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

CONTENTS

SECTION A. General description of project activity

A.1. Title of the project activity:

Installation of Top-Pressure Recovery Turbine at Blast Furnace -4
Version: 06

Date: 12/07/2013

A.2. Description of the project activity:

The project activity will utilize the pressure of the gas released from Blast Furnace-4 (hereafter referred as BF 4) to generate 12.4MW of electricity through operation of Top-Pressure Recovery Turbine (hereafter referred as TRT). The project activity has been undertaken by JSW Steel Limited (hereafter referred as JSWSL) at their steel plant located at Toranagallu. JSWSL[1] is one among the largest integrated private steel manufacturer in India having units across Karnataka, Maharashtra and producing a wide range of products from pellets to colour-coated steel.

The JSW Steel Limited is a largest private sector integrated iron & steel production facility located in the Bellary district of India with the steel production amounted to approximately ~ 10 Million Tons per Annum (hereafter referred as MTPA). In the year 1999 & 2001, 2 units of Corex (0.8MTPA) each has been commissioned. Only available power source was JSW Energy Ltd (hereafter referred as JSWEL) SBU-1 (2X130MW) for 0.8 MTPA.

Later on company has commissioned Blast Furnace – 1 (hereafter referred as BF-1) & Blast Furnace -2 (hereafter referred as BF-2) in year 2004 and 2006 respectively. With a view to reduce power dependency on SBU-1, with BF-1, BF-2 gas availability CPP-1[2] (100MW) & CPP-2[3] (130MW) has been developed to meet the power demand. Therefore JSWSL has disinvested share from JSWEL & subsequently SBU I PPA has been closed. JSWSL now also has SBU II (2 X 300MW) coal based power plant located at Vijaynagar facility. SBU II did exist at the time TRT IV investment decision. SBU II has got commissioned in 2009. After CPP4 commissioning JSWSL has become power independent & thus power from JSWEL is no more required.

History of JSWSL Steel Plant EXPANSION:

- 1999- Corex 01st unit- 0.8MTPA
- 2001- Corex 02nd unit - 0.8MTPA (total capacity is 1.6MTPA)
- 2004- BF-1 - 0.9MTPA (total capacity is 2.5MTPA)
- 2006- BF-2 - 1.3MTPA (total capacity is 3.8 MTPA)
- 2009- BF-3 - 3MTPA (total capacity is ~7MTPA)
- 2011- BF-4 - 3MTPA (total capacity is 10MTPA)

History of JSWSL power plant expansion:

- CPP-1 (100MW) 2005 commissioned

[1] http://www.jsw.in/companies/company_JSWSteel.shtml

[2] Captive Power Plant-1

[3] Captive Power Plant-2

- CPP-2 (130MW) 2006 commissioned
- CPP-3 (300MW) 2010 commissioned
- CPP-4 (300MW) 2012 commissioned

Details of other plants located at Vijaynagar (owned by JSWEL)

- SBU-1 (2X130MW) 2001 commissioned (owned by JSWEL)
- SBU –II (2X300MW) 2009 commissioned

With a view to cater the growing demand of steel in domestic & international market, JSWSL has expanded its capacity from 4MTPA to 7 MTPA in year 2006 (board approval) & subsequently 7MTPA to 10 MTPA in year 2007. At 4 MTPA to 7 MTPA expansions, a 300 MW coal based CPP-3 was considered to meet the expansion energy requirement. CDM project activity TRT IV is a part of 7 to 10MTPA expansion project. Since the project was expansion, a 300MW coal based CPP was also considered during 10MTPA conceptualization to meet the expansion demand. In absence of TRT IV CDM project, equivalent power otherwise would have been sourced from 300MW coal based CPP (i.e. CPP-4).

Pre-project Scenario:
Since the project activity is implemented at a new facility[4], there was no waste pressure based power generation system that existed in the pre-project scenario.

Purpose of the project activity:
The present capacity of the steel plant located at Toranagallu is 10 Million Tonnes Per Annum (hereafter referred as MTPA). The plant operates on COREX and BF-BOF-CC-HSM process route.

The project activity will be implemented as a part of this capacity expansion project. The purpose of the project activity is to recover the pressure of the Blast Furnace – 4 (hereafter referred as BF-4) gas and to generate 12.4 MW of electricity through operation of TRT.

The top gas generated from BF-4 will have pressure around 2.5 bar (g). From BF-4, the gas will be directed to dust separator and then to gas cleaning plant for the removal of particulates. From gas cleaning plant, the gas will be passed through TRT where the pressure of the gas will be utilized for electricity generation. The electricity generated will be used to meet the captive power requirements. The gas leaving TRT will be fed to the gas distribution network from where it will be sent to various processes for further use. The project activity is expected to get commissioned in August 2011.

Baseline scenario:
In the absence of the project activity, the pressure of the BF-4 gas would have been lost through septum valve and thus would have remained unutilized. The equivalent amount of electricity would have been generated in JSWSL's new 300 MW coal based captive power plant. This plant was commissioned along with the BF-4 expansion dedicated for this capacity and hence a realistic baseline. Thus, the project activity contributes to Green House Gas (GHG) emission reductions by displacing power generation from combustion of GHG intensive fossil fuel (i.e. coal) with that of zero-GHG emitting fuel (i.e. pressure of gas). The selection of baseline scenario is discussed in detail in section B.4.

Contribution of the project activity to sustainable development
The National CDM Authority, Ministry of Environment and Forests, Govt. of India has stipulated the social well being, economic well being, environmental well being and technological well being as the four

[4] As a part of capacity expansion scheme from 7 MTPA to 10MTPA. As per the baseline methodology ACM 0012, capacity expansion is treated as a new facility.

indicators for sustainable development in the interim approval guidelines host country approval eligibility criteria for Clean Development Mechanism (CDM) projects[5].

