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

CONTENTS

SECTION A. General description of project activity

A.1. Title of the project activity:

Waste Heat Recovery based Captive Power Project of Adhunik Metaliks Limited
Version: 04
Date: 07th April, 2009.

A.2. Description of the project activity:

Adhunik Metaliks Limited (AML) is a part of the Adhunik Group- an esteemed conglomerate in Indian iron and steel and ferro alloy industry with a strong presence in Eastern India. It has group companies in the states of West Bengal, Jharkhand and Orissa. The integrated iron and steel plant of Adhunik Metaliks Limited (AML) is situated in Orissa and comprises of the following basic units:

- Direct Reduction Iron (DRI) Plant
- Mini Blast Furnace
- SMS-I & SMS-II and Concast-I
- AOD & Concast
- Ferro Alloy Plant
- Rolling Mill
- Coal Washery
- Oxygen Plant and
- Other ancillary units

The DRI plant of AML comprises of 5 Direct Reduction Iron kilns (DRI kilns) of 100 tonnes per day (TPD) capacity each. The process of sponge iron manufacturing generates waste gas (*i.e.* DRI kiln gas) with substantial heat value. The DRI kiln gas does not have any utilization in the integrated iron and steel plant and therefore, as per the conventional industrial practice, the same could have been combusted and emitted into the atmosphere thereby wasting its thermal energy potential. The project activity aims at effective utilization of the heat content of the DRI kiln gas for generation of stem and subsequently power in a Captive Power Plant (CPP) to the tune of around 10.7 MW. Therefore the purpose of the project activity is:

- Prevention of wastage of useful energy through recovery of the heat content of the DRI kiln gas
- Generation of electrical energy through utilization of the heat content of the DRI kiln gas
- Catering partially to the in-house power requirement of the integrated iron and steel plat of AML

Furthermore, in absence of the project activity, the heat content of the DRI kiln gas would have been wasted and the power demand of the integrated iron and steel plant would be met through a coal based

captive power plant[1]. 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 300 days of annual operation of the Captive Power Plant with the DRI kiln gas, the project activity will generate around 69429MWh of net electrical energy per annum and will partially meet the electrical energy requirement of the integrated iron and steel plant of AML. 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 69429MWh of electrical energy per annum from a coal based captive power plant and will eliminate emission of around 80065 tonnes of CO_2 per annum amounting to a total of about 800650 tonnes of CO_2 over the entire crediting period of 10 years.

Project's Contribution to the Sustainable Development

The project activity will also lead to sustainable development of the host country-India. The sustainability aspects of the project activity are furnished below:

Table-A.1: Project's Contribution to Sustainable Development
Social well-being
The project activity is expected to create employment opportunities for the local people directly by way of manpower required to construct, operate and maintain the captive power generation unit. With the growing technological advancement, the project activity will contribute to the capacity building in terms of technical know-how and long-term skills. Furthermore the project activity will be implemented within the plant premise of AML without causing any dislocation of the local population.
Economical well-being
Indian power sector is primarily dominated by thermal power generated with coal. Thermal power plants are the major consumers of coal in India. Changing pattern of coal consumption requires a massive & integrated multi-pronged strategy for demand management, energy conservation in industrial units and gradual change over to other alternative fuel options. The project activity will positively contribute towards reduction in (demand) use of finite natural resource coal, minimizing depletion and indirectly increasing its availability to other important processes. This will lead to an overall industrial and economical development of the country as a whole. The project activity will also create business opportunities for local contractors, consultants and suppliers.
Technological well-being

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

Table-A.1: Project's Contribution to Sustainable Development
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 AML's core business area *i.e*. production of steel. So the employees of AML 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.

A.3. Project participants:

Name of 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 participant (Yes/No)
Ministry of Environment and Forests, Government of India (Host Country)	Adhunik Metaliks Ltd	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/Orissa/Sundergarh

A.4.1.3. City/Town/Community etc.:

Village: Chadrihariharpur, P.O. Kuarmunda

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

The plant is located in the village of Chadrihariharpur, P.O. Kuarmunda in the District of Sundargarh, Orissa. The geographical co-ordinates of the district is given by Latitude- 21°35' to 22°32' N and Longitude-83°32' to 85°22' E. The nearest railway station is at Rourekella and the nearest domestic airport is at Bhubaneshwar which is the state capital and is around 120 km from the plant site. The nearest seaport is at Kolkata which is almost 350 km from the plant. The site is well connected both by road and rail.


TAJIKISTAN
AFGHANISTAN
PAKISTAN
JAMMU & KASHMIR
HIMACHAL PRADESH
PUNJAB
HARYANA
DELHI
UTTARANCHAL
C H I N A
T I B E T
N E P A L
SIKKIM
BHUTAN
ARUNACHAL PRADESH
ASSAM
NAGALAND
MEGHALAYA
MANIPUR
MIZORAM
TRIPURA
BANGLADESH
UTTAR PRADESH
RAJASTHAN
BIHAR
JHARKHAND
WEST BENGAL
GUJARAT
MADHYA PRADESH
CHHATTISGARH
ORISSA
BHUBANESHWAR
I N D I A
MAHARASHTRA
ARABIAN SEA
BAY OF BENGAL
ANDHRA PRADESH
HYDERABAD
KARNATAKA
GOA
BANGALORE
TAMIL NADU
CHENNAI
KERALA
LAKSHADWEEP SEA
ANDAMAN AND NICOBAR ISLANDS (INDIA)
ANDAMAN SEA
PORT BLAIR
THIRUVANATHAPURAM
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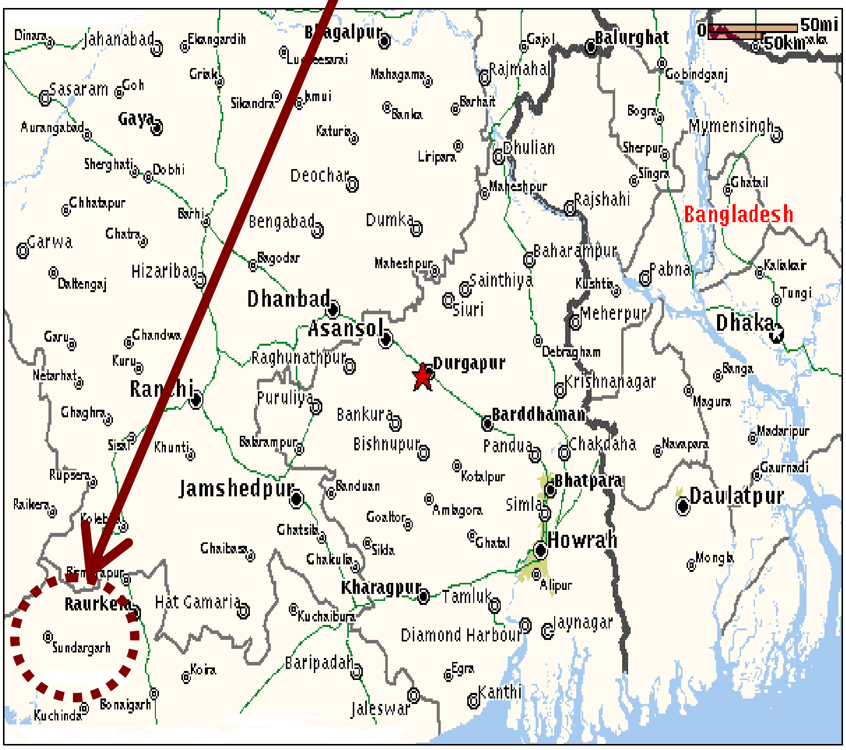
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Sainthiya
Siuri
Asansol
Meherpur
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Hat Gamaria
Kharagpur
Tamluk
Sundargarh
Diamond Harbour
Jaynagar
Baripadah
Jaleswar
Kanthi
Kuchinda
Bonaigarh

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)

(2) Manufacturing industries

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 iron and steel plant of AML. The project activity will be facilitated as explained below:

Recovery of heat content of the DRI kiln gas

Under normal operational condition, an estimated 24,000 Nm^3/hr of DRI kiln gas will be available from each of the 5 DRI kilns. The dust laden waste gas emanating from the DRI kilns 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 5 Waste Heat Recovery Boilers (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 160°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 Boilers

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 Waste Heat Recovery Boilers (WHRB) for generation of steam. The project activity involves installation of 5 nos. (connected to each of the DRI kilns) single drum, natural circulation water tube, vertical type Waste Heat Recovery Boilers 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) of each WHRB	Tonnes per Hour (TPH)	10
Steam pressure at super heater outlet	kg/cm^2	67
Steam temperature at super heater outlet	^0C	485
Waste Gas inlet conditions, Gas flow (from each kiln)	Nm^3/hr	24,000
Gas temperature	^0C	950
Dust Content at outlet of ESP	g/Nm^3	25
Exit Temperature of DRI kiln gas from WHRB	^0C	160

Generation of power in Steam Turbo-Generator

The steam generated in the WHRB will be fed into a common steam header. Steam from Circulating Fluidised Bed Combustion (CFBC) boiler will also be fed into the same common steam header. Thereafter the steam will be fed to two impulse reaction condensing type Steam Turbo Generators 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	17,000
Steam conditions at turbine inlet: Pressure Temperature	 kg/cm^2 ^0C	 62.5±1 485±5
Condenser pressure	kg/cm^2	0.1
Cooling Water Temperature	^0C	32

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

Years	Annual estimation of emission reductions in tonnes of CO2 e
August 2009-December 2009	33360
January 2010-December 2010	80065
January 2011-December 2011	80065
January 2012-December 2012	80065
January 2013-December 2013	80065
January 2014-December 2014	80065
January 2015-December 2015	80065
January 2016-December 2016	80065
January 2017-December 2017	80065
January 2018-December 2018	80065

January 2019-July 2019	46705
Total estimated reductions(tonnes of CO_2 e)	**800650**
Total number of crediting years	10 years
Annual average over the first crediting period of estimated reductions (tones of CO2 e)	**80065**

A.4.5. Public funding of the project activity:

No funding from the Annex I parties 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:

The consolidated methodology is applicable to project activities that utilize waste gas and/or waste heat (henceforth referred to as waste gas/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 project activity entails recovery of heat content of the waste gas emanating from the DRI kilns of the integrated iron and steel plant of AML and utilizing the same as an energy source for generation of 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 Adhunik Metaliks Limited. Electrical energy will be generated utilising the heat content of the waste gas by the owner of the integrated iron and steel manufacturing facility *i.e.* Adhunik Metaliks 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 iron and steel plant of Adhunik Metaliks 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 iron and steel plant of Adhunik Metaliks Limited and the waste gas, used in the project activity, is emitted from the DRI kilns which are 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 iron and steel plant of Adhunik Metaliks 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."- Adhunik Metaliks Limited is implementing the project activity to utilize the heat content of the waste gas generated from their DRI kilns for generation of power. The emission reduction credits will solely be claimed by the project proponent *i.e.* Adhunik Metaliks 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."

- Adhunik Metaliks 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 Greenfield integrated iron and steel plant project of Adhunik Metaliks 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 gases 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 Chambers (ABC) of the DRI kilns of AML and will also include the ducting systems for transportation of waste gas from the ABC outlet to the Waste Heat Recovery Boilers (WHRBs) in the Captive Power Pant (CPP) of AML;

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 iron and steel plant of AML where the electricity will be consumed.

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

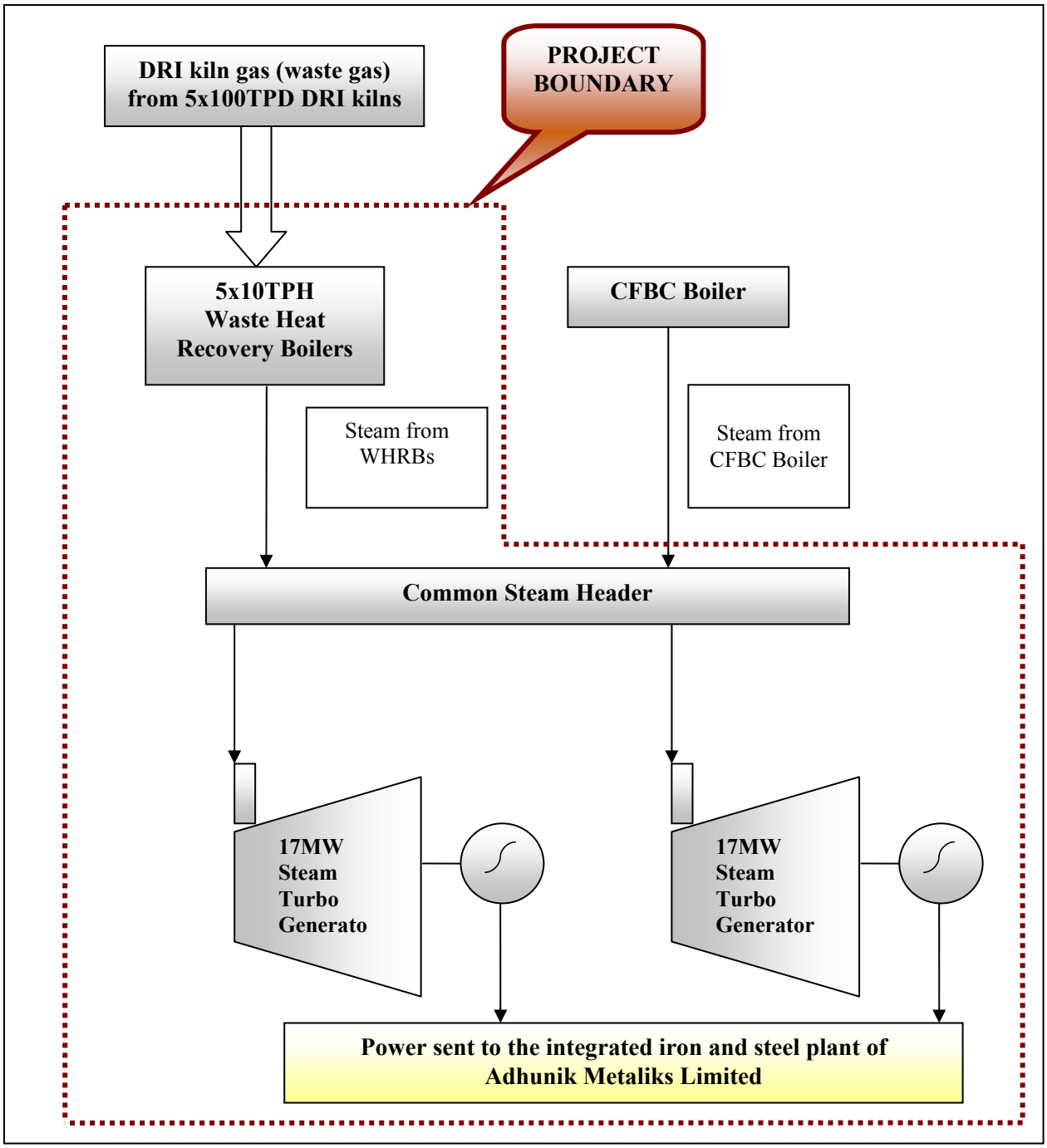


Table-B.1: Overview on emission sources included in or excluded from the project boundary				
	Source	Gas	Included	Justification/ Explanation

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 iron and steel plant of AML.
		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 Adhunik Metaliks 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[2]

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:

Table-B.2: Potential alternatives for waste gas use and power generation

[2] 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.

