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

CONTENTS

Annexes

SECTION A. General description of project activity

A.1. Title of the project activity:

Waste Heat Recovery Based Captive Power Plant at Maheshwary Ispat Limited, Khuntuni, Cuttack, Orissa

Version no: 1

Date: 30/05/2008

A.2. Description of the project activity:

The proposed project activity is Waste Heat Recovery based Power Generation. It involves utilization of the Direct Reduced Iron (DRI) Kiln gas coming out from the 128000MTPA sponge iron manufacturing facility of the integrated steel plant of Maheshwary Ispat Limited (MIL).

Operation of DRI kilns will lead to the generation of waste gas with significant heat content. The proposed project activity envisages the utilization of the heat content of the DRI kiln gas for generation of around 8 MW of power. After meeting the auxiliary consumption of the power plant equipment, around 6 MW of power will be available to meet partially the power requirement of the steel plant. In absence of the proposed project activity, the DRI kiln gas would have been emitted into the atmosphere thereby wasting the heat content of the waste gas. The power, under such a circumstance, would have been sourced from the Eastern Regional Grid[1]. Therefore the proposed project activity will prevent the wastage of useful energy, utilize it effectively for power generation and replace an equivalent quantum of power from a more carbon intensive source (*i.e.* fossil fuel fired power plants at the grid end) resulting in an overall reduction of Greenhouse Gas (GHG) emissions.

With an expected 300 days of annual operation of the power plant with waste gas of the two DRI kilns, the proposed project activity will generate around 27.99Million kWh (MkWh) of net electrical energy per annum and will partially meet the electrical energy requirement of the integrated steel plant. In absence of the proposed project activity the same electrical energy would have been generated by thermal power plants connected to the grid. Therefore the proposed project activity will replace generation of around 27.99 MkWh of electrical energy per annum (*i.e.* 279.9 MkWh over the entire crediting period of

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

10 years) from the Eastern Regional Grid and will eliminate emission of 65273 tonnes of CO_2 per annum amounting to a total of about 652730 tonnes CO_2 of over the entire crediting period of 10 years.

The resulting benefits are listed below:

Social well- being

The proposed project activity will generate employment opportunities for the rural population of Khuntuni in the process of implementation of the power plant and for its operation and maintenance activities. This will help in improving the social status of the local people in and around the plant site as well as improving their operating skills thereby benefiting them in the long run. Furthermore, implementation of the project activity will not require any dislocation of local population.

Over and above, India being a power deficit country the power generated by the project activity will actually cater to the growing demand of electricity thereby leading to a better power balance scenario.

Technological well-being

Conservation of Non Renewable Resources: The proposed project activity of MIL will generate electricity for in house generation. It will displace equivalent power which would have been imported from the Eastern Regional Grid. The Eastern Regional Grid is dominated by thermal power sources which depend on renewable resources, mostly coal. The proposed project activity will reduce dependency on the Grid and thus help in conservation of non renewable resources.

Conservation of energy through clean power generation: The proposed project activity will involve utilization of the heat content of the DRI kiln gas for generation of power. This thermal energy of the DRI kiln gas, in absence of the proposed project activity, would have been wasted. Generation of power through the waste heat recovery route does not cause any significant increase in the air pollution in comparison to generation of power with fossil fuels. Therefore the proposed project activity will lead to conservation of thermal energy and utilization of the same for generation of clean power.

Economic well- being

The proposed project activity has also created business opportunities for contractors, consultants and suppliers. Therefore it has resulted in an overall economic improvement of the locality and the country as a whole. Moreover, by reducing the dependency on grid power, the proposed project activity will make grid power available for other usages which in turn will lead to an overall economic progress of India.

Environmental well- being

In absence of the proposed project activity, the DRI kiln gas would have been emitted to the atmosphere, thus creating thermal pollution of the local environment. The proposed 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 the party involved((host) indicates a host party)	Private and/or public entity(ies) Project participants (as applicable)	Kindly indicate if the party involved wishes to be considered as project proponent(Yes/No)
Ministry of Environment and Forests, Government of India	Maheshwary Ispat Limited	No

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

A.4.1.1. Host Party(ies):

India

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

Orissa

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

Rampei, Khuntuni

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

The proposed project activity will be located in village Rampei P.O Khuntuni, in Cuttack (20^0 26’ N Latitude and 85^0 56’N Longitude).It is 2km away from the National Highway 42 connecting Cuttack and Sambalpur. The Rajasthan junction railway station on the Paradip-Cuttack-Sambalpur section and BSSR and Raipur section is just 0.5km away. The plant is thus well connected by motorable roadways and rail.

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

The proposed project activity involves transmission of electricity generated in a waste gas based power plant where aggregated electricity generation exceeds the 60 GWh per annum equivalent. The approved consolidated baseline and monitoring methodology ACM0012/ Version 02 has been adopted for the project activity. The proposed project is transmission of electricity generated in the captive power plant to the industrial facility for their in-house consumption. As per the methodology guidance the baseline and monitoring methodologies are used for accredition by Designated Operational Entities (DOE's).

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

The waste gas from the Direct Reduced Iron (DRI) Kiln is used in the proposed project activity for electricity generation. The proposed project activity generated 24 MW of electricity which after meeting the auxiliary requirements is used for the Cuttack industrial facility. The power generated by the project activity will partially meet the electrical energy requirement of the integrated Cuttack facility. The project activity will be facilitated as explained below:

Recovery of heat content of the DRI kiln

Under normal operational condition, an estimated 24000 Nm^3/hr of DRI kiln gas will be available from each of the DRI kiln. As per the conventional sponge iron manufacturing process, the gas emanating from DRI kiln is introduced into an After Burning Chamber (ABC) to ensure complete combustion. In the project scenario, the DRI kiln gas, after complete combustion in the ABC, will be introduced into four WHRBs where the heat content of the DRI kiln gas will be extracted and utilised for generation of steam (485^0C temperature and 66 ksca pressure). The steam generated will be used for generation of power. In the process of heat extraction and its utilization, the DRI kiln gas will be cooled to a temperature of around 170°C which will then be introduced into the Electrostatic Precipitator (ESP) and finally released to the atmosphere.

Utilisation of the heat content of the DRI kiln gas in WHRBs

The DRI kiln gas, after complete combustion in the ABC, will attain a temperature of around 1000^0C. The same will then be introduced into the Waste Heat Recovery Boilers (WHRBs) for generation of steam. The project activity involves installation of four numbers of unfired, single drum, top supported natural circulation type WHRBs, each connected to the respective DRI kilns. The super-heater of the WHRBs will be arranged in two stages with a spray type de-super heater in between to control the steam temperature. Proper arrangements for integral piping and flue gas ducting will also be designed in the WHRBs. The following table provides the technical specifications of both the WHRBs.

Table A-2: Technical specifications of WHRBs		
Parameter	Unit	Value
Steam output maximum continuous rating (MCR)	Tonnes per Hour (TPH)	10
Steam pressure at super heater outlet	Ksca	66
Steam temperature at super heater outlet	^0C	485
Feed water temperature at economizer inlet	^0C	126
Waste Gas inlet conditions, Gas flow	Nm^3/hr	24000
Gas temperature	^0C	950
Dust Content at outlet of ESP	mg/Nm^3	50
Exit Temperature of DRI kiln gas	^0C	170

<u>Generation of power in a steam turbo-generator</u>

The steam generated in the WHRBs will be fed into a common steam header. Steam from the four WHRBs, and the two Atmospheric Fluidized Bed Combustion Boilers (AFBC) will also be fed to the common steam header. Then the steam will be fed to the turbine for generation of power. Two Extraction Cum Condensing multistage impulse reaction type steam turbines complete with casing, rotor, blading bearings and glands and having a Maximum Continuous Rating (MCR) of 12MW each will be used for generation of electricity. The technical specifications of the steam turbo-generator sets are provided herein:

Table A-3: Technical specifications of steam turbo-generator		
Parameter	Unit	Value
Rated capacity of turbine	kW	12,000
Steam conditions at turbine inlet: Pressure Temperature	 kg/cm^2 ^0C	 66 485
Condenser pressure	kg/cm^2	0.1095
Circulating water temperature at inlet to condenser	^0C	32

The waste gases after maximum heat recovery in the boiler are directed to the exhaust stack through the ESP. Suspended particles in the exhaust gases are removed to the maximum extent in the ESP. The particulate matter collected in the hoppers is transported for disposal. Other systems required for project activity include Circulating cooling water system, DM Plant, Instrument air compressor system etc. Circulating water system is used to condense exhaust steam after passing through turbine rotor. Cooling water enters the condenser and extracts the heat available in the exhaust steam. Only treated water is supplied for better performance of the boiler and to avoid scale formation in boiler heat transfer tubes. Makeup water is regulated to the Deaerator through de-aerator level controller.