Social well being:

***NCDMA requirement**: The CDM project activity should lead to alleviation of poverty by generating additional employment, removal of social disparities and contribution to provision of basic amenities to people leading to improvement in quality of life of people.*

Status of project activity:

- The project activity will result in a positive social return (e.g. Employment growth, improved knowledge base of employees)
- The facilitation of the project activity will generate skilled and unskilled employment opportunities for people during both the construction and operation phases of the project which will have a direct bearing on improving their professional skills as well as the quality of their lives.

Environmental well being:

***NCDMA requirement**: This should include a discussion of impact of the project activity on resource sustainability and resource degradation, if any, due to proposed activity; bio-diversity friendliness; impact on human health; reduction of levels of pollution in general.*

Status of project activity:

- The project activity will eliminate the emissions of SO_x, NO_x and Suspended Particulate Matter (SPM) resulting from the combustion of coal in the captive power plant of JSWSL.
- The project activity will improve the local air quality, by eliminating the environmental hazards associated with disposal of fly ash generated during coal combustion.
- By opting for a cleaner technology, there will be a corresponding reduction in emissions of Greenhouse Gases (like CO_2) which would have happened otherwise due to combustion of coal for power generation.
- The project activity does not use any natural resource and does not have negative impacts either on human health or biodiversity.

Economic well being:

***NCDMA requirement**: The CDM project activity should bring in additional investment consistent with the needs of the people.*

Status of project activity:

- The economic well being of the local people will be improved by the direct and indirect employment opportunities created by the project activity. Further, the project activity encourages investment for environment friendly technologies in the nearby locality.

Technological well being:

***NCDMA requirement**: The CDM project activity should lead to transfer of environmentally safe and sound technologies that are comparable to best practices in order to assist in upgradation of the*

[5] http://www.cdmindia.in/approval_process.php

technological base. The transfer of technology can be within the country as well from other developing countries also.

Status of project activity:

- The project activity will involve use of an environmentally safe and sound technology.
- The project activity will encourage the replication of the technology and thus will transfer of the technology within the host country.

The project proponent ensures to commit two percent (2%) of the CERs revenue every year for socio-economic development including society/community development credible monitorable action plan for the same is included in the Annex 5.

Thus, the project activity meets the national sustainable development criteria.

A.3. Project participants:

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Name of Party involved (*) (host) indicates a host Party	Private and/or public entity(ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
Government of India (Host Country)	JSW Steel Limited -Private entity	No

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

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A.4.1.1. Host Party(ies):

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India

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

>> State – Karnataka

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

>>

Village: Toranagallu
Taluka: Sandur
District-Bellary

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

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JSWSL is located at Toranagallu in the district of Bellary in the state of Karnataka. The place is well connected from Bangalore by Air, road and Rail. The site is located 29 km away from Bellary town and it is well connected by road SH-40 and NH-63. The co-ordinates of Toranagallu are 15˚11'6" N and 76˚39'5" E. JSWSL is situated almost in the middle point between the two famous towns Bellary and Hospet, which are 60 km apart. Bangalore the nearest city is about 340 km from Toranagallu. The nearest railway station is Toranagallu Railway Station, which is located about 2 km from the steel plant. Also, Toranagallu is linked by broad-gauge rails to port cities like Goa, Mangalore and Chennai. The location map of JSW is presented in the Figure below. The proposed project will be located inside the JSWSL premises.

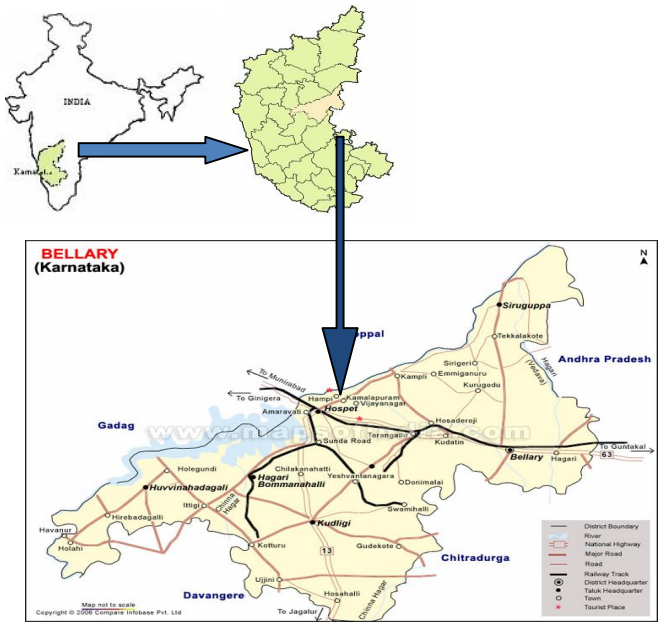

Figure 1: Map showing the location of the project activity

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

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The project activity is electricity generation by recovering waste pressure of the blast furnace gas. As per the latest list of categories of project activities, the project activity falls under:

Sectoral Scope: 01 Energy industries (renewable - /non-renewable sources) and
: 04 Manufacturing industries

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

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The blast furnaces in steel plant operate at a high top gas pressure. The gases coming out of the furnace are cleaned to remove dust and the clean gases are used in the steel plant for heating purposes at relatively low pressures. In the process, a large amount of pressure energy is wasted across the valve. Installation of TRT is a mechanism that involves recovery of gases from the top of a blast furnace so that the pressure energy of the gases is used to turn turbines to generate power. The purpose of the project activity is to install TRT in BF-4 for energy conservation and to reduce emission of green house gases. Although the pressure difference is low, the large gas volumes make the recovery feasible. The key technology of TRT is to secure stable and high-efficiency in operation of the expansion turbine in dusty blast gas conditions, without adversely affecting the BF operation. The introduction of such generation schemes is therefore, a positive step towards reducing the dependence on fossil fuels and fosters sustainable development. In addition the project activity will introduce a cleaner and energy efficient technology by enabling utilization of pressure energy in process waste gas steams.

