the parameter. If possible, fuel purchase receipt will also be used to cross-verify the data.

Data / Parameter:	NCV_i
Data unit:	TJ/ton
Description:	Net calorific value of the fossil fuel type *i* combusted as supplementary fuel
Source of data to be used:	Plant Records/ National Sources/ 2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.043 (considering light diesel oil) 0.0189 (considering sub-bituminous coal) *For any other fuel type, the same standard will be used.*
Description of measurement methods and procedures to be applied:	The parameter will be determined following the standard testing practice. In absence of plant specific data, country specific data or IPCC default values will be used.
QA/QC procedures to be applied:	Yes
Any comment:	Determination of the parameter following the standard testing practice will ensure the reliability of the parameter. In absence of authentic plant specific data, country specific data or IPCC default values will be used to ensure reliability of the parameter.

Data / Parameter:	$EF_{CO2,i}$
Data unit:	tCO_2/TJ
Description:	CO_2 emission factor per unit of energy of the fuel type i
Source of data to be used:	Plant Records/ National Sources/ 2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value of data applied for the purpose of calculating expected emission reductions in section B.5	74.1 (considering diesel oil) 96.1 (considering sub-bituminous coal) *For any other fuel type, the same standard will be used.*
Description of measurement methods and procedures to be applied:	The parameter will be determined following the standard testing practice. In absence of plant specific data, country specific data or IPCC default values will be used.

QA/QC procedures to be applied:	Yes
Any comment:	Determination of the parameter following the standard testing practice will ensure the reliability of the parameter. In absence of authentic plant specific data, country specific data or IPCC default values will be used to ensure reliability of the parameter.

B.7.2 Description of the monitoring plan:

Please refer to 'Annex-4: Monitoring Plan' of the PDD for detail description of the Monitoring Plan.

B.8 Date of completion of the application of the baseline study and monitoring methodology and the name of the responsible person(s)/entity(ies)

Parameter	Details
Date of completing the final draft of this baseline selection and monitoring plan	22/01/2009
Name of person/ entity determining the baseline and establishing the monitoring plan	Ankit Metal & Power Limited

SECTION C. Duration of the project activity / crediting period

C.1 Duration of the project activity:

C.1.1. Starting date of the project activity:

04/05/2005- First Contract Agreement between the project proponent and the manufacturer of the Steam-Turbo Generator set.

C.1.2. Expected operational lifetime of the project activity:

20 y 0 m

C.2 Choice of the crediting period and related information:

C.2.1. Renewable crediting period

C.2.1.1. Starting date of the first crediting period:

Not Applicable

C.2.1.2. Length of the first crediting period:

Not Applicable

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

01/07/2009 or the date of registration of the project activity with UNFCCC, whichever is later.

C.2.2.2. Length:

10 y 0 m

SECTION D. Environmental impacts

D.1. Documentation on the analysis of the environmental impacts, including transboundary impacts:

Sustainable Development is an emerging concept which has been brought in the realization of the importance of the environmental issues linked with the development objectives and policies. A project activity can cause impacts on the environment either positively or negatively throughout its lifetime depending on the type of the activity. Furthermore Article 12 of the Kyoto Protocol requires that a CDM project activity contributes to the sustainable development of the host country. Therefore assessing the project activity's positive and negative impacts on the local environment and on society is a key element for each CDM project activity. AMPL plans to contribute to the cause of improving the local and global environment by the implementation of the project activity. A detailed environmental impact assessment has been conducted for the integrated steel plant of AMPL which also includes all the environmental aspects of the project activity under consideration. The study primarily includes identifying the key environmental parameters and evaluating the impact of the project activity on these parameters throughout its lifetime. The same has been broadly classified during three distinct phases of the project activity implementation namely,

- Impacts during Construction phase
- Impacts during Operational phase and
- Impacts during Maintenance phase

This also describes the Environmental Management Plan to be followed by the project proponent (*i.e.* AMPL) in order to negate the negative impacts of the project activity, if any and thereby enhancing its positive environmental impacts.