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

Years	Annual estimation of emission reductions in tonnes of CO_2 e
October2008-September2009	65273
October 2009- September 2010	65273
October 2010- September 2011	65273
October 2011- September 2011	65273
October 2011- September 2012	65273
October 2013- September 2014	65273
October 2014- September 2015	65273
October 2015- September 2016	65273
October 2016- September 2017	65273
October 2017- September 2018	65273
Total estimated reductions(tonnes of CO_2 e)	652730
Total number of crediting years	10
Annual average over the crediting period of estimated reductions (tonnes of CO_2 e)	65273

A.4.5. Public funding of the project activity:

No public funding is available for the proposed project activity

SECTION B. Application of a baseline and monitoring methodology

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

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

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

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

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

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

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

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

Apart from the key applicability condition depicted above, the proposed project activity is also required to meet the following applicability condition 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 proposed project activity does not involve usage of the waste gas pressure for generation of electricity. Therefore this applicability condition is not applicable for the proposed 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 proposed 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 proposed 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 proposed project activity under consideration.

"Energy in the project activity can be generated by the owner of the industrial facility producing the waste gas/heat or by a third party (e.g. ESCO) within the industrial facility." – Waste gas with substantial heat content will be generated from the DRI kilns. Electrical energy will be generated utilising the heat content of the waste gas by the owner of the integrated steel manufacturing facility.

"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(s) or any legal mandate that would have prevented the project proponent from using fossil fuels for generation of electrical energy.

"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 proposed project activity will be undertaken in the integrated iron and steel plant of MIL.The waste gas, used in the proposed project activity, will be emitted from the DRI kiln which will be operating in the existing facility site.

"The waste gas/pressure 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 utilized in the proposed project activity does not have any other use in the integrated iron and steel plant at MIL. The same can be demonstrated with an energy balance for the entire unit or through on-site verification at the facility site. Therefore the waste gas utilized in the proposed project activity is surplus and will be flared in absence of the proposed 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."- MIL is implementing the proposed project activity to utilize the heat content of the waste gas generated from their DRI for generation of power. The emission reduction credits will solely be claimed

by the project proponent *i.e.* MIL. Furthermore the entire power generated by the proposed 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."

– MIL was not involved with power generation before the implementation of the proposed project activity. The proposed project activity will be implemented as a part of the Greenfield integrated iron and steel plant project of MIL. Therefore this condition is not applicable for the proposed project activity under consideration. However all the equipments to be installed under the proposed project activity will have a minimum lifetime of 25years. Therefore the project proponent will claim the emission reduction credits for a fixed crediting period of 10years.

"Waste gas/pressure that is released under abnormal operation (emergencies, shut down) of the plant shall not be accounted for."- The project proponent will not account for any waste gas that will be released under abnormal operation (emergencies, shut down) of the plant.

"Cogeneration of energy is from combined heat and power and not combined cycle mode of electricity generation."- The proposed project activity does not entail cogeneration of heat and power[2]. Therefore this condition is not applicable for the proposed project activity under consideration.

From the above explanation, it is established that the proposed 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 proposed project activity.

[2] Please refer to Section A.4.3

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

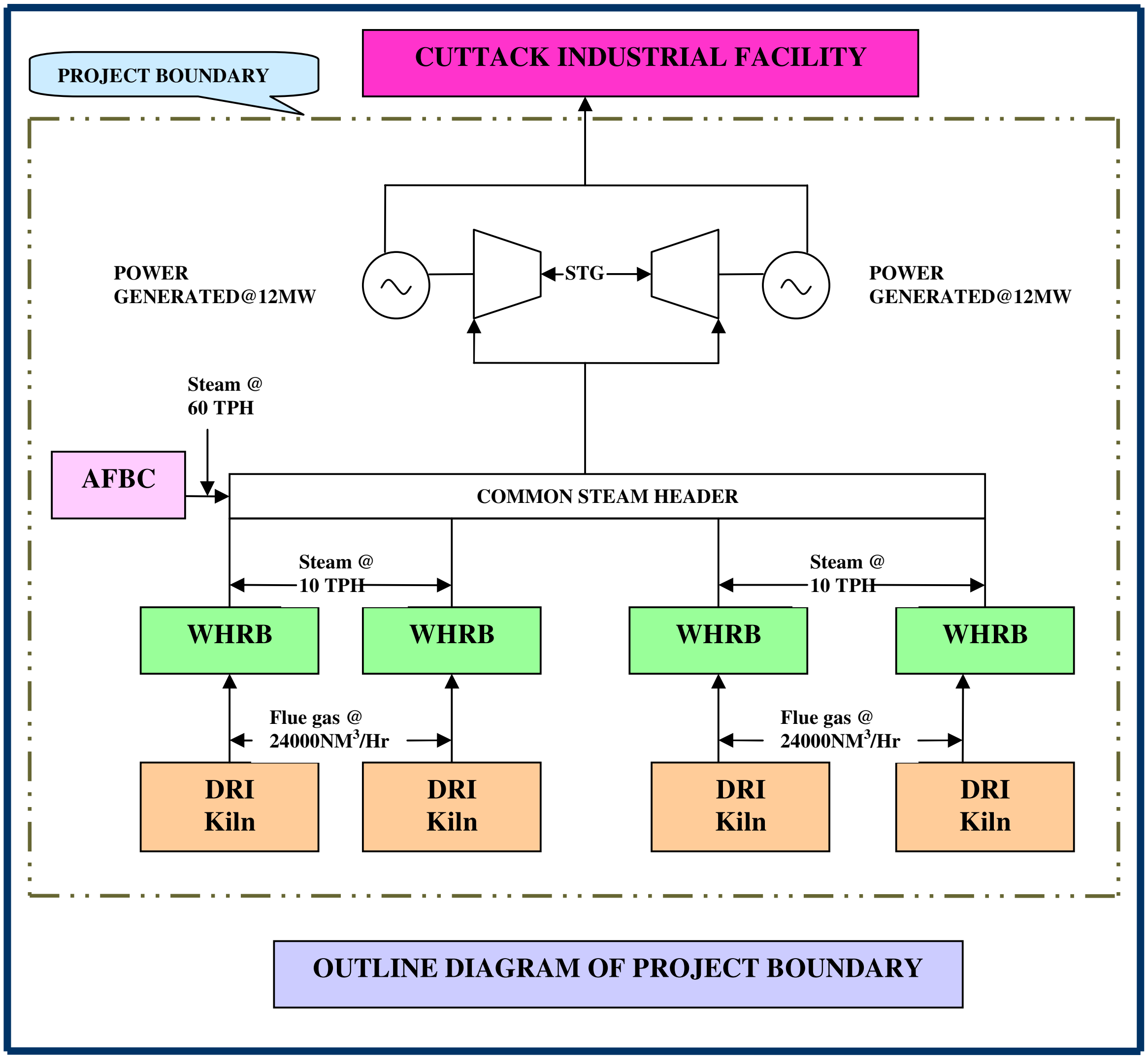
As per the methodology the project boundary shall include:-

- *The industrial facility where waste gas is generated (generator of waste energy).* – The sponge iron kiln (DRI kiln).
- *The facility where electricity is generated. Equipment providing auxiliary heat to the waste heat recovery process shall be included within the project boundary.* – The captive facility
- *The facility where electricity is used.* - The industrial facility at Cuttack

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 kiln of MIL and will include the ducting system for transportation of waste gas from the ABC outlet to the Waste Heat Recovery Boilers (WHRBs) in the power plant;
2. The power plant equipments where the heat content of the waste gas will be utilized for generation steam and subsequently power. This will also include the equipment required to cater to the auxiliary power demand of the power plant; and
3. The Cuttack facility of MIL where the electricity will be consumed.

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



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

Table B-1: Overview on emission sources included in or excluded from the project boundary

	Source	Gas	Included	Justification/ Explanation
Baseline	Electricity generation, grid or captive source	CO_2	Included	Main emission source.
		CH_4	Excluded	Excluded for simplification. This is conservative.
		N_2O	Excluded	Excluded for simplification. This is conservative.
	Fossil fuel consumption in boiler for thermal energy	CO_2	Excluded	Not applicable since the project activity will not cater to the thermal energy requirement of the integrated iron and steel plant of Visa Steel Limited.
		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 this 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 this 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 baseline is identified considering the steps given in ACM0012/Version 2 and additionality is determined using the latest version of "Tools for the demonstration and assessment of additionality" agreed by the CDM Executive Board available at UNFCCC CDM website.

Identification of baseline scenario

The baseline scenario is identified as the most plausible scenario among all realistic and credible alternatives.

Realistic and credible alternatives are determined from:-

- Waste gas use in the absence of the project activity
- Power generation in the absence of the project activity

The project participants exclude those options from consideration as credible baseline scenarios that:-

- Do not comply with legal and regulatory requirements
- Depend on fuels that are not available at the project site

Step 1: Define the most plausible baseline scenario for the generation of heat and electricity using the following baseline options and combinations.