Pre-Project Scenario:

Since the project activity is implemented at a new facility, there was no waste pressure based power generation system that existed in the pre-project scenario.

Project Scenario:
In case of the project activity the top-pressure recovery turbine plant is installed in the downstream of gas-cleaning equipment of blast furnace. The top gas from blast furnace, typically contains about 5 g/Nm^3 dust and will be available at a pressure of 2.5 kg/cm^2 (g). The top gas will then be passed through a Gas Cleaning Plant (GCP) to reduce the quantity of dust to below 5 mg/Nm^3 and will be available at a pressure of 2.2 kg/cm^2 (g). The gas is then fed to the turbine and drives it while expanding from 2.2 kg/cm^2 (g) to atmospheric pressure 0.125 kg/cm^2 (g). The power generated by the turbine is transferred to the generator and converted to electric power. The TRT will be a wet and multistage variable type expansion turbine with axial flow reaction design which will be provided with horizontal split casing and a governor speed of 3,000 rpm. The gas system generally would consist of a dust catcher, a 3 cone annular scrubber with internal mist separator, an external demister, furnace top pressure control equipment, gas mains and other auxiliary equipment to feed the TRT.

Enclosed type high pressure goggle valve, provided in the circuit, will ensure uninterrupted operation of the blast furnace under circumstances of complete isolation of the TRT (for *e.g.* during the maintenance phase). The project would adopt brushless excitation synchronous power generators. The electricity generated will be completely consumed by the iron making zone. The proposed TRT Generator will generate at 6.6 kV and then step up to 33 kV through 6.6/33 kV step up transformer. The power produced is proposed to be utilized for the BF-4 through its internal distribution systems and thus to replace power which would, otherwise, have to be generated by 300MW fossil fuel based captive power plant of JSWSL.

The schematic process flow diagram is as follows:

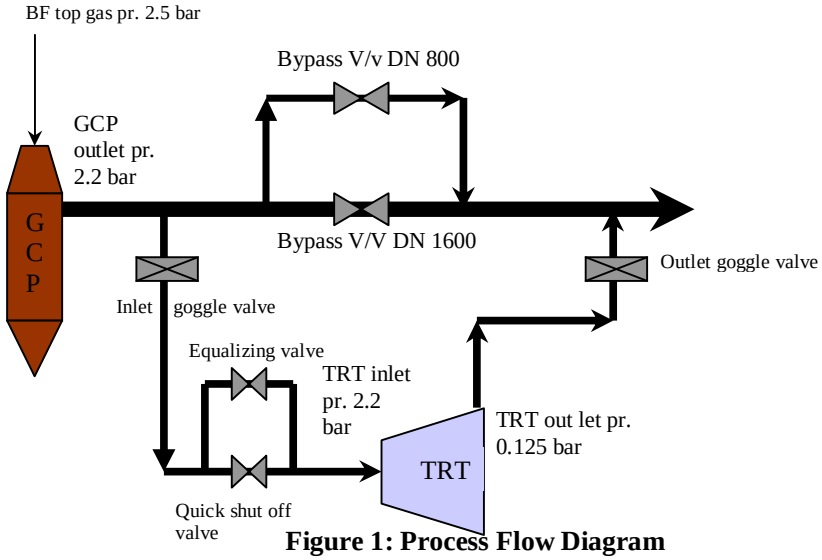

Figure 1: Process Flow Diagram

Single Line diagram showing the arrangements at Blast Furnace 4

Design parameters of the project plant:

Parameter	Unit	Value
Hot Metal Production	million ton/yr	3.2
Gas Flow Rate through Turbine	Nm^3/hr (Max.)	512,000
Power Generated	MW	12.4
Gas pressure at top of the BF unit	kg/cm^2 (g)	2.5
Gas pressure at TRT inlet	kg/cm^2 (g)	2.2
Gas pressure at TRT outlet	kg/cm^2 (g)	0.125
Mist content at turbine inlet (max.)	g/Nm^3(dry)	5
Relative Humidity at turbine inlet	% R.H	100
Dust Content in gas after GCP (at inlet of TRT)	mg/ Nm^3	5
Gas Temperature at TRT inlet	ºC (Normal)	50

Design Parameters of the TRT:

Turbine Type	Wet type axial flow reaction turbine with horizontal split casing.
Shaft speed	3000 rpm
Generator output power	12.4 MW
Stator Blade Mechanism	Adjustable construction and automatically positioned by hydraulic cylinder during operation
Shaft sealing	Labyrinth seal using N_2 as buffer

The following are the main parameters of the generator:

Parameter	Value
Rated Voltage	6.6 kV
Rated Power	15000kw
Power Factor	0.9
Rotation Speed	3000 rpm
Number of Phase	3-phase
Frequency	50 Hz
Connection	Y
Insulation Class	Class F (Class B as acceptance test)
Efficiency	97%

The main equipment (TRT) providers for the project activity are Shaanxi Blower Group (Co) Ltd.

Baseline Scenario:

In the absence of the project activity, the pressure of BF-4 gas would have been reduced through septum valve and the gas would have been for processes at relatively low pressure. Thus, by the adoption of this technology for electricity generation there will be reduction in GHG emissions which would have otherwise occurred due to the generation of equivalent power from new 300 MW coal based captive power plant at JSWSL. This captive power plant will be commissioned to cater dedicatedly for BF-4 and allied expansion project. Both these process plant and power plant were conceptualised together and will operate as per the same plan. Thus, this is not a theoretical baseline. Identification of baseline scenario as per ACM0012, Version 04.0.0 is discussed in detail in the section B.4 below.