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

Table-B.2: Potential alternatives for waste gas use and power generation			
Option	Description	Credibility	Conclusion

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 fuel powered cogeneration plant	The project proponent does not have any requirement for steam. Therefore installation of a fossil fuel fired cogeneration plant in absence of the project activity is not a realistic and credible alternative for the project proponent.	Cannot be a part of 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 eastern region of the country 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

Table-B.2: Potential alternatives for waste gas use and power generation			
Option	Description	Credibility	Conclusion
Power generation			
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
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 Adhunik Metaliks 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 kilns at AML 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 kilns at AML 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, AML 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 Adhunik Metaliks Limited in absence of the project activity[3]

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)	1.83	3.20
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 iron and steel plant like AML.	Disruptions in power supply, power outages are encountered more frequently which may hamper the smooth operation of an integrated iron and steel plant like AML.
Conclusion	Considering all the points mentioned above, "Alternative-1: Generation of power in a coal based captive power plant" has been found to be the most economically attractive option available to AML in absence of the project activity and therefore, as per the methodology, this alternative option is the baseline scenario.	

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):

[3] 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.

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 05.2)", agreed by the CDM Executive Board.

Prior consideration of CDM (As per EB 41, Annex 46, paragraph 5 and 6).

"The project participant must indicate awareness of the CDM prior to the project activity start date, and that the benefits of the CDM were a decisive factor in the decision to proceed with the project". – The Management of Adhunik Metaliks Limited (formerly known as Neepaz Metalliks Limited) were planning to set up their integrated iron and steel plant comprising of the different units . In order to evaluate the different options for sourcing power, the Management of Neepaz Metaliks Limited approached renowned consultants M/s. Avant-Garde Engineers and Consultants (P) Limited for analysis of power cost from the different alternatives available to M/s Neepaz Metaliks Limited. (Refer to Letter from Neepaz Metaliks Limited to M/s. Avant-Garde Engineers and Consultants (P) Limited dated 10th August, 2004). The consultants have provided the detailed costing for all the different alternatives for sourcing power and had also appraised that the alternative of power generation from utilization of surplus gases from the DRI kilns would be eligible for available carbon revenue (Ref. No.-24117/NML/00A dated 14th August 2004). On the 25th of August 2004, the Board decided to undertake the project under the CDM en route. (Refer to the Extracts of the Resolution passed at the Meeting of the Board of Directors of Neepaz Metlaiks Limited'). This demonstrates the CDM awareness of the project proponent before the start date of the project activity *i.e.* 17th April 2006.

*"The project participant must indicate, by means of reliable evidence, that continuing and real actions were taken to secure CDM status for the project in parallel with its implementation".*The chronology of events have been tabulated below which establishes that real initiatives were taken for securing the project through the CDM route:

Details of Events	Timelines	Documentary Evidence

Awareness of CDM		
Preliminary Discussions with CDM consultant regarding the basics of CDM	9th July 2004	Email Communication between CDM consultant and Neepaz Metaliks Limited
Submission of unit power cost by M/s. Avant Gadre Engineers & Consultants (P) Ltd. (Third party CDM recommendation)	14th August 2004	Letter from M/s Avant Gadre Engineers & Consultants (P) Ltd to M/s. Neepaz Metaliks Limited (Ref. No.-24117/NML/00A)
Board Approval with consideration of CDM		
Approval of the project activity with CDM consideration	25th August 2004	Extracts of the Resolution passed at the Meeting of the Board of Directors of Neepaz Metaliks Limited
Continuing and Real Actions Undertaken		
Appointment of M/s. Avant Gadre Engineers & Consultants (P) Ltd. for designing of Power Plant.	14th January 2005	Work Order to Consultant (Ref. No.-NML/PP/PO-01)
Initiation of the process for appointment of consultants for CDM advisory services	18th January,2005	Email communication by Neepaz Metaliks Limited to CDM Consultant (Copy of the same has been submitted to the DOE).
Subsequent Communication between Neepaz Metaliks Limited and CDM Consultant for : - CDM Cycle and process intricacies - Proposal from CDM Consultant for project development	19th January 2005-1st February 2005	Email communication between Neepaz Metaliks Limited and CDM Consultant-(Copies of the same have been submitted to the DOE).
Placement of Work Order to CDM Consultant	9th February 2005	Work Order for CDM Consultancy Services. (NML/05/CDM/LOI/01)
Communication between Neepaz Metaliks Limited and CDM Consultant for : -Project Information and on -site visit -Preparation of initial documentation by CDM consultants.	23rd February 2005-5th April 2005	Email communication between Neepaz Metaliks Limited and CDM Consultant --(Copies of the same have been submitted to the DOE).
Letter of Intent to M/s. Thermal Systems	21st April 2005	Letter from M/s. Neepaz

(Hyderabad) Pvt. Ltd. from M/s. Neepaz Metaliks Limited for design, engineering, supply erection and commissioning of Waste Heat Recovery Boilers		Metaliks Limited to M/s. Thermal Systems (Hyderabad) Pvt. Ltd. (Ref No.- NML/PP/LOI-01)
Communication between Neepaz Metaliks Limited and CDM Consultant for : -Submission of Final PIN by the CDM consultant	25th April 2005	Email communication to Neepaz Metaliks Limited by CDM Consultant. -(Copy of the same has been submitted to the DOE)
Letter of Intent to M/s. Greensol Power Systems Pvt. Ltd. from M/s. Neepaz Metaliks Limited for Steam-Turbo Generator Packages	4th May 2005	Letter from M/s. Neepaz Metaliks Limited to M/s. Greensol Power Systems Pvt. Ltd. (Ref No.- NML/PP/LOI-01)
Communication between Neepaz Metaliks Limited and CDM Consultant- -Information requirement related to technical configuration, carbon content of coal, blow down loss and operating conditions for CFBC boiler. -Draft PDD based on ACM0004 -Requirement of a new methodology - Communication between CDM consultant and M/s Adhunik Metaliks Limited[4] regarding developing process of a new methodology on "*Waste Heat Recovery and Power Generation*" for one of the CDM consultants client.	11th May 2005-20th Sept 2005	Email communication between Neepaz Metaliks Limited and CDM Consultant. -(Copy of the same has been submitted to the DOE)
Placement of Purchase Order for Steam-Turbo Generator	17th April 2006	'Contract for Supply of Turbogenerator and Auxiliaries' between M/s. Adhinik Metaliks Limited and M/s. Greensol Power Systems Pvt. Ltd.
Placement of Purchase Order for Waste Heat Recovery Boilers	30th April 2006	Purchase Order from M/s. Adhunik Metaliks Limited (Ref No.- AML/KOL/PO/PP/PO/06-07/5152)
Submission of new methodology by CDM Consultant in the name of "NM0179: Waste Heat Recovery based Steam and Power Generation"	May 2006 (Round-15)	http://cdm.unfccc.int/methodologies/PAmethodologies/publicview.html?meth_ref=NM0179

[4] The "Fresh Certificate of Incorporation Consequent on Change of Name" from M/s. Neepaz Metaliks Limited to M/s. Adhunik Metaliks Limited was in effect from 9th August 2005