The baseline candidates are considered for following facilities:-

- For the industrial facility where the waste gas is generated
- For the facility where the energy is produced
- For the facility where the energy is consumed

The options considered are tabulated below:

Table B2: Potential alternatives for waste gas use and power generation			
Option	Description	Credibility	Conclusion
Utilization of the heat content of the waste gas			
W1	Waste gas is directly vented to atmosphere without incineration.	As per the legal requirement, the waste gas is required to be combusted completely in an After Burning Chamber (ABC) before the same can be discharged into the atmosphere. Therefore direct venting of waste gas to the atmosphere without incineration is not an option for the project	Cannot be a part of the baseline

Table B2: Potential alternatives for waste gas use and power generation			
Option	Description	Credibility	Conclusion
		proponent in absence of the project activity.	
W2	Waste gas is released to the atmosphere after incineration.	In absence of the project activity, the project proponent could have released the waste gas after burning in an ABC 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.	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 barriers that the project activity is facing *(please refer to Section B.5 of the Project Design Document for details)*. Therefore in absence of CDM revenue, this alternative can not be considered as a realistic and credible alternative for the project proponent.	Cannot be a part of the baseline
Power generation			
P1	Proposed project activity	In absence of the project activity, the project proponent could have utilized the heat content of the waste gas for generation	Cannot be a part of

Table B2: Potential alternatives for waste gas use and power generation			
Option	Description	Credibility	Conclusion
	not undertaken as a CDM project activity.	of power. However this alternative would have faced all the 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.	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 region because of limited availability of renewable resources.[3]	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	May be a part of the baseline

[3] http://www.cea.nic.in/power_sec_reports/general_review/0405/ch2.pdf

Table B2: Potential alternatives for waste gas use and power generation			
Option	Description	Credibility	Conclusion
		determination of baseline scenario for the project activity under consideration.	
P5	On site or off site existing/new renewable energy based existing captive or identified plant.	This alternative is not a realistic and credible alternative for the project proponent in absence of the project activity considering limited availability of renewable resources in the eastern region of the country where the project activity plant is situated	Cannot be a part of the baseline
P6	Source Grid connected power plants	In absence of the project activity, the project proponent could have chosen not to generate any power. Under such a situation, electricity 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	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 in absence of the project activity. 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

Table B2: Potential alternatives for waste gas use and power generation			
Option	Description	Credibility	Conclusion
	waste gas, this scenario represents captive generation with lower efficiency than the project activity)		
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 MIL in absence of the project activity			
Alternative	Baseline Alternatives		Description of Alternative
	Waste Gas	Power	
1	W2	P6	With this alternative in place, the waste gas generated from the DRI kilns at MIL 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.
2	W2	P4	With this alternative in place, the waste gas generated from the DRI kilns at MIL 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.

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 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.

In case of Aternative-2, 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 is situated

Therefore in case of Alternative-2, 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.

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, MIL has carried out a complete analysis of the realistic and credible alternatives (as mentioned above) based on the flowing key parameters:

- Capital Cost
- Generation / Purchase Cost

The same is provided below:

Table B-4: Economic analysis of all the realistic and credible alternatives available to MIL in absence of the project activity		
Parameters	Alternative-1- Import of electricity from the grid	Alternative 2- Installation of a coal based captive power plant
Unit cost of generation/ purchase	INR 3.07/kWh	INR 3.11/kWh
Analysis on the basis of economic and regulatory parameters	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.	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.

Conclusion	Considering all the points mentioned above, “Alternative-1: Import of electricity from the grid” was found to be the most economically attractive option available to Maheshwary Ispat Limited in absence of the project activity and therefore, as per the methodology, this alternative option is the baseline scenario.

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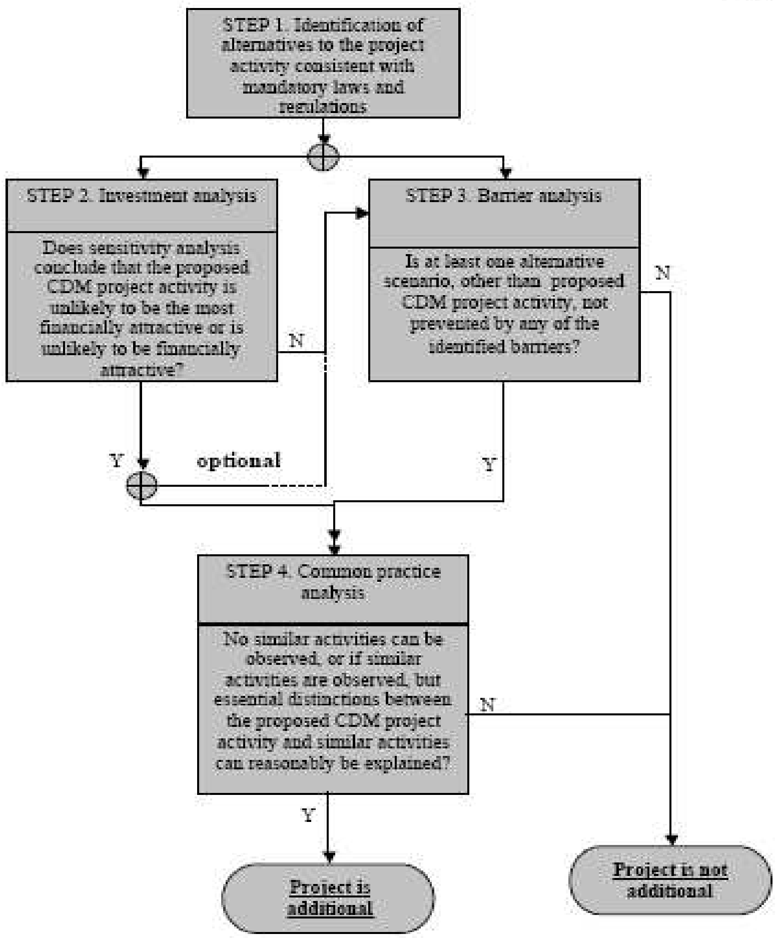
Hence we can infer that the baseline scenario for the proposed project activity is alternative 1 i.e “Import of electricity from the grid.

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

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

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



MIL proposes to prove the additionality of the proposed project activity in the following manner:

Step 1: Identification of alternatives to the project activity consistent with current laws and regulatons

The project proponent is required to define realistic and credible alternatives to the project activity(s) that can be (part of) the baseline scenario through the following sub-steps:

Sub-step 1a. Define alternatives to the project activity:

Sub-step 1b. Enforcement of applicable laws and regulations:

The plausible baseline scenario options that were considered are:

- *Alternative 1:* Import of electricity from the grid
- *Alternative 2:* Installation of a coal based captive power plant

After Step1 project proponent is required to conduct:

Step 2: Investment analysis

OR

Step 3: Barrier analysis

MIL proposes to prove additionality of the project activity via the route of "Investment Analysis". The project proponent has to determine whether the proposed project activity faces barriers that:-

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

b) Do not prevent the implementation of at least one of the alternatives through the following substeps:

Step 2: Investment analysis

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

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

MIL conducted an investment analysis for both the alternatives (*i.e.* Alternative-1 or Alternative-2) that were available with them in absence of the proposed project activity and the project activity without CDM benefit.

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

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

Unit cost of electricity generation for "Alternative-1: Import of electricity from the grid"

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

Alternative-1: Import of electrcity from the Grid				
Sl. No.	DESCRIPTION	Units		Remarks
	Power purchase cost	INR/kWh	3.07	
	Capital Investment	INR	Nil	
Unit cost of electrcity generation - INR 3.07/kWh				

Unit cost of electricity generation for "Alternative-2: Installation of a coal based captive power plant"