Environmentally safe and sound technology:
The technology used in the project activity is environmentally safe. The usage of this technology for power generation has no negative impacts on the ecosystem as it leads to the reduction of the greenhouse gases which would have otherwise been emitted from the alternative use of fossil fuel. By the implementation of this technology the project proponent will introduce a cleaner and energy efficient technology for enabling utilization of pressure energy in process waste gas steams which otherwise would have been lost. Hence, the project activity will lead to the replication of this technology in similar industries thereby initiating a positive step towards utilization of waste pressure.

Sources of emissions and greenhouse gases:
As described in Section A.4.3 and B.3, the main emission source of GHG that the project activity primarily aims to reduce is CO_2 emissions from the 300 MW coal based captive power plant at JSWSL. The project emission from cleaning of gas has not been considered as it would have happened in the absence of the project activity as well. Hence this emission source has not been considered both in the baseline scenario as well as in the project activity.

There is no technology transfer under the project activity from Annex –I countries.

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

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The project activity will generate 503,800 tCO_2 over the crediting period of 10 years. The table below shows the year wise generation of emission reductions over the 10 years.

Years	Annual estimation of emission reductions in tonnes of CO_2
2013	50,380
2014	50,380
2015	50,380
2016	50,380
2017	50,380
2018	50,380
2019	50,380
2020	50,380
2021	50,380
2022	50,380
Total estimated reductions (tonnes of CO_2e)	503,800
Total number of crediting years	**10**
Annual average over the crediting period of estimated reductions (tonnes of CO_2e)	503,800

A.4.5. Public funding of the project activity:

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No public funding from parties included in Annex 1 or Overseas Development Assistance is used for the proposed project activity. The total project cost is met by the Project Participant (Here after referred as PP), in part by debt finance.

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:

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Baseline Methodology:
Title: "Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects"
Methodology: ACM0012
Version: 04.0.0
Sectoral Scope: 01 and 04
EB - 60

This methodology also refers to the latest approved versions of the following tools:

- "Tool to calculate the emission factor for an electricity system";
- "Tool for the demonstration and assessment of additionality";
- "Tool to determine the baseline efficiency of thermal or electric energy generation systems";
- "Tool to determine the remaining lifetime of equipment"; and
- "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion".

In line with the guidance provided in the chosen methodology, PP has applied the tool as mentioned below:

Title : **"Tool for the demonstration and assessment of additionality"**
Version : 06.1.0
EB : 69

Other than the above mentioned tool, PP has applied following guidelines:

1. Title : **"Guidelines on assessment of investment analysis"**
   Version : 05
   EB : 62

2. Title : **"Guidelines on the demonstration and assessment of prior consideration of the CDM"**
   Version : 04
   EB : 62

3. Title : **"Tool to calculate the emission factor for an electricity system"**

   Version : 02.2.1

4. Title : Guidelines on Common Practice

   Version : 02.0

PP has not used the other tools for the following reasons:

- "Tool to determine the baseline efficiency of thermal or electric energy generation systems": the efficiency of the baseline system is determined based on the default value as recommended by the methodology.
- "Tool to determine the remaining lifetime of equipment": the project is not replacing any existing system/equipment and hence this tool is not applied.
- "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion": PP has not taken into account project and leakage emissions for the reasons explained in B.6.1 and hence not applied.

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

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PP has applied ACM0012 Version 04.0.0 to the project activity. The choice of the methodology and its applicability to the project activity has been discussed in the table below.

Sr. no	Applicability Criteria	Status of the project activity	Remarks
1	The consolidated methodology is applicable to project activities implemented in an existing or Greenfield facility converting waste energy carried in identified WECM stream(s) into useful energy. The WECM stream may be an energy source for: 1. Generation of electricity; 2. Cogeneration; 3. Direct use as process heat source; 4. Generation of heat in element process; 5. Generation of mechanical energy; or 6. Supply of heat of reaction with or without process heating.	The project activity is implemented in Greenfield facility (expanded steel plant of 3. MTPA) converting the waste pressure (Waste energy) of BF-4 gas (WECM) into electricity. Thus, condition (1) Generation of electricity is fulfilled.	Since the project activity is Greenfield project activity converting waste pressure of BF-4 gas into electricity, this condition is met.
2	In the absence of the project activity, the WECM stream: (a) Would not be recovered and therefore would be flared, released to atmosphere, or remain unutilized in the absence of the project activity at the existing or Greenfield project facility; or (b) Would be partially recovered, and the unrecovered portion of WECM stream would be	In the absence of the project activity, pressure of BF 4 gas (WECM stream) would not be recovered and thus would have remained unutilized (Option a). In the plant design of this expansion facility, there was no other provision to use this waste pressure.	Since in the baseline scenario, the pressure of BF4 gas would have remained unutilized, this condition is met.