Please refer to the following section for detail analysis of environmental impact of the project activity under consideration:

Impacts during Construction phase

Activity: This primarily includes construction of the power plant, erection of the WHRB, the Steam Turbo-Generator set and other power plant equipments, installation of the ducting system for the transportation of the DRI kiln gas and installation of power evacuation system. All these activities have minor impacts on the following baseline parameters as mentioned below:

Environmental/Social Parameters	Impacts	Recommendations/ Implementation/ Remarks
Air	During the construction phase of the project activity, there will be a marginal increase in the dust emission level. The effect, although direct, will be for short term, reversible, minor and confined to the plant site	AMPL will ensure sprinkling of water during construction phase to suppress dust emissions. They will also monitor vehicular emissions in order to be within the norms and to ensure minimum pollution.
Soil	The construction activity will involve site levelling operations, site preparation and erection of utilities which will result in a minimal quantum of soil movements. However the same will be for a very short spell of time and therefore the impacts are not considered to be significant.	The impacts are expected to be stabilized during the operational phase of the project activity. Hence, soil conservation and afforestation programmes are not required.
Noise	Site preparatory work and erection of various utilities during the construction phase of the project activity will change the noise generation level within the plant premise to certain extent. However the impact will be primarily confined within the plant premise.	AMPL will ensure use of silencers on noise generating machines (wherever possible) and distribute ear plugs or ear-muffs to the workers in the noisy zones.
Social and Economic	No dislocation of population will be required to facilitate the construction activities. Further the construction of the power plant will generate employment opportunities for the local people on a temporary basis which will help them improvising their quality of life.	No rehabilitation of population will therefore be required. However AMPL has decided to set up new infrastructural facilities for the project personnel and their families.

Impacts during Operational phase

Activity: During operational phase, the project activity will utilise the heat content of the waste gas of the DRI kiln to generate power. The following impacts are envisaged during the operational phase of the project activity:

Environmental/ Social Parameters	Impacts / Activities	Recommendations/ Implementation/ Remarks
Ambient Air Quality	The project activity for generation of power through utilisation of the heat content of the waste gas is a cleaner means of power generation. This will replace fossil fuel based power generation from a coal based captive power plant and hence the emissions from the same. Moreover the project activity will reduce the temperature of the waste gas in the WHRB which will directly improve the operational efficiency of the ESP and hence reduce the dust emission level. Furthermore the project activity, by preventing the loss of useful heat energy of the waste gas of the DRI kiln to the atmosphere, will reduce the thermal pollution of the local environment.	This is a positive step towards air quality improvement. AMPL will constantly monitor all the Ambient Air Quality parameters in and around the plant site and non-conformance of any one of them with the prescribed standards will be addressed with top priority.
Ground Water	The ground water will not be directly used in the project activity. However there may be some use of ground water by people involved in secondary development of the area.	AMPL will ensure recharge of ground water through various impoundments.
Surface Water	Surface water contamination may result from cooling tower blow down, boiler chemical cleaning solutions, gas side waste water washing waste solutions as well as from variety of low volume wastes including ion exchange regeneration solutions from the reverse osmosis plant, boiler blow down, sewerage discharges from buildings and plant floor drains. Consumption of such water may lead to certain water borne diseases.	Provisions will be made to neutralize the effluents by addition of acids or alkali to achieve the required pH of about 7.0. Sewage from various buildings in the plant will be conveyed through separate drains to the septic tank. The effluents from the septic tank will be disposed off into soil by providing disposing trenches thereby restricting the possibility of ground water contamination.
Land Environment	All solid wastes will be dumped in a systematic manner and land will not be polluted due to the project activity	Systematic dumping will have minimum or no impact on the surrounding land environment. Further to minimise this minimal impact, AMPL will utilise the solid waste for road making *etc*.