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

Alternative-2: Unit Power Cost at Coal based CPP				
Sl. No.	DESCRIPTION	Units	CFBC	Remarks
	Power generation capacity	MW	24	
	Auxiliary consumption	%	14%	
	Working days / annum	days	330	
	Gross power generation	kWh/annum	142560000	
	Auxiliary power consumption	kWh/annum	19958400	
	Net power generation-power available for the steel plant	kWh/annum	122601600	
	Variable Cost			
	Determination of Fuel Cost			
	Coal consumption	TPD	332	in case of cfbc, 0.18 tons of coal reqd for every ton of steam generated
	Cost of coal	Rs/day	646963	
	Fuel cost for power generation	**Rs / kWh**	**1.74**	
	Determination of Water Cost			
	Water requirement @ 5CuM/MWh	CuM/annum	712800	
	Cost of water	Rs/Cum	3564000	
	Water cost for power generation	**Rs / kWh**	**0.03**	
	Determination of Chemical Cost			
	Cost of chemicals	**Rs / kWh**	**777600.00**	
	cost of D.M.water for power generation	**Rs/kWh**	**0.01**	
	Total variable cost for power generation	**Rs/kWh**	**1.78**	
	Capital Investment			
	Project cost	Rs. Lakhs	9000	
	Equity portion (@ 40% of Total Project Cost)	Rs. Lakhs	3600	
	Loan portion	Rs. Lakhs	5400	
	Computation of Working Capital			
	Coal consumption	TPD	332	
	No of days for storage	days	30	
	Coal storage	MT	9953	
	Cost of coal storage	Rs./ MT	1950	
	Total working capital	**Rs Lakhs**	**19408896**	
	Fixed Cost			
	Interest on loan @ 12%	Rs. Lakhs/annum	648	
	Retun on equity @ 14%	Rs. Lakhs/annum	504	
	Depreciation @ 3.6% considering 88% of project cost to be equipment cost	Rs. Lakhs/annum	285	
	O&M expenses @ 2% of project cost	Rs. Lakhs/annum	180	
	Intrest on Working Capital (considering 25% Margin Money)	Rs. Lakhs/annum	17.47	Interest @ 12% (short term loan)
	Total Fixed Cost	**Rs. Lakhs/annum**	**1635**	
	Total fixed cost for power generation	**Rs/kWh**	**1.33**	
	Power Generation Cost			
	Fixed cost for power generation	Rs/kWh	1.33	
	Variable cost for power generation	Rs/kWh	1.78	
	Unit cost of power	**Rs/kWh**	**3.11**	
	Unit cost of power in the project scenario	**Rs/kWh**	**3.11**	

Unit cost of electricity generation for the project case

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

Alternative-1: Unit Power Cost in the Project Scenario						
Sl. No.	DESCRIPTION	Units	AFBC	Waste Heat	Grid	Remarks
	Power generation capacity	MW	16	8		
	Auxiliary consumption	%	16%	10%		
	Working days / annum	days	300	270		
	Gross power generation	kWh/annum	86400000	31104000		Taking 75% as utilisation rate for afbc and 60% for whrb, taking into account 2 boilers and higher dependency on waste gas generated for production
	Auxiliary power consumption	kWh/annum	13824000	3110400		
	Net power generation-power available for the steel plant	kWh/annum	72576000	27993600	36288000	
	Variable Cost					
	Determination of Fuel Cost					
	Coal consumption	TPD	283	0.00		1 MW requires 4 tons steam; 1 ton steam = .22 tons of coal; 80% coal and 20% char; char used as an in-house byproduct, hence no cost for char
	Cost of coal	Rs/day	551117	0.00		
	Fuel cost for power generation	**Rs / kWh**	**2.28**	**0.00**		
	Determination of Water Cost					
	Water requirement @ 5CuM/MWh	CuM/annum	432000	155520		water cost negligible according to us
	Cost of water	Rs/Cum	2160000	777600		
	Water cost for power generation	**Rs / kWh**	**0.03**	**0.03**		
	Determination of Chemical Cost					chemical cost negligible according to us
	Cost of chemicals	**Rs / kWh**	**518400.00**	**186624.00**		
	cost of D.M.water for power generation	**Rs/kWh**	**0.01**	**0.01**		
	Total variable cost for power generation		**2.32**	**0.03**		
	Capital Investment					
	Project cost	Rs. Lakhs	4453	4425		total project cost =49.32; divided in the ratio of 3:2
	Equity portion (@40% of Total Project Cost)	Rs. Lakhs	1,781.28	1,770.08		
	Loan portion	Rs. Lakhs	2672	2655		
	Computation of Working Capital					
	Coal consumption	TPD	283			
	No of days for storage	days	60			
	Coal storage	MT	16957			
	Cost of coal storage	Rs. /mt	1950			
	Total working capital	**Rs.**	33067008			
	Fixed Cost					
	Interest on loan @12%	Rs. Lakhs/annum	321	319		
	Retun on equity @ 14%	Rs. Lakhs/annum	249	248		
	Depreciation @ 3.6% considering 88% of project cost to be equipment cost	Rs. Lakhs/annum	141	140		
	O&M expenses @ 2% of project cost	Rs. Lakhs/annum	89	89		
	Interest on Working Capital (considering 25% Margin Money)	Rs. Lakhs/annum	29.76	0		Interest @ 12% (short term loan)
	Total Fixed Cost	**Rs. Lakhs/annum**	**830**	**795**		
	Total fixed cost for power generation	**Rs/kWh**	**1.14**	**2.84**		
	Power Generation Cost					
	Fixed cost for power generation	Rs/kWh	1.14	2.84		
	Variable cost for power generation	Rs/kWh	2.32	0.03		
	Unit cost of power	**Rs/kWh**	**3.46**	**2.87**	**3.07**	
	Unit cost of power in the project scenario	**Rs/kWh**	**3.24**			

Sub step 2d. Sensitivity analysis

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

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

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

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

Table B-4. Sensitivity Analysis					
Sl. No.	Parameters	Variation	Unit Cost of Service (INR/kWh)		Comment
			Alternative- 1	Project Activity	
1.	Grid power purchase cost	+5%	3.22	3.28	In both the situations, the unit cost of electricity generation in the project scenario is higher than that for Alternative-1.
		-5%	2.92	3.20	
2.	Net power generated with waste gas	+10%	3.07	3.17	In both the situations, the unit cost of electricity generation in the project scenario is higher than that for Alternative-1.
		-10%	3.07	3.30	
3.	Combination of parameters 1 and 2	1→ +10% 2→ +5%	3.21	3.22	In both the situations, the unit cost of electricity generation in the project scenario is higher than that for Alternative-1.
		1→ -10% 2→ -5%	2.92	3.26	

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

Hence, it may be concluded that

(a) 'the project activity without CDM revenue is not the most financially attractive option' is robust to reasonable variations in the critical assumptions and that
(b) the CDM revenue the project activity would obtain through sale of the emission reductions has been one of the most important determinants for MIL to opt for the project activity which is financially less attractive than Alternative-1.

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

MIL proposes to prove the additionality of its proposed project activity via the route of barrier analysis. The barriers that crept up during implementation of the proposed project activity are enumerated below:

Technological Barriers

Fluctuating production from kiln

Success of the proposed project activity depends on uninterrupted supply of energy input from waste gases of kilns at consistently high temperatures to waste heat recovery boilers. However, supply of high temperature flue gases depends on continuous operation of kilns. The variation in production from the kiln has direct impact on quantity of coal burned in kiln and hence on the quantum of waste gas generation. Low capacity utilisation of kilns would have direct impact on project's viability. Low capacity utilization of kilns may be linked to operational problems, technological issues and unavailability and quality of raw material for kiln operation. These have been discussed in following sections.

As shown above power generation potential directly depends on kiln capacity utilization. Any direct or indirect aspect which impacts kiln production, impacts negatively power generation from the project activity too.

Raw material un-availability

As per the survey from Joint Plant Committee (JPC) set up by Government of India, major constraints toady faced by sponge iron industry are related to raw material (availability & prices), power and to some extent labour & investments. Management of iron ore for kiln is a major hurdle in successful and continuous operation of kiln. With growing numbers of sponge iron plants, this situation will only become worse affecting small & medium industries more. A feature in Jan 2006 edition of Steel World [4]reports that 70 of 115 units in Chattisgarh went on strike in December 2006 and stopped production due to recurring shortage of iron ore. The scarcity of raw material has a direct impact on the proposed project activity as the waste gas volume directly depends on the availability of raw materials. Hence shortage of raw materials will result in reduced volume of DRI gas. This will affect the quantum of electricity generated by the proposed project activity.

Raw material quality

Availability constraint for raw material has forced industries to opt for iron ore of lesser quality. Quality of iron ore is judged on the basis of Fe content, moisture level and presence of fines in it. Fines in iron ore is not desired as most of the fines escape during reduction process from the kiln and result in more losses & low production. The presence of fines in flue gases also causes problems in WHRB operation. Similarly presence of iron ore with size larger than normal requires more coal. This leads to more load in form of particulate matter in flue gases. Also particulate matter carries some heat of coal and quantum of actual usable energy is reduced at WHRB inlet.

Problems in operation & maintenance[5]

Handling of high particulate matter laden waste gas from kiln is tricky. High particulate matter level causes erosion and abrasion of mechanical parts which is speeded up at high temperature of these gases. Higher rate of erosion than normal may lead to more frequent changes in mechanical parts/ machinery resulting in more shutdown and/ or breakdown of system.