	flared, vented or remained unutilized at the existing or Greenfield project facility.		
3	Project activities improving the WECM recovery may (i) capture and utilise a larger quantity of WECM stream as compared to the historical situation in existing facility, or capture and utilise a larger quantity of WECM stream as compared to a "reference waste energy generating facility"; and/or (ii) apply more energy efficient equipment to replace/modify/expand waste energy recovery equipment, or implement a more energy efficient equipment than the "reference waste energy generating facility".	The project activity is implemented in Greenfield project facility and thus does not lead to improvement in the WECM recovery in an existing facility or modification/replacement of existing waste energy recovery equipment with more energy efficient recovery equipment.	Since the project activity is implemented in Greenfield facility, this condition does not apply.
4	The methodology is applicable under the following conditions: • For project activities which recover waste pressure, the methodology is applicable where waste pressure is used to generate electricity only and the electricity generated from waste pressure is measurable; • Regulations do not require the project facility to recover and/or utilize the waste energy prior to the implementation of the project activity; • The methodology is applicable to both Greenfield and existing waste energy generation facilities. If the production capacity of the project facility is expanded as a result of the project activity, the added production capacity must be treated as a Greenfield facility; • Waste energy that is released under abnormal operation (for example, emergencies, shut down) of the project facility shall not be included in the emission reduction calculations.	• The project activity involves electricity generation using waste pressure where electricity is a measurable parameter. • There is no regulation that mandates recovery of waste pressure prior to the implementation of the project activity. • JSWSL is undergoing production capacity expansion from 7 MTPA to 10 MTPA. The project activity is implemented in the added 3MTPA new production plant. Hence, the added production capacity is treated as Greenfield facility (that did not exist in pre-project scenario). • In case where waste pressure is released under abnormal operations like emergencies or shut downs, the emission reductions will not be claimed. Also it should be noted that the	The project activity meets all the applicability conditions.

		TRT has designed inlet pressure of 2.2 kg/cm^2. In cases, where the pressure of BF4 gas goes beyond the designed inlet pressure of TRT, the TRT will automatically shut down. Hence, there will not be power production during such period.	
5	If multiple waste gas streams are available in the project facility and can be used interchangeably for various applications as part of the energy sources in the facility, the recovery of any waste gas stream, which would be totally or partially recovered in the absence of the project activity, shall not be reduced due to the implementation of CDM project activity. For such situations, the guidance provided in Annex 3 shall be followed.	The project activity is only utilization the waste pressure of BF-4 gas. The volume of BF – 4 gas (which is utilized in various processes as energy source) will remain same in Pre and Post TRT-4 scenario. Also, this pressure cannot be used in any other facility. The implementation of project activity will not affect the application of BF-4 Gas as an energy source in the facility. Hence this will not have any impact on other waste energy streams.	Since the project activity does not involve recovery of waste gas/heat, this condition does not apply.
6	The methodology is **not** applicable to the cases where a WECM stream is partially recovered in the absence of the CDM project activity to supply the heat of reaction, and the recovery of this WECM stream is increased under the project activity to replace fossil fuels used for the purpose of supplying heat of reaction.	The project activity involves recovery of only waste pressure and does not entail recovery of waste gas/heat. The pressure recovered in the project activity would not have been recovered in the absence of CDM project activity.	Since the project activity does not involve recovery of waste gas/heat, this condition does not apply.
7	This methodology is also **not** applicable to project activities where the waste gas/heat recovery project is implemented in a single-cycle power plant (e.g. gas turbine or diesel generator) to generate power. However, the projects recovering waste energy from single cycle and/or combined cycle power plants for the purpose of generation of heat only can apply this methodology.	The project activity involves recovery of only waste pressure and does not entail recovery of waste gas/heat.	Since the project activity does not involve recovery of waste gas/heat, this condition does not apply.
8	The emission reduction credits can be claimed up to the end of the lifetime of the waste energy generation equipment. The remaining lifetime of	In the project activity, waste energy generating equipment is Blast Furnace 4 which is a new installation. The lifetime of BF4 is 20 years and 0 months. Therefore, PP has selected	Since PP is not claiming emission reductions beyond the technical lifetime of BF4,

	the equipment should be determined using the latest version of the "Tool to determine the remaining lifetime of equipment".	fixed crediting period of 10 years.	this condition is met.
9	The extent of use of waste energy from the waste energy generation facilities in the absence of the CDM project activity will be determined in accordance with the procedures provided in Annex 1 (for Greenfield project facilities) and in Annex 2 (for existing project facilities) to this methodology.	PP has demonstrated the extent of use of waste pressure in the baseline scenario in line with Annex 1 of methodology. Please refer to Annex 3 of PDD for details.	Since PP has demonstrated the extent of use of waste pressure in accordance with Annex 1 of methodology, this condition is met.
10	In addition, the applicability conditions included in the tools referred to above apply.	PP has applied "Tool for the demonstration and assessment of additionality". The applicability conditions of this tool have been met as shown in the section B.5.	Since the project activity meets the applicability conditions of the applied tool, this condition is met.

Thus it is apparent from the above table, the project activity satisfies all the applicability conditions specified in ACM0012 (version 04.0.0). Hence, the choice of the methodology is justified and is applicable to the project activity.

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

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As per ACM0012/ Version 04.0.0, *"The geographical extent of the project boundary comprises*

The relevant WECM stream(s), equipment and energy distribution system in the following facilities:

(1) The "project facility";

(2) The "recipient facility (ies)", which may be the same as the "project facility".

The spatial extent of the grid is as defined in the "Tool to calculate the emission factor for an electricity system".

The relevant equipment and energy distribution system cover:

- *In a project facility, the WECM stream(s), waste energy recovery and useful energy generation equipment, and distribution system(s) for useful project energy;*
- *In a recipient facility, the equipment which receives useful energy supplied by the project, and distribution system(s) for useful project energy."*

Thus as per the above definition, the project boundary includes:

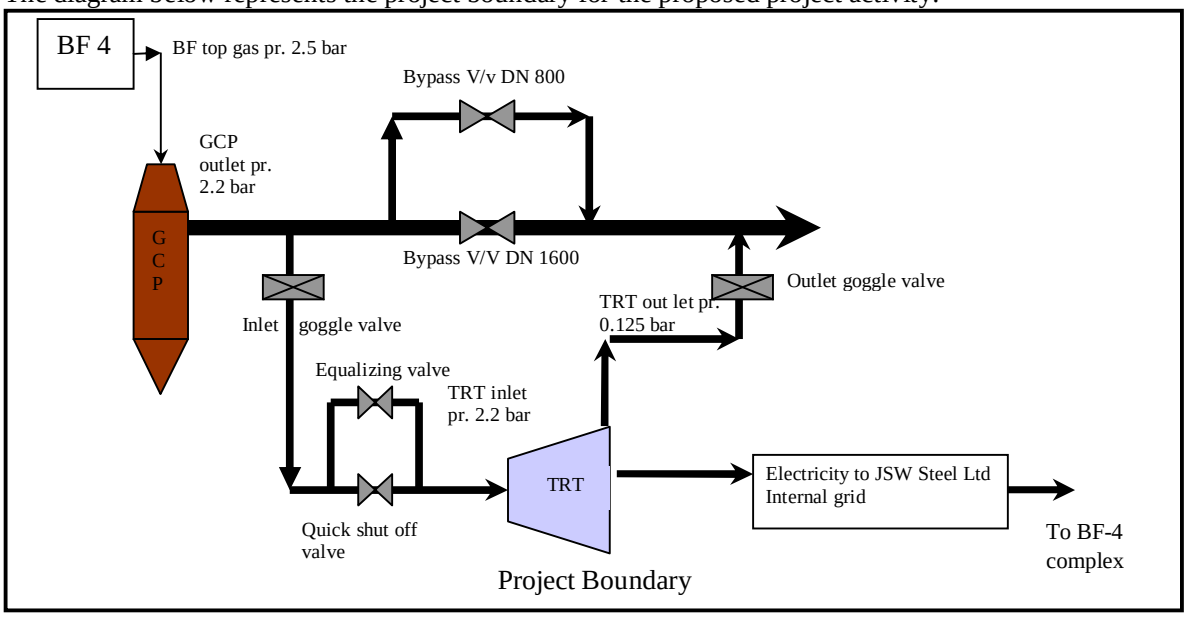
1. Project facility which comprises of off gas from BF4 (WECM stream), TRT (waste energy recovery equipment)
2. Recipient facility which comprises of BF4 (Equipment receiving useful energy)

As per the guidelines in the methodology, the emissions of the following greenhouse gases and their sources will be considered within the project boundary of the proposed project activity:

	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 element process for thermal energy	CO_2	Excluded	Since the project activity does not include thermal energy generation, this source is not included in the project boundary.
		CH_4	Excluded	
		N_2O	Excluded	
	Fossil fuel consumption in cogeneration plant	CO_2	Excluded	Since the project activity does not include cogeneration, this source is not included in the project boundary.
		CH_4	Excluded	
		N_2O	Excluded	
	Generation of steam used in the flaring process, if any	CO_2	Excluded	Since the project activity does not include steam generation, this source is not included in the project boundary.
		CH_4	Excluded	
		N_2O	Excluded	
	Fossil fuel consumption for supply of process heat and/or reaction heat	CO_2	Excluded	Since the project activity does not include *supply of process heat and/or reaction heat*, this source is not included in the project boundary.
		CH_4	Excluded	
		N_2O	Excluded	

	Source	Gas	Included?	Justification/Explanation
Project Activity	Supplemental fossil fuel consumption at the project plant	CO_2	Excluded	Since the project activity does not use any supplemental fossil fuel consumption, this source is not included in the project boundary.
		CH_4	Excluded	
		N_2O	Excluded	
	Supplemental electricity consumption	CO_2	Included	The auxiliary electricity demand is met from the electricity generated using pressure of the gas. Hence, this emission source is not included in the project boundary.
		CH_4	Excluded	
		N_2O	Excluded	
	Electricity import to replace captive electricity, which was generated using waste energy in absence of project activity	CO_2	Included	There was no import of electricity generated from waste energy in the absence of project activity. Hence, this source is not included in the project boundary.
		CH_4	Excluded	
		N_2O	Excluded	
	Energy consumption for gas cleaning	CO_2	Included	The same emission source would have existed in the baseline scenario as gas had to be cleaned anyway. Hence, this emission source is neglected.
		CH_4	Excluded	
		N_2O	Excluded	

The diagram below represents the project boundary for the proposed project activity:



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

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According to the methodology ACM0012, Version 04.0.0, the baseline scenario is identified as the most plausible baseline scenario among all realistic and credible alternative(s).

Realistic and credible alternatives are determined for:

- Waste energy use in the absence of the project activity;
- Power generation in the absence of the project activity for each recipient facility if the project activity involves electricity generation for that recipient facility;

In accordance with the guidance of methodology, the project proponent excluded baseline option that:

- Do not comply with legal and regulatory requirements; or
- Involve fuels (used for the generation of heat, power or mechanical energy), that are not produced or imported in the host country.

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 the following facilities:

- For the waste energy generation facility(ies) where the waste energy is generated; and
- For the recipient facility (ies) where the energy is consumed.

Thus, PP has identified the baseline scenarios

- For use of waste pressure in the waste energy generation facility and
- Source of power consumption in the recipient facility

The project activity is implemented in the expanded steel facility of 10MTPA. Therefore, as per the guidance provided in the methodology, the approach adopted for the selection of baseline scenario for added production capacity is same as that followed for the Greenfield project activity. The baseline scenarios are analysed considering the guidance provided in the Annex 1 of the methodology as discussed below.