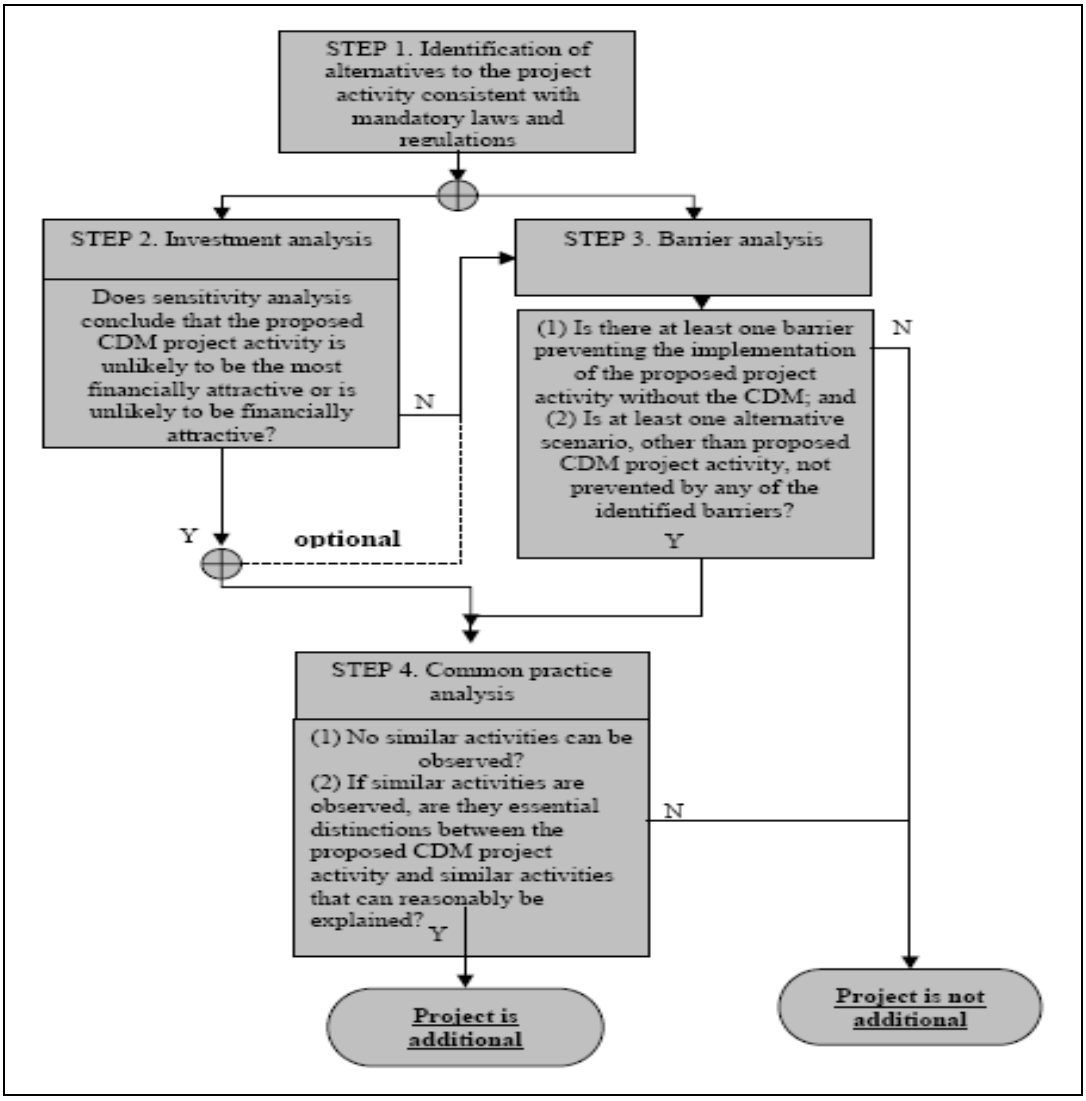
Approval of NM0179 in EB 31(Page 5 of the meeting report)	4th May 2007	http://cdm.unfccc.int/EB/031/eb31rep.pdf.
Communication between Adhunik Metaliks Limited and CDM Consultant regarding Approval of the Methodology (for one of the clients of CDM consultant) in EB 31 and path forward for the CDM project of Adhunik Metaliks Limited	7th May 2007	Email communication by CDM Consultant to Adhunik Metaliks Limited . -(Copy of the same has been submitted to the DOE)
Approval of Consolidated Methodology by the Methodology Panel and Executive Board of UNFCCC as 'Approved Consolidated Methodology-ACM0012/ Version 01'	July 2007	http://cdm.unfccc.int/methodologies/DB/3YL5T8ATMB8NTD9HEBU42EP6OJLAY4/view.html
Communications between Adhunik Metaliks Limited and CDM Consultant related to : -Operational formalities -Information requirement related to ACM0012 including Monitoring Parameters, waste gas flaring and other technical clarifications.	7th July 2007-17th September 2007	Email communication between Adhunik Metaliks Limited and CDM Consultant. -(Copies of the same have been submitted to the DOE)
Request for Budgetary Proposals to DOE	18th September, 2007.	Email communication to DOE dated 18/09/07
Communications between Adhunik Metaliks Limited and CDM Consultant related to : Submission of Draft PDD as per ACM0012	3rd October 2007-6th November 2007	Email communication between Adhunik Metaliks Limited and CDM Consultant. -(Copies of the same have been submitted to the DOE)
Receipt of Budgetary Proposal from DOE	15th November 2007	Email communication dated 15/11/2007
Revision of ACM0012/ Version 01 and availability of ACM0012/ Version 02	November 2007	
Communications between Adhunik Metaliks Limited and CDM Consultant related to : -Further information requirement regarding design efficiency, station heat rate of coal based captive power plant -PDD reviewed by Adhunik Metaliks with their comments -Modified PDD incorporating the feedback received and also appraising Adhunik Metaliks Limited regarding some further modifications necessary as per the Revised Methodology ACM0012 –Version 02	21st November 2007-6th December 2007	Email communication between Adhunik Metaliks Limited and CDM Consultant. -(Copies of the same have been submitted to the DOE)

Communication to Adhunik Metaliks Limited by CDM Consultant regarding procedural formalities for submission of documents to the Ministry of Environment and Forests	20th December 2007	Email communication dated 20/12/2007.
Appointment of DOE for Validation	14th January 2008	Contract Agreement between M/s. Adhunik Metaliks Limited and the appointed DOE
Clarifications submitted by SGS to the Meth Panel regarding *"Q BL product' determination in cases where no 3 years historic data is available AM_CLA_0071"*.	18th January 2008	F-CDM-AM-Clar_Resp_ver 01.1 - AM_CLA_0071
Submission of Project Design Document (PDD) and Project Concept Note (PCN) to Ministry of Environment & Forests (MoEF), Government of India-Application for Host Country Approval (HCA) from Indian DNA	22nd February 2008	Forwarding Letter to the Ministry of Environment and Forests, Government of India from M/s. Adhunik Metaliks Limited
Responses by the Meth Panel to the Clarifications submitted by SGS	7-11th April 2008	http://cdm.unfccc.int/UserManagement/FileStorage/AM_CLAR_GU59XMVIK6RS6RXDL25B0HBHWHAP30
Presentation at Ministry of Environment and Forests (MoEF), Government of India for obtaining Host Country Approval (HCA)	25th April 2008	Host Country Approval Letter (Ref. No.-4/7/2008-CCC)
Receipt of Host Country Approval from Ministry of Environment and Forests (MoEF), Government of India	4th August 2008	
Global Stakeholder Consultation	15th August 2008-13th September 2008.	http://cdm.unfccc.int/Projects/Validation/index.html

This demonstrates that the project proponent has undertaken all necessary measures to secure the CDM revenue in parallel with the actual implementation of the project activity

Additonality of the project

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 current laws and regulations

In Sub-step 1a (Define alternatives to the project activity) and Sub-step 1b (Consistency with mandatory laws and regulations), Adhunik Metaliks 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 gases utilisation and power generation as well as their compliance with the current laws and regulations have 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 (*i.e.* Recovery and utilisation of the heat content of the waste gas of the DRI kilns for power generation) are in

line with the current laws and regulations those are enforced in the host country-India. Therefore Adhunik Metaliks 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, Adhunik Metaliks 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', Adhunik Metaliks 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 kilns 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

Adhunik Metaliks Limited conducted an investment analysis for both the alternatives (*i.e.* Alternative-1 or Alternative-2) that were available with them in absence of the project activity and the project activity without CDM benefit. The unit power cost has been used as the financial indicator for the investment comparison analysis. The unit power cost is calculated taking into consideration both fixed and variable cost. All relevant assumptions used for the investment analysis have been provided below and the financial computations on the unit power cost for the alternatives have been provided to the DOE.