Impacts during Operational phase		
Environmental/ Social Parameters	Impacts / Activities	Recommendations/ Implementation/ Remarks

Noise Generation	An increase in noise level is anticipated with the implementation of the project activity which includes operation of vibrating equipment like steam turbo-generator. However the same is expected to be confined within AMPL boundary thereby minimising the impacts on the local habitats.	The rotating equipment in the plant is designed in such manner so as to keep the noise level upto 85 to 90 db as per the requirements of Occupational Safety and Health Administration Standards. In addition, noise monitoring will also be carried out in township in day and night to observe the effect of industrial activities on noise level. Appropriate mitigation measures will be adopted in case the noise level exceeds the stipulated value.
Solid Waste Management	The project activity will not lead to any additional solid waste generation since only the heat content of the waste gas will be utilised for generation of steam and subsequently power.	No solid waste management plan is therefore required.
Natural Resource Conservation	The project activity will replace fossil fuel (coal) based power generation at a captive power plant thereby conserving an equivalent quantum of non-renewable fossil fuel-coal.	This is a positive step towards non-renewable resource – coal conservation.
Ecology- Flora and Fauna	The emissions, discharge of solid and liquid effluents may have some impact on the local flora. Cutting of trees and vegetal cover for facilitation of the project activity, although limited to the extent possible, may cause loss of habitats for fauna. Furthermore the noise generated from the project activity will have some impact on the fauna.	The impact on local flora is expected to be contained within the battery limit. Greenbelt development shall be taken up as a part of the project activity implementation. Soil binding plants (*e.g.* grass) will be planted wherever feasible. Care shall be taken not to kill fauna during clearing up of lands. Operation of noise producing equipment will be avoided during night time to avoid impacts on fauna.
Social	The project activity will generate employment opportunities for the local people for successful operation of the power plant. This will help them to develop professional skills in the field of power plant operation. Furthermore this will improve the quality of life of the local people. Moreover a pollution free work area will ensure safety and health of the employees at the workplace.	AMPL is always committed to provide better work area environment at shop floors. Upkeep of the workplace, proactive maintenance and effective running of the pollution control devices will substantially contribute in maintaining a clean and healthy work environment.
Impacts during Maintenance phase		
Activity: An annual shut down of the power plant will be planned every year for ensuring proper maintenance of the power plant equipment. Since this will be for a very short span of time, hence no significant environmental impacts are envisaged during this phase. The only impact during this phase, as		

envisaged, is detailed below:		
Environmental /Social Parameters	Impacts / Activities	Recommendations/ Implementation/ Remarks
Solid Waste Management	In the maintenance phase some oily cloth, waste and scrap will be generated after cleaning but it will not cause any adverse impact on the environment.	AMPL will ensure the reuse and recycle of solid wastes to improve the business performance and the environmental performance of the organization.

D.2. If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to support documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party:

The above evaluation clearly describes that the project activity is a cleaner mean of power generation which will reduce the dependency of AMPL on fossil fuel (coal) based power generation. Furthermore, by utilising the heat content of waste gas, which otherwise would have been wasted, the project activity will reduce thermal pollution of the local environment. Therefore the project activity primarily has only positive environmental impacts. However the project performance will be monitored as a part of the regular Environmental Management Plan of AMPL and negative impacts, if any, will immediately be taken care off.

SECTION E. Stakeholders' comments

E.1. Brief description how comments by local stakeholders have been invited and compiled:

The Management of Ankit Metal & Power Limited is aware of their responsibilities for being a corporate citizen of India. Therefore stakeholder consultation is considered to be an integral component of every project activity implementation at AMPL. All the possible stakeholders have been identified and communicated about the project activity and requested to provide their feedback for the same. Their comments, whether positive or negative, have been properly addressed at the Management level and appropriate measures have been undertaken.