Other than erosion of parts, fusion of ash and formation of clinker build up at high temperatures isanother area of concern. This phenomenon is called “Accretion”. Accretion leads to clinker build up inside the kiln, restricting its opening, which requires frequent cleaning and hence more kiln stoppages or

[4] http://www.steelworld.com/analysis0106.pdf

[5] http://www.steelworld.com/technology7.pdf

shorter campaign life. Shorter campaign life directly impacts availability of waste gases for power generation in project activity. This is further affected if inferior quality of raw material is used in kiln. The problem is particularly severe to small capacity (100 TPD) kilns with smaller sizes as in the project activity.

Presence of sulphur aggravates the situation as it restricts the temperature gradient available for utilization. For, if temperature of waste gas is brought below 170 deg C, then possibility of sulphuric acid formation in the system is increased leading to corrosion of vital machinery/ parts in down stream. This keeps a tab on extent of utilization of waste heat in the system in power generation. The presence of moisture at times complicates the situation as it speed up the formation of acid in economiser area. In case of WHRB the economiser life may be affected because of formation of sulphurous and sulphuric acid in economiser.

The above problems associated with kiln operation result in fluctuating production i.e. fluctuating quantum of waste heat availability for steam generation in WHRB. This is specific to WHRB operation only and not the case with coal/ char based AFBC boilers or with power drawn from the grid.

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

The realistic and credible alternatives available to MIL and described in Substep 1b of this section were evaluated.

The barriers identified in sub-step 3a affect only the project activity. The most attractive alternative has been identified as the alternative where there is *import* of electricity from the grid by MIL. The barriers identified do not apply to this baseline alternative. The CDM project activity of MIL faces barriers to the maximum extent as has been discussed in the sections above.

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

Most of the plants in the integrated iron and steel industry in India depend on dual fuel (a mix of coal and waste gas) to generate power in order to meet their in-house power demand. This is primarily to ensure reliability of power supply under any circumstance. All the plants which have developed a 100% waste gas based power generation system have considered CDM revenue and are in various stages of CDM registration. Therefore the common practice scenario demonstrates that there is a poor penetration of this technology in the Indian iron and steel sector which can be attributed to the various investment risks or barriers associated with the project activity implementation.

From the above discussion, it can be established that the project activity is not a feasible option for the project proponent considering all the financial risks and barriers associated with its implementation. The Management of MIL has been appraised about all these direct financial risks and barriers which even have the potential to make the project proposal completely unviable. Furthermore the failure of the project activity could ultimately lead to a production downtime and subsequently into loss of revenue. However the Management of MIL 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 MIL has finally decided to implement the project activity as a climate change initiative.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

As per section B.4 off this PDD the baseline chosen is “Import of electricity from the grid. The calculations are shown below.

Baseline Emissions:

The baseline emissions for the year y shall be determined as follows:

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

Where:

BE_y is total baseline emissions during the year y in tons of CO_2

$BE_{En,y}$ are baseline emissions from energy generated by project activity during the year y in tons of CO_2

$BE_{flst,y}$ Baseline emissions from generation of steam using fossil fuel that would have been used for flaring the waste gas in absence of the project activity (tCO_2e per year). This value is not required in the proposed project activity.

Baseline emission $BE_{En,y}$ is calculated as per the identified baseline scenario i.e. import of electricity from the grid to meet the in-house requirements. The calculations are done as per scenario 1 of the baseline calculations given in ACM0012/Version 2.

Baseline Emissions for Scenario 1

Scenario 1 represents the situation where electricity is imported from the grid. No heat for any industrial use is generated. Hence the calculations for baseline emissions are done in the following manner.

$$BE_{En,y} = BE_{Elec,y} + BE_{Ther,y}$$

Where:

$BE_{Elec,y}$ are baseline emissions from electricity during the year y in tons of CO_2

$BE_{Ther,y}$ are baseline emissions from thermal energy (due to heat generation by element process) during the year y in tons of CO_2. This is not considered as thermal energy is not generated for industrial use. Hence this value is taken as 0.

Baseline emissions from electricity ($BE_{Elec,y}$) that is displaced by the project activity:

$$BE_{Elec,y} = f_{cap} * f_{WG} * \sum_j \sum_i ((EG_{i,j,y} * EG_{Elec,i,j,y}))$$

$BE_{Elec,y}$ are baseline emissions due to displacement of electricity during the year y in tons of CO_2

$EG_{i,j,y}$ is the quantity of electricity supplied to the recipient(sponge iron plant) *j* by the generator, which in the absence of the proposed project activity would have been sourced from i^{th} source (i=grid (Eastern Regional Grid) during the year y in MWh, and

$EF_{Elec,i,j,y}$ is the CO_2 emission factor for the electricity source i (i=grid (Eastern Regional Grid), displaced due to the proposed project activity, during the year y in tonsCO_2/MWh

f_{WG} Fraction of total electricity generated by the proposed project activity using waste gas. In the proposed project activity the steam is used from power generation is supplied by a) one AFBC boiler which is coal based and b) two WHRB boilers which are waste gas based. Hence steam used for generation of the electricity is produced in dedicated boilers but supplied through common header, this factor is estimated using equation given below.

f_{cap} Energy that would have been produced in the project year y using waste gas generated in base year expressed as a fraction of total energy produced using waste gas in year y. The ratio is 1 if the waste gas generated in the project year y is same or less than that generated in base year. For ex-ante calculation this is taken as 1 but for ex-post baseline calculations it is calculated using equation given below.

The proportion of electricity that would have been sourced from the i^{th} source to the j^{th} recipient plant should be estimated based on historical data of the proportion received during the three most recent years.

The baseline is import from the grid and hence the emission factor is the grid emission factor which is obtained from CEA Database Version 3. The value is taken as 1.01.

Calulation of the energy generated (electricity) in units supplied by waste gas and other fuels

The fraction of energy produced by the waste gas in project activity is calculated as follows:

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

Where:

$ST_{whr,y}$ Energy content of the steam generated in waste heat recovery boiler fed to turbine via common steam header

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

Capping of baseline emissions

As per ACM0012 baseline emissions should be capped. The parameter f_{cap} is calculated in the following manner.

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

Where:

$Q_{WG,BL}$ Quantity of waste gas generated prior to the start of the project activity estimated using equation . (Nm3)

$Q_{WG,y}$ Quantity of waste gas emitted in the project year y

<u>Project Emissions:</u>

As per ACM0012 the project emission is calculated as follows:

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

Where:

PE_y Project emissions due to project activity

$PE_{AF,y}$ Project activity emissions from on-site consumption of fossil fuels by the cogeneration 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.

$PE_{EL,y}$ Project activity emissions from on-site consumption of electricity for gas cleaning equipment which is not applicable here as credits are claimed only against export.

Project emissions due to auxiliary fossil fuel

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

Where :

$PE_{AF,y}$ are the emissions from the project activity in the year y due to combustion of auxiliary fuel in tons of CO_2

$FF_{i,y}$ is the quantity of fossil fuel type i combusted to supplement waste gas in the project activity during the year y, in energy or mass units

NCV_i is the net calorific value of the fossil fuel type I combusted as supplementary fuel, in TJ per unit of energy or mass units. IPCC value is taken

$EF_{CO2,j}$ is the CO_2 emission factor per unit of energy or mass of the fuel type I tons of CO_2 IPCC value is taken

<u>Leakage</u>

No leakage is applicable under this methodology

<u>Emission Reductions</u>

$$ER_y = BE_y - PE_y$$

Where:

ER_y are the total emissions reductions during the year y in tons of CO_2

PE_y are the emissions from the project activity during the year y in tons of CO_2

BE_y is the baseline emissions for the project activity during the year y in tons of CO_2

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 proposed 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 proposed 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:	760320000 (24000Nm_3/hr from each DRI kiln)
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.

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

The Combined Margin emission factor, which is the weighted average of the Operating Margin emission factor and the Build Margin emission factor, for Eastern Regional Grid[6] is calculated as per ACM0002/ Version 06 by Central Electricity Authority of Government of India. The Operating Margin emission factor ($EF_{OM,y}$), Build Margin emission factor ($EF_{BM,y}$) and the Combined Margin emission factor ($EF_{elec,i,j,y}$) for Eastern Regional Grid are available at the start of the crediting period, as given below, and will remain fixed for the entire crediting period of 10 years:

Data / Parameter:	$EF_{elec,i,j,y}$
Data unit:	tCO_2/ MWh
Description:	CO_2 emission for the electricity source *i* (*i.e.* grid), displaced due to the project activity during the year y
Source of data used:	CO2 Baseline Database for the Indian Power Sector User Guide Version 3.0 December 2007
Value applied:	1.01
Justification of the choice of data or description of measurement methods and procedures actually applied :	Information available from Central Electricity Authority of Government of India has been used. The same is calculated as a weighted sum of Operating Margin emission factor and Build Margin emission factor following the guidelines of ACM0002/ Version 07 methodology. Recording frequency – Once at the start of crediting period.
Any comment:	Please refer to 'Annex-3: Baseline Information' of PDD for details.