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

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

The unit power cost in case of Alternative-1 is computed based on the following assumptions:

Unit Power Cost for 'Alternative 1:Generation of power in a coal based captive power plant'				
Description	**Units**	**CFBC**	**Grid**	**Comments**
Power Generation Capacity	MW	55		
Auxiliary Consumption	%	10		
Annual Operational Days	Days/annum	350		
Gross Electricity Generated	MWh/annum	462305		
Net Electricity Generated	MWh/annum	416075	41958	The power import from grid will be only to cater to sudden surge in demand of the rolling mill.The rest of the power requirement would be catered through CFBC based power plant.
Variable Cost				
Determination of Fuel Cost				
Station Heat Rate	kCal/kWh	2867		
Thermal Energy Input	kCal/annum	1.325E+12		
Gross calorific Value of fuel mix	kCal/kg	2270		
Total fuel mix consumed	MT/annum	583822		
Quantity of Coal Washery Rejects consumed	MT/annum	149175		
Gross Calorific Value of Coal Washery Rejects	kCal/kg	1500		
Quanity of Coal Char consumed	MT/annum	40500		
Gross Calorific Value of Coal Char	kCal/kg	1100		
Quanity of Coal consumed	MT/annum	330301		
Gross Calorific Value of Coal	kCal/kg	3200		
Coal Washery Rejects Cost	Rs./MT	400		
Coal Char Cost	Rs./MT	0		
Coal Cost	Rs./MT	1000		
Total fuel cost for power generation	**Rs./kWh**	**0.94**	**0.00**	
Total Utility Cost-Water & Chemicals	**Rs./kWh**	**0.05**	**0.00**	
Total Variable Cost for power generation	**Rs./kWh**	**0.99**	**0.00**	
Fixed Cost				
Capital Investment				
Total Project Cost	Rs. Lacs	22015		
Equity Portion	Rs. Lacs	7705		
Loan Portion	Rs. Lacs	14309		
Interest on Loan	Rs. Lacs/annum	1288		
Total Interest	**Rs./kWh**	**0.31**		
Depreciation				
Depreciation on Building Cost	Rs. Lacs/annum	110		
Depreciation on Plant & Macineries	Rs. Lacs/annum	988		
Total Depreciation	**Rs./kWh**	**0.26**		
Operation & Maintenance				
Operation & Maintenance	Rs. Lacs/annum	550		
O&M Expenses	**Rs./kWh**	**0.13**		
Total Fixed Cost for power generation	**Rs./kWh**	**0.71**	**3.20**	
Total Cost of Power Generation	**Rs./kWh**	**1.69**	**3.20**	
Unit Cost of Power Generation	**Rs./kWh**	**1.83**		

Note: The power requirement of the Rolling Mill of Adhunik Metaliks Limited would not be catered from the coal based captive power plant in the baseline scenario. This is because of the sudden surge loads of the Rolling Mill which will be of very high magnitude; however the same will persist for a very short spell of time. Hence catering this kind of load from captive power generating facilities will require the project proponent to keep an additional power generation capacity which will be idle for most of the time except during the spell of such steep surge loads. Therefore the power requirement of Rolling Mill of Adhunik Metaliks Limited would have been met from the grid even in the baseline scenario.

Unit power cost for 'Alternative-2: Import of power from the grid'

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

Unit Power Cost for 'Alternative 2: Import of power from the grid'		
Description	**Units**	**Grid Power**
Capital investment	Rs.Lacs	NIL
Power Purchase Cost	Rs/kWh	3.2
Unit cost of power generation	**Rs/kWh**	**3.2**

Unit power cost in the project scenario

The unit power cost in case of project activity is computed based on the following assumptions:

Unit Power Cost in Project Case					
Description	Units	CFBC	Waste Gas	Grid	Comments
Power Generation Capacity	MW	25.4	10.7		
Gross Electricity Generated	MWh/annum	213600	77143		
Net Electricity Generated	MWh/annum	192240	69429	196364	The total power requirement of 55 MW would be met from a combination of waste gas based power generation, coal,coal char and coal washery rejects based power generation and the balance power would be imported from grid.
Variable Cost					
Determination of Fuel Cost					
Station Heat Rate	kCal/kWh	2867			
Thermal Energy Input (Coal-Char mix)	kCal/annum	6.1232E+11			
Gross calorific Value of fuel mix	kCal/kg	2270			
Total fuel mix consumed	MT/annum	269744			
Quantity of Coal Washery Rejects consumed	MT/annum	80923			
Gross Calorific Value of Coal Washery Rejects	kCal/kg	1500			
Quanity of Coal Char consumed	MT/annum	40500			
Gross Calorific Value of Coal Char	kCal/kg	1100			
Quanity of Coal consumed	MT/annum	139495			
Gross Calorific Value of Coal	kCal/kg	3200			
Coal Washery Rejects Cost	Rs./MT	400			
Coal Char Cost	Rs./MT	0			
Coal Cost	Rs./MT	1000			
Total fuel cost for power generation	**Rs./kWh**	**0.89**	**0.00**	**0.00**	
Total Utility Cost-Water & Chemicals	**Rs./kWh**	**0.05**	**0.05**	**0.00**	
Total Variable Cost for power generation	**Rs./kWh**	**0.94**	**0.05**	**0.00**	
Fixed Cost					
Capital Investment					
Total Project Cost	Rs. Lacs	10171	4286		
Equity Portion	Rs. Lacs	3560	1500		
Loan Portion	Rs. Lacs	6611	2786		
Interest on Loan	Rs. Lacs/annum	595	251		
Total Interest	**Rs./kWh**	**0.31**	**0.36**		
Depreciation					
Depreciation on Building Cost	Rs. Lacs/annum	51	21		
Depreciation on Plant & Macineries	Rs. Lacs/annum	456	192		
Total Depreciation	**Rs./kWh**	**0.26**	**0.31**		
Operation & Maintenance					
Operation & Maintenance	Rs. Lacs/annum	254	107		
O&M Expenses	**Rs./kWh**	**0.13**	**0.15**		
Total Fixed Cost for power generation	**Rs./kWh**	**0.71**	**0.82**	**3.20**	
Total Cost of Power Generation	**Rs./kWh**	**1.65**	**0.87**	**3.20**	
Unit Cost of Power Generation	**Rs./kWh**	**2.20**			

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 power cost) amongst all plausible alternatives including the project activity without CDM revenue. As per the "Tool for the demonstration and assessment of additionality (Version 05.2)", *"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 power cost 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.5: Sensitivity Analysis

Sl. No.	Parameters	Variation	Unit Power Cost (Rs./kWh)		Comment
			Base Case	Project Activity	
1.	Coal price	+10%	1.90	2.23[5]	In both the situations, the unit power cost in the project scenario is higher than that for Alternative-1.
		-10%	1.76	2.17	
2.	Grid power purchase cost	+10%	1.86	2.33	In both the situations, the unit power cost in the project scenario is higher than that for Alternative-1.
		-10%	1.80	2.06	

[5] The unit power cost would possibly increase also due to the increased cost of the component from grid's power purchase, however it is not possible to predict the increase.

Table-B.5: Sensitivity Analysis					
			Unit Power Cost (Rs./kWh)		Comment
3.	Net power generated with waste gas	+5%	1.83	2.17	In both the situations, the unit power cost in the project scenario is higher than that for Alternative-1.
		-5%	1.83	2.22	
4.	Combination of parameters 1 and 2	1→ +10% 2→ +10%	1.93	2.36	In both the situations, the unit power cost in the project scenario is higher than that for Alternative-1.
		1→ -10% 2→ -10%	1.73	2.03	
5.	Combination of parameters 1 and 3	1→ +10% 3→ +5%	1.90	2.20	In both the situations, the unit power cost in the project scenario is higher than that for Alternative-1.
		1→ -10% 3→ -5%	1.76	2.19	
6.	Combination of parameters 2 and 3	2→ +10% 3→ -5%	1.86	2.36	In both the situations, the unit power cost in the project scenario is higher than that for Alternative-1.
		2→ -10% 3→ +5%	1.80	2.04	
7.	Combination of parameters 1, 2 and 3	1→ +10% 2→ +10% 3→ -5%	1.93	2.39	In all the situations, the unit power cost in the project scenario is higher than that for Alternative-1.
		1→ -10% 2→ -10% 3→ +5%	1.73	2.01	
		1→ +10% 2→ +10% 3→ +5%	1.93	2.34	
		1→ -10% 2→ -10% 3→ -5%	1.73	2.05	

The results of the sensitivity analysis conducted substantiate that the unit power cost 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 Adhunik Metaliks Limited to opt for the project activity which is financially less attractive than Alternative-1.