The stakeholder consultation is generally carried out in a phased manner at AMPL. The same is explained below:

Table-E.1: Stakeholder Consultation Protocol

Phase	Activity
Phase-I: Identification of Stakeholders	All the parties involved with the project activity at any stage of its implementation (*i.e.* from conceptualisation to actual implementation) are considered to be a potential stakeholder for the project activity. For the project activity under consideration, the following government and non-government parties and organizations are identified as the stakeholders: ▪ Village Panchayat ▪ Employees of AMPL ▪ Consultants. ▪ Equipment Suppliers ▪ Non-Governmental Organizations (NGOs) ▪ West Bengal State Electricity Board. ▪ West Bengal Pollution Control Board. ▪ Ministry of Environment and Forests, Government of India..
Phase-II: Information Sharing	The representatives from AMPL have explained to the identified stakeholders and shared with them the salient features of the project activity and its probable socio-economic and environmental impacts on the locality. They are encouraged to give their feedbacks either verbally or through written communication on all the aspects of the project activity implementation and its operation.
Phase-III: Compilation of the comments received and measures undertaken	The comments received from all the stakeholders are compiled and their significance is considered by the project team of AMPL. Appropriate measures are undertaken to address the issues raised by the stakeholders. In case of any significant comment received from the stakeholders, the same is escalated to the Management Level and necessary actions are implemented by the Management of AMPL.

E.2. Summary of the comments received:

Table-E.2: Summary of Stakeholder Consultation				
Sl No.	Name of Stakeholders	Mode of Communication	Feedback	Status
Comments received from Non-Governmental Parties				
1.	Village Panchayat	The Panchayat Pradhans are considered to be the true representatives of the local people in a democratic country like India. AMPL Representatives have explained the Village Panchayat Pradhans the salient features of the project activity. They are requested to provide their feedbacks on the same.	The Village Panchayat Pradhans have acknowledged the positive socio-economic and environmental impacts of the project activity. They commended AMPL's initiative of implementing the project activity without causing any population dislocation and their role in generating local employment opportunities. They have assured their support to the Management of AMPL.	AMPL Management has received a written consent from the Village Panchayat for the project activity.
2.	Employees of AMPL	AMPL Management has communicated the relevant information of the project activity and its associated socio-economic and environmental benefits through a notice to its employees.	The employees have realized the positive attributes of the project activity. They have appraised the Management's decision to implement the project activity and assured their support for the same.	The AMPL Management has received a written consent from the employees for the project activity.
3.	Consultants	The Consultants and the Equipment Suppliers have been actively involved during the facilitation of the project activity. They have been appraised verbally about the project activity and its other aspects.	The project activity has generated a lot of business opportunities for the Consultants and the Equipment Suppliers. They have appreciated the initiative of AMPL and provided their support throughout to make it successful.	AMPL Management has received a positive feedback from their Consultant and Equipment Suppliers.
4.	Equipment Suppliers			
5.	Non-Governmental Organizations (NGOs)	The project activity details, its associated environmental impacts and its contribution towards the up-liftment of the social and economic structure of the locality have been briefed to the NGO through a letter and their opinion on the same is requested for.	The NGO has appreciated the initiative of AMPL towards socio-economic development of the locality and their commitment towards developing an environment friendly manufacturing process.	AMPL Management has received a written consent from the NGO for the project activity.
Comments received from Government Parties				

Table-E.2: Summary of Stakeholder Consultation				
Sl No.	Name of Stakeholders	Mode of Communication	Feedback	Status
6.	West Bengal State Electricity Board (WBSEB)	West Bengal State Electricity Board (WBSEB) is the state's nodal body which deals with power generation, its transmission and distribution. The project activity details have been communicated to WBSEB.	The project proponent is not required to take any permission from WBSEB in order to implement the project activity. However based on the information shared by the project proponent, WBSEB has appreciated the initiative of AMPL Management.	AMPL Management has always interacted with WBSEB during the implementation of the project activity.
7.	West Bengal Pollution Control Board (WBPCB)	West Bengal Pollution Control Board (WBPCB) has prescribed standards of environmental compliance and monitors the adherence to the standards. The relevant information of the project activity was presented to WBPCB.	The project activity has been appraised by WBPCB. The environmental parameters will be monitored by WBPCB as per the statutory requirements.	The project activity has received the Consent to Establish (or No Objection Certificate (NOC)) and the Consent to Operate from WBPCB as per provisions under Section 25/26 of Water (Prevention & Control of Pollution) Act, 1974 & Section 21 of Air (Prevention & Control of Pollution) Act, 1981 before the commissioning of the plant.
8.	Ministry of Environment and Forests, Government of India	The Project Design Document and the Project Concept Note have been submitted to MoEF for their consideration. The project activity details have also been presented.	The project activity has been developed following the guidelines proposed by Ministry of Environment & Forests, Government of India in order to ensure environmental quality.	The project proponent has received the Host Country Approval from Ministry of Environment & Forests, Government of India for the project activity.