Potential alternatives for the utilization of waste pressure:

Baseline scenario for the use of waste pressure	**Description**	**Justification for inclusion/exclusion of an alternative**	**Included/Excluded**
W1	WECM is directly vented to the atmosphere without incineration	Direct venting of the WECM to the atmosphere without incineration is not legally permitted. This BF gas would have been used in the absence of CDM project as well, however pressure would have been lost. Hence, not a credible alternative.	Excluded
W2	WECM is released to the atmosphere (for example after incineration) or waste heat is	This alternative is evaluated as per option 1 of Annex 1 of ACM0012. The detailed assessment of extent of use of pressure of blast furnace gas in the steel sector is provided in the Annex 3 of the PDD.	Included

	released (or vented) to the atmosphere or waste pressure energy is not utilized	From the detailed assessment, it is clear that in the absence of the project activity, the waste gas pressure would have been lost through septum valve expansion giving kinetic energy to gas molecules. This alternative also complies with the relevant local regulations. Hence this is a realistic and credible alternative.	
W3	Waste energy is sold as an energy source	The transportation of the high pressure gas over a longer distance (i.e. outside the waste energy generating facility) may result in drop in the pressure and may lose its potential to generate electricity. Moreover, there are no other potential users of the waste pressure outside the industrial facility. Hence this is not a realistic and credible alternative.	Excluded
W4	Waste energy is used for meeting energy demand at the recipient facility(ies)	The waste pressure in the BF 4 gas is utilized by TRT-4 for electricity generation and the generated power is used to meet the power demand of JSWSL facilities i.e. BF-4 electricity demand .This scenario represents project activity without undertaken as CDM project activity. The alternative is in compliance with the environmental and legal regulations. This is a realistic and credible alternative. Therefore, this scenario is a plausible baseline alternative and it will be further discussed in Step 3 and Sec B.5.	Included
W5	A portion of the quantity or energy of WECM is recovered for generation of heat and/or electricity and/or mechanical energy, while the rest of the waste energy produced at the project facility is flared/released to atmosphere/ unutilised	Project activity is the complete utilization of waste pressure of BF-4 gas in TRT-4 for power generation. Hence there is no partial recovery of energy and flaring/release of rest of energy in to atmosphere. Thus, this is not a credible alternative.	Excluded
W6	All the waste	From the assessment of common practice	Excluded

	energy produced at the facility is captured and used for export electricity generation or steam	for use of pressure of blast furnace gas in the steel sector, it becomes clear that more than 50% of the steel industries are not utilizing the pressure of the gas. Hence, this is not a credible alternative.	

Potential Alternative for power generation

Baseline scenario for power generation	Description	Justification for inclusion/exclusion of an alternative	Included/excluded
P1	Proposed project activity not undertaken as a CDM project activity	The proposed project activity is utilisation of pressure energy for power generation. & it is in compliance with the laws and regulations of the host country. Hence it's a realistic and credible alternative.	Included
P2	On-site or off-site existing fossil fuel fired cogeneration plant	The objective of project activity is generation of power by utilization of waste pressure. There is no specific requirement of steam exclusively due to project activity. Therefore co-generation is not a requirement. Hence it is not a credible & realistic alternative..	Excluded
P3	On-site or off-site Greenfield fossil fuel fired cogeneration plant	The objective of project activity is generation of power by utilization of waste pressure. There is no specific requirement of steam exclusively due to project activity. Therefore co-generation is not a requirement. Hence it is not a credible & realistic alternative.	Excluded
P4	On-site or off-site existing renewable energy based cogeneration plant	The objective of project activity is generation of power by utilization of waste pressure. There is no specific requirement of steam exclusively due to project activity. Therefore co-generation is not a requirement. Hence it is not a credible & realistic alternative.	Excluded
P5	On-site or off-site Greenfield renewable energy based cogeneration plant	The objective of project activity is generation of power by utilization of waste pressure. There is no specific requirement of steam exclusively due to project activity. Therefore co-generation is not a requirement. Hence it is not a credible & realistic alternative.	Excluded

P6	On-site or off-site existing fossil fuel based existing identified captive power plant	At the investment decision time of 7 to 10 MTPA expansion, JSWSL was not having any onsite fossil fuel based captive power plant. During 4 to 7 MTPA expansion, a 300 MW coal based CPP-3 was conceptualized to meet the expansion demand. At the investment decision time of 7 to 10 MTPA expansion, CPP-3 was only in board approval stage and not yet commissioned. Hence JSWSL was not having any onsite fossil fuel based captive power plant JSW Energy Ltd was having SBU I (2*130 MW) which is offsite of JSWSL , but its PPA was terminated by JSW Steel Ltd on 2006 which is before investment decision of project activity since the JSWSL is self sufficient with its CPP1 and CPP2 at 4 MTPA stage. So SBU-I is no more option to JSWSL. Hence SBU-I cannot be plausible alternative to project activity. At the same location JSWEL also having SBU II (2X300MW) coal based power plant, which has got commissioned in 2009. Since JSWEL is into business of power generation & trading, objective of SBU-II is to generate power & sale in the market. At the time of TRT IV investment there was no SBU II in to the scenario. Hence SBU –II cannot be a credible & realistic alternative. However in emission reduction sheet SBU1, SBU II, have been considered on conservative basis since both the units are connected to internal grid where JSWSL CPPs also connected. So JSWSL was not having any offsite fossil fuel based captive power plant. Hence at the time of 10MTPA investment decision, there was no off	Excluded

		site & on site existing fossil fuel based captive power plant available to cater the new power demand. The objective of JSWSL is to become self dependent in meeting power requirement of 10MTPA project. The power scenario at the time of investment decision is presented in Annex 6 Hence, this can not be a credible alternative.	
P7	On-site or off-site existing identified renewable energy or other waste energy based captive power plant	The project activity is the 12.4 MW power generations which is meeting the power demand of Blast Furnace IV otherwise same power would have been drawn from 300 MW coal based CPP (baseline CPP). Blast Furnace IV requires continuous and reliable power supply for consistent operation. Hence generation of continuous and reliable 12.4 MW power from renewable energy is not a credible option through dedicated on-site or off-site renewable energy (like solar, wind, hydro, biomass etc) source. More over there is no on-site or off-site existing renewable energy power plants with JSWSL. Also on whole the expansion project power requirement is approx 300MW, which is not possible to achieve through any of the renewable energy sources. Steel plant requires continuous & sustainable power from reliable sources. Renewable energy sources like wind, hydro, biomass, solar etc cannot meet the requirement.PLF of such RE plants are low, also seasonal parameters affects the reliable power. Again the availability of the renewable fuel is not dependable in that region where the plant is located. Its highly non credible option to meet the expansion power demand of 300 MW through dedicated wind farm in onsite or offsite due to availability and seasonal variation of wind resource. The same condition applies to solar as well	Excluded