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 investment risks and barriers to implementation and is therefore not a widespread proposition for integrated iron and steel manufacturing sectors under similar socio-economic environment in India.

The Indian integrated iron and steel industry consists of the following plants besides Adhunik Metaliks Limited:

1. Five plants[6] of Steel Authority of India Limited (SAIL) namely
   - Bhilai Steel Plant (BSP)
   - Durgapur Steel Plant (DSP)
   - Rourkela Steel Plant (RSP)
   - Bokaro Steel Plant (BSL) and
   - IISCO Steel Plant (ISP)
2. Tata Steel
3. Rashtriya Ispat Nigam Limited (RINL)
4. Ispat Industries
5. JSW Steel Limited
6. Jindal Steel & Power Limited
7. Essar Steel
8. Visa Steel Limited

In all the SAIL plants, non-coking coal is used for power generation[7]. The only LD Gas recovery based power generation project at Rourkela Steel Plat[8] is developed under CDM and the same is registered with UNFCCC (Ref No: 0864). Tata Steel is setting up a waste gas recovery based power generation project with CDM revenue into consideration[9]. The power requirement at Rastriya Ispat Nigam Limited[10] and

[6] Source: http://www.sail.co.in/aboutus.php?tag=company-aboutus

[7] Source : http://www.sail.co.in/aboutus.php?tag=company-energy

[8] Source : : http://cdm.unfccc.int/UserManagement/FileStorage/D0YOKH0N9YHKRWDMSX7I67L0UA9XXW

[9] Source : http://cdm.unfccc.int/Projects/Validation/DB/ZJPUUUHM7IA8AF8P2PWM24OQGWGSC8/view.html and http://cdm.unfccc.int/Projects/Validation/DB/1G00Z18R5G2CFKTHS0Q7WPDWNGJB69/view.html

Ispat Industries[11] is also met with coal as the fuel source. The power requirement of JSW Steel Limited and Jindal Steel & Power Limited is met respectively from a 'Blast Furnace Gas and Corex Gas based power generation system' and 'Coke Oven Gas based power generation system'. Both these power generation projects have been developed with CDM revenue into consideration and are registered with UNFCCC[12] (Ref No: 0325 & 0351). Essar Steel is also in the process of setting up a natural gas based power generation facility to meet their power demand[13]. Visa Steel Limited is also in the process of setting up a Blast Furnace Gas, Coke Oven Gas and DRI kiln gas based power generation system under CDM[14].

Therefore it can be concluded that the project activity of DRI kiln gas based power generation system to cater to the power requirement has not been adopted widely by the Indian integrated iron and steel plants. Only five waste gas based power generation system have so far been implemented in the relevant industrial sector and all of them have been conceived with CDM revenue into consideration. The common practice scenario therefore demonstrates that there is a poor penetration of this technology in the Indian integrated iron and steel sector which can be attributed to the various investment risks and barrier 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 barrier associated with its implementation. The Management of Adhunik Metaliks Limited has been appraised about all these direct financial risks which 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 revenue. However the Management of Adhunik Metaliks 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 Adhunik Metaliks Limited has finally decided to implement the project activity as a climate change initiative.

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[10]Source : http://www.bee-india.nic.in/sidelinks/EC%20Award/eca07/Award2007_CD/17IntegratedSteel/RashtiyaIspatNigamLimitedVisakhapatnamSteelPlantVisakhapatnam/Profile.pdf

[11] Source : http://www.rediff.com/money/2003/may/29ispat.htm

[12] Source : http://cdm.unfccc.int/UserManagement/FileStorage/5K5XJ3GMSTGYQE2KT3IL1NP0RGLSVK and http://cdm.unfccc.int/UserManagement/FileStorage/XQKW19L92IAYD0XP1QP8YRQIU3ZL8I

[13] Source: http://www.projectsmonitor.com/detailnews.asp?newsid=10794

[14] Source: http://cdm.unfccc.int/Projects/Validation/DB/PCMDYRFPJ5J3KOU53BOX14JT43AMWK/view.html

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. 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 reductions 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 emissions 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 kilns at AML 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 kilns and
- Steam generated from the Circulating Fluidized Bed Combustion Boiler

will be fed to a common steam header and there from to the steam turbo-generator sets 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 kilns

$ST_{whr,y}$ = 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 (in kCal)

$ST_{other,y}$ = Energy content of steam generated in other boiler and 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. The manufacturer's data for the industrial facility has been used to estimate the amount of waste energy the industrial facility generates per unit of product generated by the process that generates waste energy[15]. The value arrived based on this data has been used to estimate the baseline cap (f_{cap})[16].

. 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 (Nm^3)

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

[15] The relevant documents have been submitted to the DOE during validation. This is also in accordance with the Responses by the Meth Panel to the Clarifications submitted by SGS- AM_CLA_0071. http://cdm.unfccc.int/UserManagement/FileStorage/AM_CLAR_GU59XMVIK6RS6RXDL25B0HBHWHAP30

[16] Refer to the Emission Reduction excel sheet for detailed calculation

process that generates waste gas (Nm^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 Boilers 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:	Nm^3
Description:	Quantity of waste gas generated prior to the start of the project activity
Source of data used:	Plant Records
Value applied:	864000000
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	150000

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:	Nm^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	5760
Justification of the choice of data or description of measurement methods and procedures actually applied :	Manufacturer's Specification.
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 Specification
Value applied	0.30
Justification of the	Efficiency of the power plant will be determined as the highest of the efficiency

choice of data or description of measurement methods and procedures actually applied :	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

Sl. No.	Operating Year	Baseline Emission (tonnes of CO_2 e)
1.	August 2009-December 2009	33360
2.	January 2010-December 2010	80065
3.	January 2011-December 2011	80065
4.	January 2012-December 2012	80065
5.	January 2013-December 2013	80065
6.	January 2014-December 2014	80065
7.	January 2015-December 2015	80065
8.	January 2016-December 2016	80065
9.	January 2017-December 2017	80065
10.	January 2018-December 2018	80065
11.	January 2019-July 2019	46705
Total		**800650**

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 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 Leakage Emissions

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

$L_y = 0$

where,

L_y = Leakage Emissions in the year y (tCO_2)

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 as below:

Sl. No.	Operating Year	Emission Reductions (tonnes of CO_2 e)
1.	August 2009-December 2009	33360
2.	January 2010-December 2010	80065
3.	January 2011-December 2011	80065
4.	January 2012-December 2012	80065
5.	January 2013-December 2013	80065
6.	January 2014-December 2014	80065
7.	January 2015-December 2015	80065
8.	January 2016-December 2016	80065
9.	January 2017-December 2017	80065
10.	January 2018-December 2018	80065
11.	January 2019-July 2019	46705
Total		**800650**

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

Year	Estimation of 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)
August 2009-December 2009	0	33360	0	33360
January 2010-December 2010	0	80065	0	80065
January 2011-December 2011	0	80065	0	80065
January 2012-December 2012	0	80065	0	80065
January 2013-December 2013	0	80065	0	80065
January 2014-December 2014	0	80065	0	80065
January 2015-December 2015	0	80065	0	80065
January 2016-December 2016	0	80065	0	80065
January 2017-December 2017	0	80065	0	80065
January 2018-December 2018	0	80065	0	80065
January 2019-July 2019	0	46705	0	46705
Total (tonnes of CO_2 e)	**0**	**800650**	**0**	**800650**

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:	Nm^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	864000000

calculating expected emission reductions in section B.5	
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- The same will be ensured through annual calibration of the gas flow meters.
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:	$Q_{steam, whr,y}$
Data unit:	TPH
Description:	Quantity of steam supplied by each of the 5 WHRBs
Source of data used:	Plant Records
Value applied:	45 (cumulative for all 5 WHRBs)
Description of measurement methods and procedures to be applied:	The parameter will be monitored with flow meters 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 meters. 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- The same will be ensured through annual calibration of the flow meters.
Any comment:	The uncertainty level of the parameter will be low since the same will be monitored with calibrated meter.