E.3. Report on how due account was taken of any comments received:

Ankit Metal & Power Limited has received only positive feedbacks on the project activity from all the stakeholders. All the comments and consents received have been considered and given due consideration while preparing the Project Design Document.

Furthermore, as per the requirement of UNFCCC, the Project Design Document will be web-hosted on the DOE's (Designated Operational Entity) website for a period of one month for global stakeholder consultation. The comments received by the Validator during the period of global stakeholder consultation will be properly addressed as a part of CDM process.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Ankit Metal & Power Limited
Street/P.O.Box:	35,Chittaranjan Avenue Kolkata-700012
Building:	
City:	Kolkata
State/Region:	West Bengal
Postfix/ZIP:	700012
Country:	India
Telephone:	Tel: +91-33-2211 9805/2211 9806/ 2211 8807
FAX:	Fax: -91-33-2211 0522
E-Mail:	ipo@ankitmetal.com
URL:	www.ankitmetal.com
Represented by:	
Title:	Jt. Managing Director
Salutation:	Mr
Last Name:	Patni
Middle Name:	-
First Name:	Rohit
Department:	Board of Management
Mobile:	+91-9831200322
Direct FAX:	+91-33- 2211 4134
Direct tel:	+91-33- 22115786
Personal E-Mail:	rohit_patni@yahoo.com

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding for this project activity.

Annex 3

BASELINE INFORMATION

Computation of Emission Reductions			
Parameter	**Parameter**	**Unit**	**Value**
Computation of Baseline Emissions			
Determination of f_{cap}			
Production by process (i.e. sponge iron manufacturing) that most logically relates to waste gas generation in baseline	$Q_{BL,product}$	Tonnes/annum	56181
Amount of waste gas the industrial facility generates per unit of product (i.e. DRI) generated by the process (i.e. sponge iron manufacturing) that generates waste gas	$q_{wg,product}$	Nm^3/tonne	6171
Quantity of waste gas generated prior to the start of the project activity	$Q_{WG,BL}$	m^3	346715794
Quantity of waste gas used for energy generation during year y	$Q_{WG,y}$	m^3	583200000
Energy that would have been produced in project year y using waste gas generated in base year expressed as a fraction of total energy produced using waste gas in year y	f_{cap}		0.59450582
Determination of f_{WG}			
Capacity of the TG		tonnes/MWh	4.5
Gross power generation from WHRB		kWh/annum	51840000
Gross power generation from AFBC		kWh/annum	31680000
Energy content of the steam generated in Waste Heat Recovery Boilers with the heat content of the waste gas of the DRI kilns and fed to turbine via common steam header	$ST_{WHR,y}$	kCal	1.88308E+11
Energy content of steam generated in AFBC boiler fed to turbine via common steam header	$ST_{AFBC,y}$	kCal	1.15077E+11
Fraction of total electricity generated by the project activity using waste gas	f_{wg}		0.621
Determination of $EF_{Eleci,j,y}$			
CO_2 emission factor per unit of energy of the fossil fuel (coal) used in the baseline generation source i	$EF_{CO2,is,j}$	tCO_2/TJ	96.1
Overall efficiency of the existing plant that would be used by jth recipient in the absence of the project activity	$n_{Plant,j}$		0.35
CO_2 emission for the electricity source i (i.e. the coal based captive power plant), displaced due to the project activity during the year y	$EF_{elec,i,j,y}$	tCO_2/MWh	0.988
Determination of $EG_{i,j,y}$			
Quantity of electricity supplied to the recipient *j* by generator which in the absence of the project activity would have been sourced from the i^{th} source (*i.e.* the coal based captive power plant) during the year y	$EG_{i,j,y}$	MWh	73497.6
Baseline Emissions during the year y	BE_y	tCO_2	26808
Project Emissions during the year y	PE_y	tCO_2/annum	0
Emission Reductions resulting from the project activity during the year y	ER_y	tCO_2/annum	26808