Data / Parameter:	$EF_{OM,y}$
Data unit:	tCO_2/ MWh
Description:	CO_2 Operating Margin emission factor of the grid
Source of data used:	CO2 Baseline Database for the Indian Power Sector User Guide Version 3.0 December 2007
Value applied:	1.09
Justification of the choice of data or description of measurement methods and procedures actually applied :	Information available from Central Electricity Authority of Government of India has been used. The same is calculated as an average of 3-years' (*i.e.* 2003-2004, 2004-2005 and 2005-2006) Simple Operating Margin emission factor following the guidelines of ACM0002/ Version 07 methodology. Recording frequency – Once at the start of crediting period.
Any comment:	Please refer to 'Annex-3: Baseline Information' of PDD for details.

[6] Please refer to 'Annex-3: Baseline Information' for selection of Eastern Regional Grid.

Data / Parameter:	$EF_{BM,y}$
Data unit:	tCO_2/ MWh
Description:	CO_2 Build Margin emission factor of the grid
Source of data used:	CO2 Baseline Database for the Indian Power Sector User Guide Version 3.0 December 2007
Value applied:	0.93
Justification of the choice of data or description of measurement methods and procedures actually applied :	Information available from Central Electricity Authority of Government of India has been used. The same is calculated for the year 2005-2006 following the guidelines of ACM0002/ Version 07 methodology. Recording frequency – Once at the start of crediting period.
Any comment:	Please refer to 'Annex-3: Baseline Information' of PDD for details.

<u>Fixed parameters for the computation of Project Emissions</u>

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

B.6.3. Ex-ante calculation of emission reductions:

Ex-ante estimation of Baseline Emissions

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

Sl No.	Operating Year	f_{cap}	f_{WG}	CO_2 emission factor for the electricity source i(i=grid) displaced due to the project activity, during the year y $EF_{elec,i,j,y}$ (tonsCO_2/MWh)	$EG_{i,j,y}$ (MWh)	Baseline Emissions in tonnes of CO_2
1	October2008-September2009	0.4	1	1.01	161568	65273
2	October 2009-September 2010	0.4	1	1.01	161568	65273
3	October 2010-September 2011	0.4	1	1.01	161568	65273
4	October 2011-September 2011	0.4	1	1.01	161568	65273
5	October 2011-September 2012	0.4	1	1.01	161568	65273
6	October 2013-September 2014	0.4	1	1.01	161568	65273
7	October 2014-September 2015	0.4	1	1.01	161568	65273
8	October 2015-September 2016	0.4	1	1.01	161568	65273
9	October 2016-September 2017	0.4	1	1.01	161568	65273
10	October 2017-	0.4	1	1.01	161568	65273

	September 2018					
TOTAL					1615680	652730

<u>Ex-ante estimation of Project Emissions</u>

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

$PE_y = 0$

Where,

PE_y = Project Emissions in the year y (tCO_2)

However the combustion of fossil fuel during generation start up or in emergencies in the proposed 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.

<u>Ex-ante estimation of Leakage Emissions</u>

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)

<u>Ex-ante estimation of Emission Reductions</u>

The ex-ante computation of emission reductions resulting from the proposed 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.	October2008-September2009	65273
2.	October 2009- September 2010	65273
3.	October 2010- September 2011	65273
4.	October 2011- September 2011	65273
5.	October 2011- September 2012	65273
6.	October 2013- September 2014	65273
7.	October 2014- September 2015	65273
8.	October 2015- September 2016	65273
9.	October 2016- September 2017	65273
10.	October 2017- September 2018	65273
Total		**652730**

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

Year	Estimation of Proposed project activity Emission reductions (tonnes of CO_2 e)	Estimation of baseline Emissions reductions (tonnes of CO_2 e)	Estimation of leakage (tonnes of CO_2 e)	Estimation of emission reductions (tonnes of CO_2 e)
October2008-September2009	0	65273	0	65273
October 2009- September 2010	0	65273	0	65273
October 2010- September 2011	0	65273	0	65273
October 2011- September 2011	0	65273	0	65273
October 2011- September 2012	0	65273	0	65273
October 2013- September 2014	0	65273	0	65273
October 2014- September 2015	0	65273	0	65273
October 2015- September 2016	0	65273	0	65273
October 2016- September 2017	0	65273	0	65273
October 2017- September 2018	0	65273	0	65273
Total (tonnes of CO_2 e)	**0**	**652730**	**0**	**652730**

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

Title: Consolidated monitoring methodology for GHG emission for waste heat based energy system

Reference: Approved consolidated baseline and monitoring methodology ACM0012/ Version 02.

Monitoring Methodology

As per the methodology the following data shall be monitored

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/hr
Description:	Quantity of waste gas used for energy generation during year y
Source of data to be used:	Plant Records
Value of data applied for the purpose of calculating expected emission reductions in section B.5	96000Nm^3/hr(to the four WHRBs from the DRI kiln)
Description of measurement methods and procedures to be applied:	The parameter will be monitored continuously with flow meters. The same will also be available in the power plant Distributed Control System (DCS). The Head (Mechanical & Maintenance) will be responsible for regular calibration of the flow meter. The data will be archived both electronically and in paper for the entire crediting period and two years after.
QA/QC procedures to be applied:	Yes
Any comment:	The uncertainty level of the parameter will be low since the same will be monitored with calibrated meters.

2. Parameters related to computation of f_{WG}

Data / Parameter:	$ST_{whr,y}$
Data unit:	kCal
Description:	Energy content of the steam generated in Waste Heat Recovery Boilers fed to turbine via common steam header
Source of data to be used:	Plant Records and Steam Tables
Value of data applied for the purpose of calculating expected emission reductions in section B.5	9.0198E+11
Description of measurement methods and procedures to be applied:	The parameter will be determined based on ▪ Steam flow from the Waste Heat Recovery Boilers- The parameter will be monitored with flow meters and will be available in the power plant Distributed Control System (DCS). The Head (Mechanical & Maintenance) 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. ▪ Enthalpy of steam generated- The parameter will be determined based on temperature and pressure of steam generated from the Waste Heat Recovery Boilers using Steam Tables. The temperature of steam generated will be monitored with temperature gauges and the pressure of steam generated will be monitored with pressure gauges. The Head (Mechanical & Maintenance) will be responsible for regular calibration of the temperature and pressure gauges. The data will be archived both electronically and in paper for the entire crediting period and two years after.
QA/QC procedures to be applied:	Yes
Any comment:	The uncertainty level of the parameter will be low since the same will be determined with parameters monitored with calibrated meters.

Data / Parameter:	$ST_{other,y}$
Data unit:	kCal
Description:	Energy content of steam generated in other boilers fed to turbine via common steam header
Source of data to be used:	Plant Records and Steam Tables
Value of data applied for the purpose of calculating expected emission reductions in section B.5	9.0198E+11
Description of measurement methods and procedures to be applied:	The parameter will be determined based on ▪ Steam flow from the other boilers- The parameter will be monitored with flow meters and will be available in the power plant Distributed Control System (DCS). The Head (Mechanical & Maintenance) 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. ▪ Enthalpy of steam generated- The parameter will be determined based on temperature and pressure of steam generated from other boilers using Steam Tables. The temperature of steam generated will be monitored with temperature gauges and the pressure of steam generated will be monitored with pressure gauges. The Head (Mechanical & Maintenance) will be responsible for regular calibration of the temperature and pressure gauges. The data will be archived both electronically and in paper for the entire crediting period and two years after.
QA/QC procedures to be applied:	Yes
Any comment:	The uncertainty level of the parameter will be low since the same will be determined with parameters monitored with calibrated meters.

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

Data / Parameter:	$EG_{i,j,y}$
Data unit:	MWh
Description:	Quantity of electricity supplied to the recipient *j* by generator which in the absence of the project activity would have been sourced from the i^{th} source (*i.e.* the coal based captive power plant) during the year y
Source of data to be used:	Plant Records
Value of data applied for the purpose of calculating expected emission reductions in section B.5	161568
Description of measurement methods and procedures to be applied:	The parameter will be measured continuously with energy meter and the same will be available in the plant's Distributed Control System (DCS). The Head (Mechanical & Maintenance) will be responsible for regular calibration of the energy 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
Any comment:	The uncertainty level of the parameter will be low since the same will be monitored with calibrated meters.

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

The CO_2 emission for the electricity source *i* (*i.e.* grid), displaced due to the project activity is calculated at the start of the crediting period and will remain fixed for the entire crediting period. Please refer to Section B.6.2 of the PDD for details.