Data / Parameter:	$T_{whr,y}$
Data unit:	^{0} C
Description:	Average temperature of steam generated from the WHRBs
Source of data used:	Plant Records
Value applied:	485
Description of measurement methods and procedures to be applied:	The parameter will be monitored with temperature transmitters, connected to each of the WHRBs and will be available in the power plant Distributed Control System (DCS). The Head (Power Plant) will be responsible for regular calibration of the temperature transmitters. 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- The same will be ensured through annual calibration of the temperature transmitters.
Any comment:	The uncertainty level of the parameter will be low since the same will be monitored with calibrated temperature transmitters.

Data / Parameter:	$P_{whr,y}$
Data unit:	kg/cm ^{2}
Description:	Average pressure of steam generated from the WHRBs
Source of data used:	Plant Records
Value applied:	65
Description of measurement methods and procedures to be applied:	The parameter will be monitored with pressure transmitters, connected to each of the WHRBs and will be available in the power plant Distributed Control System (DCS). The Head (Power Plant) will be responsible for regular calibration of the pressure transmitters. 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- The same will be ensured through annual calibration of the pressure transmitters.
Any comment:	The uncertainty level of the parameter will be low since the same will be monitored with calibrated pressure transmitters.

Data / Parameter:	$ST_{whr,y}$
Data unit:	kCal
Description:	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
Source of data to be used:	Calculated from Plant Records and Steam Tables
Value of data applied for the purpose of calculating expected emission reductions in section B.5	2.615×10^{11}
Description of measurement methods	This parameter will be calculated as the product of the steam flow and the enthalpy of steam generated from the Waste Heat Recovery Boilers. The

and procedures to be applied:	enthalpy of steam will be obtained from Steam Tables. This parameter will be archived both electronically and in paper for the entire crediting period and two years after.
QA/QC procedures to be applied:	Yes. The same will be ensured since the steam flow, temperature, pressure will be measured through calibrated meters.
Any comment:	The uncertainty level of the parameter will be low since steam flow, temperature and pressure transmitters will be monitored with calibrated meters.

Data / Parameter:	$Q_{steam, other,y}$
Data unit:	TPH
Description:	Quantity of steam supplied by the CFBC boiler
Source of data used:	Plant Records
Value applied:	106.8
Description of measurement methods and procedures to be applied:	The parameter will be monitored with flow meters 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 meters. 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- The same will be ensured through annual calibration of the flow meters.
Any comment:	The uncertainty level of the parameter will be low since the same will be monitored with calibrated meter.

Data / Parameter:	$T_{other\ y}$
Data unit:	^{0} C
Description:	Average Temperature of the steam from the CFBC boiler outlet.
Source of data used:	Plant Records
Value applied:	485
Description of measurement methods and procedures to be applied:	The parameter will be monitored with temperature transmitters, connected to the CFBC and will be available in the power plant Distributed Control System (DCS). The Head (Power Plant) will be responsible for regular calibration of the temperature transmitter. 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- The same will be ensured through annual calibration of the temperature transmitters.
Any comment:	The uncertainty level of the parameter will be low since the same will be monitored with calibrated temperature transmitters.

Data / Parameter:	$P_{other,y}$
Data unit:	kg/cm^2
Description:	Average Pressure of the steam from the CFBC boiler
Source of data used:	Plant Records
Value applied:	65 kg/cm^2
Description of measurement methods and procedures to be applied:	The parameter will be monitored with pressure transmitters, connected to each the CFBC and will be available in the power plant Distributed Control System (DCS). The Head (Power Plant) will be responsible for regular calibration of the pressure transmitter. 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- The same will be ensured through annual calibration of the pressure transmitter.
Any comment:	The uncertainty level of the parameter will be low since the same will be monitored with calibrated pressure transmitter.

Data / Parameter:	$ST_{other,y}$
Data unit:	kCal
Description:	Energy content of steam generated in other boiler and fed to turbine via common steam header
Source of data to be used:	Calculated from Plant Records and Steam Tables
Value of data applied for the purpose of calculating expected emission reductions in section B.5	$7.242x10^{11}$
Description of measurement methods and procedures to be applied:	This parameter will be calculated as the product of the steam flow and the enthalpy of steam generated from the CFBC boiler. The enthalpy of steam will be obtained from Steam Tables. This parameter 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 steam flow, temperature and pressure transmitters will be 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	261669
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 for the purpose of calculating expected emission reductions in section B.5	1.153
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 reductions in section B.5	0
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	10/08/2008
Name of person/ entity determining the baseline and establishing the monitoring plan	Adhunik Metaliks 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:

17/04/2006- Placement of Purchase Order.

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:

01/08/2009 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.

The project activity under consideration is a 'waste to energy generation' project which will not have any negative environmental impacts. AML plans to contribute to the cause of improving the local and global environment by the implementation of the project activity. The probable effect of the project activity on the baseline environment (that prevails before the implementation of the project activity) has been evaluated in three distinct phases of its implementation namely:

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

The significant findings of the evaluation and the major environmental management plans that will be undertaken by AML are detailed below.

Impacts during Construction phase		
Activity: This primarily includes construction of the power plant, erection of the WHRBs, the Steam Turbo-Generator sets and other power plant equipments, installation of the ducting systems 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	AML 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.	AML 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.
	No dislocation of population will be required to facilitate the construction activities. Further the	No rehabilitation of population will therefore be

Social and Economic	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.	required.

Impacts during Operational phase		
Activity: During operational phase, the project activity will utilise the heat content of the waste gas of the DRI kilns 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 mean 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. AML 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.	AML 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 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	All solid wastes will be dumped in a	Systematic dumping will have

Environment	systematic manner and land will not be polluted due to the project activity	minimum or no impact on the surrounding land environment. Further to minimise this impact, AML will utilise the solid waste for road making.

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-generators. However the same is expected to be confined within AML 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	AML 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

	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.	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.	AML 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 AML 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 AML 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 Adhunik Metaliks Limited considers stakeholder consultation as an integral component for all their new project decisions, up-gradation or modernization activities. Stakeholder consultation is carried out in a transparent manner by the representatives of Adhunik Metaliks Limited in the following way:

- Suitable stakeholders in the jurisdiction of Adhunik Metaliks Limited are identified for consultation
- The stakeholders are provided with salient information about the project activity either verbally or through written communications
- All the aspects of the project activity are clearly explained to the stakeholders and they are requested to give their comments, feedbacks and suggestions
- Comments from stakeholders are discussed by the Management of Adhunik Metaliks Limited and is given due weightage in the companies' future course of action

For the project activity under consideration, stakeholder consultation is carried out in a phased manner. The detailed protocol followed for the same is summarized below:

Table-E.1: Stakeholder Consultation Protocol for the project activity at Adhunik Metaliks Limited
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 AML ▪ Consultants ▪ Equipment Suppliers ▪ Non-Governmental Organizations (NGOs) ▪ Orissa Pollution Control Board (OPCB) ▪ Environment Department, Government of Orissa ▪ Western Electricity Supply Company (WESCO) of Orissa Limited ▪ Ministry of Environment and Forests, Government of India
Phase-II: Information Sharing
The representatives from AML 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 AML. 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 AML.