Annex 4

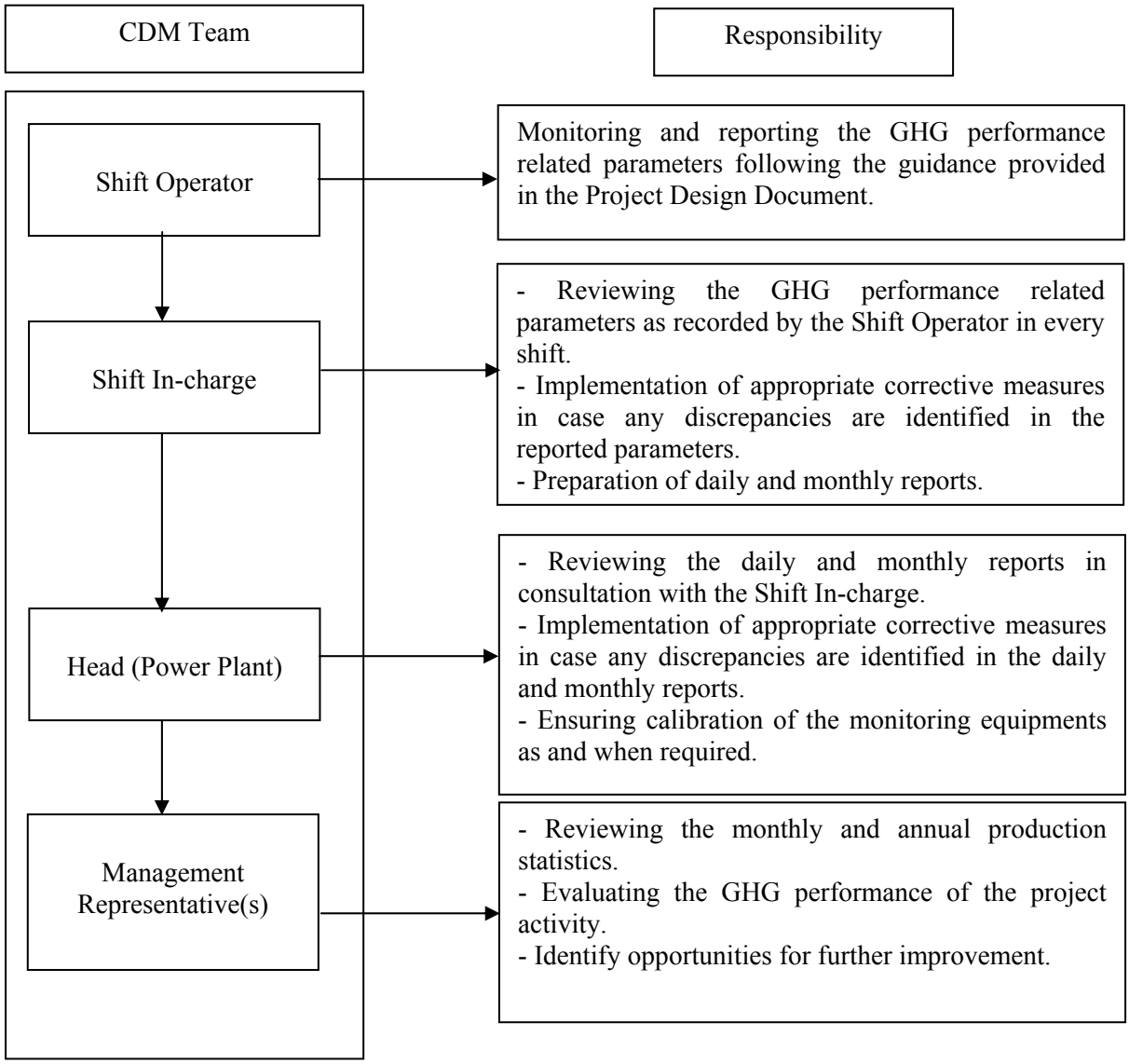
MONITORING INFORMATION

The project activity will result in emission reductions by generating power with the heat content of the waste gas emanated from the DRI kiln thereby offsetting more carbon intensive power generation at a coal based captive power plant. The financial performance of the project activity depends significantly on the CDM revenue to be availed through sale of Certified Emission Reduction (CER) units accrued from the project activity. This will require proper monitoring of all the relevant GHG performance parameters. Therefore the project proponent has developed a robust monitoring protocol which will be followed throughout the proposed crediting period in order to ensure proper operation of the project activity resulting in generation of carbon credits. This includes a range of data measurement, estimation and collection options/techniques in each case indicating preferred options consistent with good practices to allow project managers and operational staff, auditors, and verifiers to apply the most practical measurement approaches for the project activity. The same is explained below:

Table An-4.1: Monitoring Plan
1.0 Objective
▪ To ensure proper monitoring and recording of all the parameters required for the computation of emission reductions from the project activity ▪ To ensure proper evaluation of the project activity performance at regular intervals ▪ To identify the discrepancies in the data monitoring, recording and archiving system and to open up the opportunities for future improvement
2.0 Instrumentation and Control System
The instrumentation and control system is the key aspect for salubrious functioning of any monitoring and verification system of a project activity. The project activity has employed the state of the art monitoring and control equipment that will measure, record, report, monitor and control various key parameters like quantity waste gas utilised for power generation, total power generated, power used for auxiliary consumption, in-house power consumption, steam flow rate, temperature and pressure parameters of the steam generated, turbine steam consumption, any fossil fuel consumption, its calorific value and CO_2 emission factor. The instrumentation and control system for the power plant will be designed with microprocessor-based instruments having adequate provisions to control and monitor the various operating parameters for safe and efficient operation of the Waste Heat Recovery Boiler and the Steam Turbo-Generator unit.