Parameters to be monitored for the computation of Project Emissions

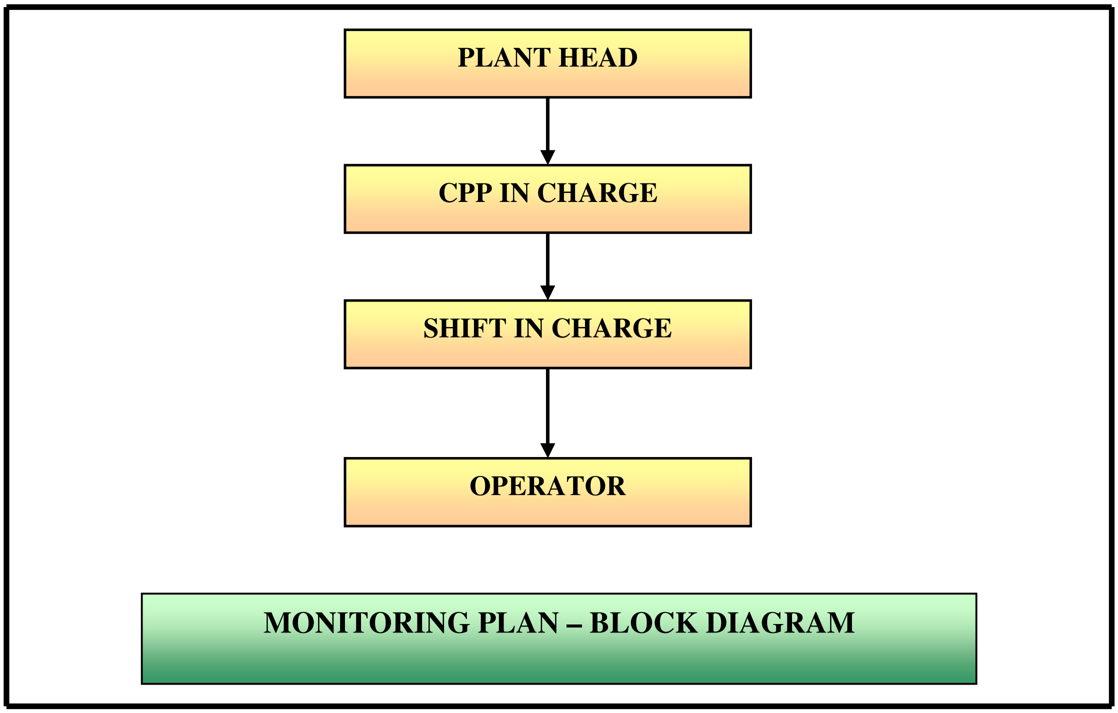
Data / Parameter:	FF_i
Data unit:	tonnes
Description:	Quantity of fossil fuel type *i* combusted to supplement waste gas in the project activity during the year y
Source of data to be used:	Plant Records
Value of data applied for the purpose of calculating expected emission reductions in section B.5	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. . The operational and management structure that the project operator will implement in order to monitor emission reductions and any leakage effects, generated by the project activity is as follows:



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	30/05/2007
Name of person/ entity determining the baseline and establishing the monitoring plan	Maheshwary Ispat 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:

02/12/2004

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

20 y 0m

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:

01/10/2008 or on registration with the 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:

Article 12 of the Kyoto Protocol states that a CDM project activity should contribute to sustainable development of the host country. Hence an investigation into the positive and negative impacts of the proposed project on the environment and society is thus a key element of any CDM project.

MIL has decided to implement the proposed CDM project activity because of its commitment to ensure maximum local and global benefits in relation to pertinent environmental and social issues and to take a major step forward towards sustainable development.

With regard to the local environment the project activity has positive effects on local air quality. By displacing electricity from the Eastern Regional Grid, it offsets emissions from the fossil fuel dominated Eastern Regional Grid mix. Moreover the proposed project activity involves usage of the waste gas which has no evident use other than power generation. The proposed project activity has the abovementioned two fold environmental benefit.

<u>Environmental Impact Analysis of the project activity:</u>

- During Construction Phase
- During Operational Phase and
- Maintenance Phase

The impacts envisaged during construction of the project activity are as follows:

- Impact on Soil Quality
- Impact on Air quality
- Impact on Noise Levels

The environmental impact during the construction phase is regarded as temporary or short term and hence does not affect the environment significantly.

The natures of the impacts that are evident during the operational and maintenance phase are discussed in detail in the tables given below. All possible environmental aspects for the proposed project activity have been identified and discussed for their impacts on the baseline environment before the proposed project activity implementation. The following table summarizes the environmental scenario in the baseline and project, project's possible local and environmental, social and other impacts, benefits and the mitigation measures.

MIL has adopted to reduce/minimize negative impacts if any and enhance the positive impacts.

A detailed analysis is done below:

Construction Phase		
Activity: This primarily includes construction of the power plant, erection of the WHRBs, the steam-turbo generator sets and other power plant equipment, installation of the ducting system for transportation of the DRI kiln gas and installation of power evacuation system. All these activities will have minor impacts on the following baseline parameters as discussed below:		
Environmental /Social Parameters	**Impacts / Activities**	**Recommendations/ Implementation / Remarks**
Air	During the construction phase of the proposed 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	Maheshwary Ispat Limited 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 proposed 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 proposed project activity will change the noise generation level within the plant premise to certain extent. However the	MIL 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.

<table>
<tr><td></td><td>impact will be primarily confined within the plant premise.</td><td></td></tr>
<tr><td>Social and Economic</td><td>No dislocation of population will be required to facilitate the construction activities. Further the construction of the power plant will generate employment opportunities for the local people on a temporary basis which will help them improvising their quality of life.</td><td>No rehabilitation of population will therefore be required. However MIL has decided to set up new schools in the area, construct roads, sewerage facilities and other infrastructural facilities for the project personnel and their families.</td></tr>
<tr><td colspan="3"><u>Operational Phase</u></td></tr>
<tr><td colspan="3"><u>Activity</u>: During operational phase, the proposed project activity will utilise the heat content of the DRI kiln gas to generate power. The following impacts are envisaged during the operational phase of the proposed project activity:</td></tr>
<tr><td><u>Environmental / Social Parameters</u></td><td><u>Impacts / Activities</u></td><td><u>Recommendations/ Implementation / Remarks</u></td></tr>
<tr><td>Ambient Air Quality</td><td>The proposed project activity for generation of power through utilisation of the heat content of the DRI kiln gas is a cleaner means of power generation. This will replace fossil fuel based power generation at the grid connected power plants and hence the emissions from the same. Moreover the proposed project activity will reduce the temperature of the DRI kiln gas in the</td><td>This is a positive step towards air quality improvement. MIL 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.</td></tr>
</table>

	WHRBs which will directly improve the operational efficiency of the ESP and hence reduce the dust emission level. Furthermore the proposed project activity, by preventing the loss of useful heat energy of the DRI kiln gas to the atmosphere, will reduce the thermal pollution of the local environment.	
Ground Water	The ground water will not be directly used in the proposed project activity. However there may be some use of ground water by people involved in secondary development of the area.	MIL will ensure recharge of ground water through various impoundments.
	The steel complex is designed to operate on a zero discharge concept. The entire plant built up area will be concreted. Reused and excess water will be collected through catch basins to internal drains.	MIL, as a regulatory requirement, will monitor the plant discharge. Adequate measures will be undertaken in case any non-conformity is identified.
Noise Generation	An increase in noise level is anticipated with the implementation of the proposed project activity which includes operation of vibrating equipment like steam turbo-generators. However the same is expected to be confined within MIL Works boundary thereby minimising the impacts on the local habitats.	MIL will ensure that the noise level in the operating area shall not exceed the prescribed limits. 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.
Land Environment	All solid wastes will be dumped in a systematic manner and land will not be	Systematic dumping will have minimum or no impact on the

	polluted due to the proposed project activity	surrounding land environment. Further to minimise this minimal impact, MIL will utilise the solid waste for road making *etc*.
Solid Waste Management	The proposed project activity will not lead to any additional solid waste generation since only the heat content of the DRI kiln gas will be utilised for generation of steam and subsequently power.	No solid waste management plan is therefore required.
Natural Resource Conservation	The proposed project activity will replace fossil fuel (primarily coal) based power generation at the grid connected power plants 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 proposed project activity, although limited to the extent possible, may cause loss of habitats for fauna. Furthermore the noise generated from the proposed 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 proposed project activity implementation. Soil binding plants (*e.g.* grass) will be planted wherever feasible. Care shall be taken not 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 proposed project activity will generate employment opportunities for the local people for successful operation of the power plant. This will help them to develop professional skills in the field of power plant operation. Furthermore this will improve the quality of life of the local people. Moreover a pollution free work area will ensure safety and health of the employees at the workplace.	MIL is always committed to provide better work area environment at shop floors. Upkeep of the workplace, proactive maintenance and effective running of the pollution control devices will substantially contribute in maintaining a clean and healthy work environment.
Maintenance Phase		
Activity: An annual shut down for 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.	MIL 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:

As explained above, the proposed project activity will be implemented as a part of the Greenfield integrated steel plant of Maheshwary Ispat Limited. The 'Environmental Impact Assessment (EIA)' study conducted for the steel plant includes all the aspects of the proposed project activity implementation which has been elaborated above. The proposed project activity is a cleaner mean of power generation which will reduce the dependency of MIL on the eastern regional grid. Furthermore, by utilising the heat content of DRI kiln gas, which otherwise would have been wasted, the proposed project activity will reduce thermal pollution of the local environment. Therefore the proposed project activity primarily has only positive environmental impacts. However the project performance will be monitored as a part of the regular Environmental Monitoring Plan of MIL 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 proposed project activity involves usage of waste gas from the sponge iron plant for generation of electricity. The proposed project activity is an attempt by MIL to reduce GHG emissions in the area by utilising the waste gas which otherwise would have been vented to the atmosphere. Some of the key stakeholders identified are:

- Local governing body (Village Panchayat)
- Employees of MIL
- Consultants
- Equipment Suppliers
- Non Governmental Organisations (NGO)
- Orissa Electrcity Regulatory Commission (OERC)
- Orissa Pollution Control Board (OPCB
- Environment Department, Government of Orissa

E.2. Summary of the comments received:

Table E-1: Summary of Stakeholder Consultation

Sl No.	Name of Stakeholders	Mode of Communication	Feedback	Status
Comments received from Non-Governmental Parties				
1.	Village Panchayats	Representatives of Maheshwary Ispat Limited has reached out to the Gram Panchayat Pradhans who represent the local people and explained to them the salient features of the project activity. They are requested to provide their feedbacks on the same.	The Gram Panchayat Pradhans have acknowledged the positive socio-economic and environmental impacts of the project activity. They commended Maheshwary Ispat Limited'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 Maheshwary Ispat Limited.	Maheshwary Ispat Limited has received a written consent from the Village Panchayat for the project activity.
2.	Employees of Maheshwary Ispat Limited	The employees of Maheshwary Ispat Limited have been communicated about the project activity implementation.	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 Management of Maheshwary Ispat Limited has received a written consent from the employees for the project activity.
3.	Consultants	Brief details on the project activity implementation and its associated impacts are verbally explained to the consultants and the equipment suppliers of the project activity.	The consultants and the equipment suppliers are involved with the project activity at every stage of its implementation. The project activity has generated a lot of business opportunities for them. They have appreciated the initiative of Maheshwary Ispat Limited and	Maheshwary Ispat Limited has received a positive feedback from their consultant and equipment suppliers.
4.	Equipment Suppliers			

Table E-1: Summary of Stakeholder Consultation				
Sl No.	Name of Stakeholders	Mode of Communication	Feedback	Status
			provided their support throughout to make it successful.	
5.	Non-Governmental Organizations (NGOs)	The project activity details, its associated environmental impacts and its contribution towards the up-liftment of the social and economic structure of the locality have been briefed to the NGO through a letter and their opinion on the same is requested for.	The NGO has appreciated the initiative of Maheshwary Ispat Limited towards socio-economic development of the locality and their commitment towards developing an environment friendly manufacturing process.	Maheshwary Ispat Limited has received a written consent from the NGO for the project activity.
Comments received from Government Parties				
6.	Orissa Electricity Regulatory Commission (OERC)	Orissa Electricity Regulatory Commission (OERC) is the state's apex body of power. The project activity details have been forwarded to OERC for their approval.	OERC has appraised the project activity and issued consent for the installation of power plant in the factory premise of Maheshwary Ispat Limited under Section 44 of the Electricity (Supply) Act, 1948 read with Sub-section 3 of Section 21 of the OER Act, 1995.	Maheshwary Ispat Limited has received the approval from OERC for installation of the power plant based on the heat content of the waste gas.
7.	Orissa Pollution Control Board (OPCB)	Orissa Pollution Control Board (OPCB) and Environment Department of Government of Orissa have prescribed standards of environmental compliance and monitor	The project activity has been appraised by OPCB and the Environment Department. 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

Table E-1: Summary of Stakeholder Consultation				
Sl No.	Name of Stakeholders	Mode of Communication	Feedback	Status
8.	Environment Department, Government of Orissa	the adherence to the standards. The relevant information of the project activity was presented in the Public Hearing conducted on 13.09.2006.		of Pollution) Act, 1974 & Section 21 of Air (Prevention & Control of Pollution) Act, 1981 before the commissioning of the plant.

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

MIL has received only positive feedback on the proposed project activity from the relevant stakeholders. However the reception of inputs from the stakeholders is a continuous process and the project proponents will thus invite regular feedbacks. All the comments from the stakeholders so far have been considered and have been considered while writing the CDM PDD.

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:	Maheshwary Ispat Limited
Street/P.O.Box:	Salt Lake City
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City:	Kolkata
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E-Mail:	mssc@vsnl.net
URL:	
Represented by:	
Title:	Director
Salutation:	Mr.
Last name:	Mundra
Middle name:	
First name:	A.K
Department:	
Mobile:	
Direct FAX:	
Direct tel:	
Personal e-mail:	

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding is available from the Annex 1 countries for the proposed project

Annex 3

BASELINE INFORMATION

The proposed project activity is the utilisation if the waste gas from the DRI kiln for the generation of electricity. The proposed project activity involves two WHRBs and one AFBC which generate steam which is subsequently used for generation of electricity. The baseline for this proposed project activity is the installation of a coal based captive power plant for generation of an equivalent (as generated in the proposed project activity) amount of electrical energy. The emission factor for a coal based captive power plant is taken from IPCC 2006 guidelines. The calculations carried out and data involved are shown in a tabular format below.

S No.	Parameter Description	Parameter	Unit	Value	Source of data
Parameters related to f_{cap}					
1.	Quantity of waste gas generated prior to the start of the proposed project activity	$Q_{WG,BL}$	Nm^3	760320000 (24000Nm_3/hr from each DRI kiln)	Manufacturer's Data
2.	Quantity of waste gas used for energy generation per hour h	$Q_{WG,y}$	Nm^3/h	96000Nm^3/hr (to the four WHRBs from the DRI kiln)	Plant Records
Parameters related to f_{WG}					
Parameters related to $ST_{WHR,y}$					
1.	Temperature of steam from WHRB		^0C	485	Plant Records
2.	Pressure of steam from WHRB		kg/cm2(abs)	66	Plant Records
3.	Feed Water Temperature		^0C	126	Plant Records
4.	Enthalpy of steam		KJ/kg	2847.15	Calculated
5.	Amount of steam sent		Kg/hr	40000	Calculated
6.	Energy content of the steam sent from the WHRB to the turbine via the common steam header		KJ	9.0198E+11	Calculated
Parameters related to $ST_{Other,y}$					
1.	Temperature of steam from AFBC		^0C	485	Plant Records
2.	Pressure of steam from AFBC		kg/cm2(abs)	66	Plant Records
3.	Feed Water Temperature		^0C	126	Plant Records

S No.	Parameter Description	Parameter	Unit	Value	Source of data
4.	Enthalpy of steam		KJ/kg	2847.15	Calculated
5.	Amount of steam sent		Kg/hr	40000	Calculated
6.	Energy content of the steam sent from the AFBC to the turbine via the common steam header		KJ	1.35297E+12	Calculated
Parameters related to EGi,j,y					
1.	Quantity of electricity supplied to the recipient *j* by generator, which in absence of the proposed project activity would have been sourced from i^{th} source(i=grid) during the year y in MWh	EGi,j,y	MWh	161568	Plant Records. The value is taken from energy meters which are calibrated regularly
Parameters related to $EF_{elec,i,j,,y}$					
1.	Build margin emission factor	$EF_{BM,y}$	tCO_2/MWh	0.93	From CEA Database Version 3 calculated based on ACM0002/Version 7
2.	Operating margin emission factor	$EF_{OM,y}$	tCO_2/MWh	1.09	From CEA Database Version 3 calculated based on ACM0002/Version 7
3.	Emission Factor	EFelec,i,j,y	tCO_2/MWh	1.01	From CEA Database Version 3 calculated based on ACM0002/Version 7

Annex 4

MONITORING INFORMATION

The CDM mechanism stands on the quantification of emission reductions and keeping the track of the emissions reduced. The proposed project activity reduces the carbon dioxide whereas an appropriate monitoring system ensures this reduction is quantified and helps maintaining the required level. The monitoring system for the GHG abatement proposed project activity is described below:

Monitoring system:

The monitoring system has been developed to determine the baseline emissions and project emissions (if any) over the entire crediting period. The total power generated needs to be monitored constantly by power meters at the plant. The actual reductions depend on the generation mix and production scenario at the grid which is accounted for in the grid emission factor.

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