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. AML 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 AML'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 AML.	AML Management has received a written consent from the Village Panchayat for the project activity.
2.	Employees of AML	AML Management has communicated the relevant information of the project activity and its associated socio-economic, technological and environmental benefits 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 AML Management has received a written consent from the employees.
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 AML and provided their support throughout to make it successful.	AML 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 and their opinion on the same is requested for.	The NGO has appreciated the initiative of AML towards socio-economic development of the locality and their commitment towards developing an environment friendly manufacturing process.	AML Management has received a written consent from the NGO for the project activity.

Table-E.2: Summary of Stakeholder Consultation				
Sl No.	Name of Stakeholders	Mode of Communication	Feedback	Status
Comments received from Government Parties				

6.	Orissa Pollution Control Board (OPCB)	Orissa Pollution Control Board (OPCB) has prescribed standards of environmental compliance and monitor the adherence to the standards. The relevant information of the project activity has been forwarded to them.	The project activity has been appraised by OPCB. The environmental parameters will be monitored by OPCB 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 OPCB as per provisions under Section 29/26 of Water (Prevention & Control of Pollution) Act, 1974 & Section 21 of Air (Prevention & Control of Pollution) Act, 1981 before the commissioning of the plant.
7.	Western Electricity Supply Company (WESCO) of Orissa Limited	Western Electricity Supply Company (WESCO) of Orissa Limited is a major stakeholder for the project activity under consideration. The project activity details have been communicated to WESCO.	The project activity has been appreciated by WESCO.	AML has entered into an agreement with WESCO for sourcing power to back up the power generation in the project activity.
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:

Adhunik Metaliks Limited has so far received only positive feedbacks on the project activity from all the stakeholders. All the comments received, so far, have been considered and given due consideration while preparing the CDM Project Design Document.

Furthermore, as per the requirement of UNFCCC, the CDM 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:	Adhunik Metaliks Limited
Street/P.O.Box:	2/1A Sarat Bose Road
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State/Region:	West Bengal
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E-Mail:	nirmalagarwal@adhunikgroup.co.in
URL:	http://www.adhunikgroup.com/
Represented by:	
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Salutation:	Mr.
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Middle Name:	
First Name:	Nirmal
Department:	Board of Management
Mobile:	+91 9903977782
Direct FAX:	
Direct tel:	+91 -33-30517114
Personal E-Mail:	

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

There is no public funding involved in the project activity.

Annex 3

BASELINE INFORMATION

Computation of Emission Reductions				
Parameter	**Parameter**	**Unit**	**Value**	**Comments/ Assumptions**
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	150000	Considering a capacity of 100 tpd and 300 working days of all the 5 DRI kilns
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	5760	Considering waste gas flow of 24000Nm^3/hr
Quantity of waste gas generated prior to the start of the project activity	$Q_{WG,BL}$	Nm^3	864000000	
Quantity of waste gas used for energy generation during year y	$Q_{WG,y}$	Nm^3	864000000	
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}		1	
Determination of f_{WG}				
Steam Generation with DRI kiln Waste Gas		TPH	45	Considering DRI kiln Waste Gas avaialability and 90% Boiler Loading
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	2.615E+11	Consideing 300 working days per annum
Steam generation from CFBC Boiler		TPH	106.8	Considering that 4 WHRBs will be on line at any point of time and the remaining would be procured from CFBC boiler and specific steam consumption of turbine as 4.2 TPH/MW
Energy content of steam generated in other boiler (CFBC boiler) and fed to turbine via common steam header	$ST_{other,y}$	kCal	7.242E+11	Consideing 350 working days per annum
Fraction of total electricity generated by the project activity using waste gas	f_{wg}		0.265	
Determination of $EF_{Elec,i,j,y}$				
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	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Overall efficiency of the existing plant that would be used by jth recipient in the absence of the project activity	$n_{Plant,j}$		0.30	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
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	1.153	
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	261669	
Baseline Emissions during the year y	BE_y	tCO_2	80065	
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	80065	

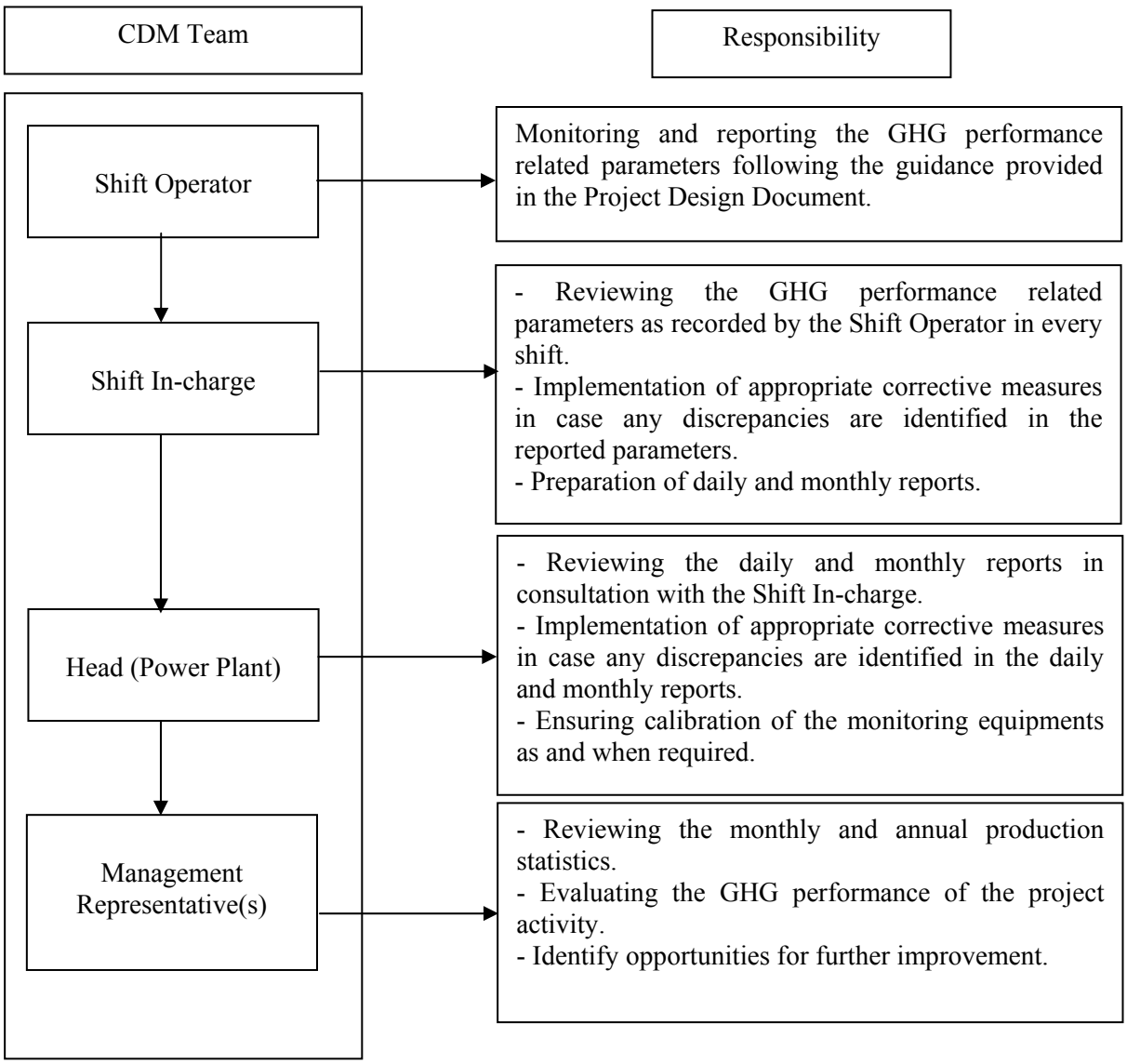
Annex 4

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 kilns thereby offsetting more carbon intensive power generation at a coal based captive power plant. 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 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, 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 Boilers and the Steam Turbo-Generator units.
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 Adhunik Metaliks 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.

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