3.0 Roles and Responsibilities

The project proponent has developed a 'CDM Team' who will be involved in monitoring, reporting and verification of all the GHG performance related parameters. The following schematic diagram will explain the individual roles and responsibilities of all the members of the 'CDM Team':



4.0 Internal Audit

Internal Audit will be conducted once in a year in order to assess the GHG performance of the project activity. Auditors will consist of people from different departments of Ankit Metal & Power Limited. The audit findings and the necessary corrective actions will be documented and reported to the Management Representative(s) for their immediate actions. The Plant Management will also be informed on the same. Compliance with the audit findings and evaluation of implementation of the corrective actions will be a part of the subsequent audit.
5.0 Experience and Training
The Head (Power Plant) will be qualified engineer/ diploma holder with prior work experience. The Shift In-charge will be diploma holder. All the Shift Operators will be provided with extensive on-the-job trainings under the guidance of the Shift In-charge which will include training on plant operations, data monitoring and report generation.

List of Appendices

Appendix 1: Minutes of the meeting of the Board of Directors dated 15.01.2004
Appendix 2: Reference: ASWPL/077/04-05
Appendix 3: Reference: AMPL-CPP-CONTRACT-02
Appendix 4: Reference: Agreement No: 10029
Appendix 5: Reference: PHE/2076/S/1(1)
Appendix 6: Reference: AMPL/CPP/0508/05-06
Appendix 7: Reference: AMPL/0527/05-06
Appendix 8: Reference: AMPL/0563/05-06
Appendix 9: Reference AMPL/0619/05-06
Appendix 10: Reference: PHE/356/S
Appendix 11: Mail communication from another CDM consultant
Appendix 12: CDM Consultancy award to present CDM consultants
Appendix 13: Letter from State Bank of India regarding information provided by M/s Ankit Metal & Power Limited on consideration of Clean Development Mechanism

- - - - -