		as hydro power generation. Power generation through solar is cost intensive and as well as PLF of solar power plants are less. Hydro power generation will not support the power requirement of expansion, as the availability of monsoon in India is hardly for few months. Hence it's impossible to cater the demand of facility throughout the year by Hydro power plants. At the same time JSWSL is not having any existing onsite or off site renewable energy source as discussed above. Therefore, it is not feasible for the project proponent to fulfill the power demand from any existing renewable energy source. JSWSL have no waste energy based captive plants. During 10 MTPA expansions, there is no waste energy available to JSWSL for captive power generation. Before 10 MTPA expansions, there was waste energy source (i.e. Coke oven gas) which is already utilized in CPP-2 whose power is used to meet the JSWSL load demand existing before the 10 MTPA expansions. Thus there is no possibility of getting power from CPP 2 to meet any of the 10 MTPA expansion demand. During expansion from 4 to 7 MTPA, JSWSL also has TRT-III which is waste energy (i.e. waste pressure) based power plant. But TRT -3 is the CDM project facing investment barrier[6] which cannot be plausible alternative for the project activity. Hence waste energy based on-site or off-site existing captive power plant cannot be a reliable option to project proponent.	

[6] http://cdm.unfccc.int/Projects/Validation/DB/UU4PSSWDP26L57L55ZN9PP8M3DY9WT/view.html

		Hence, this option is not a credible alternative.	
P8	On-site or off-site Greenfield fossil fuel based captive plant	Project DPR states the power requirement to be fulfilled by 300MW coal based captive power plant. Based on DPR recommendation & analysis, board approved 300MW coal based captive power plant along with 10MTPA project facility JSWSL decided to set up a Greenfield coal based power plant of 300MW. This is evident from the note of approval to the Board of Directors requesting to sanction the expansion project (including 300MW captive unit) Approximately BF unit power demand is ~ 40- 50 MW.After TRT IV, demand for BF-4 unit will be reduced by 12.4 MW from network. Thus replacing equivalent 12.4MW power in baseline 300MW coal based CPP. During the operation of TRT- IV, the 300 MW coal based CPP would be underutilized since 12.4 MW is generated from TRT-IV. In the absence of project activity, the 300 MW coal based CPP would be operated at higher utilization factor. The power balance of JSW Steel Limited is presented in Annex 7. Hence, can be a credible alternative.	Included
P9	On-site or off-site Greenfield renewable energy or other waste energy based captive plant	The expansion project requirement is approx 300MW, which is not possible to achieve through any of the renewable energy sources. Steel plant requires continuous & sustainable power from reliable sources. Renewable energy sources like wind, hydro, biomass, solar etc cannot meet the requirement.PLF of such RE plants are low, also seasonal parameters affected the reliable power supply. Again the availability of the renewable fuel is not dependable in that region where the plant is located. Therefore, it is not feasible for the project proponent to establish any other Greenfield renewable energy based captive plant.	Excluded

		Its highly non credible option to meet the expansion power demand of 300 MW through dedicated greenfield wind farm in onsite or offsite due to availability and seasonal variation of wind resource. The same condition applies to solar as well as hydro power generation. Power generation through solar is cost intensive and as well as PLF of solar power plants are less. Hydro power generation will not support the power requirement of expansion, as the availability of monsoon in India is hardly for few months. Hence it's impossible to cater the demand of facility throughout the year by Hydro power plants. During 10 MTPA expansions, there is no waste energy available to JSWSL to put Greenfield captive power generation power plant apart from TRT waste pressure based power plant. Before 10 MTPA expansions, there was waste energy source (i.e. Coke oven gas) which is already utilized in CPP-2 whose power is used to meet the JSWSL load demand existing before the 10 MTPA expansions. Since there is no waste energy available, establishing Greenfield waste energy based captive power plant as an alternative is not a possible option to project proponent. Hence waste energy based on-site or off-site existing captive power plant cannot be a reliable option to project proponent. In 10MTPA expansion project there is no other waste gas available. TRT IV is part of 10MTPA expansion project, which utilizes the pressure energy of gases (BF-4 Gas) keeping the volume same. Pre & post TRT IV implementation there is no change in calorific value & volume of BF-4 gases. The generated BF4 gas is used to cater the steel plant process requirement e.g. HSM, SMS other facilities. After	

		process requirement, there are not enough BF-4 gases available for power generation to meet the entire power demand of 10MTPA expansion project[7] Hence there is no possibility of green field waste energy power plant since because of non availability of sufficient waste energy. Hence, cannot be considered as credible alternative.	
P10	Sourced from grid-connected power plants	JSWSL is not connected to the Karnataka Power Transmission Corporation Limited (KPTCL) grid. Priority of JSWSL (JSW Steel Limited) is to source power from its own CPPs. Also it's not realistic for large integrated steel plant to operate plant on grid, as power requirement is continuous & reliable supply which cannot be ensured by grid. Hence, not a credible alternative	Excluded
P11	Existing captive electricity generation using waste energy (if the project activity is captive generation using waste energy, this scenario represents captive generation with lower efficiency or lower recovery than the project activity)	The project activity is the Greenfield captive electricity generation using waste energy. There is no existing captive electricity generation using waste energy with lower efficiency or lower recovery than project activity prior to project activity. Thus, it is not a plausible scenario.	Excluded
P12	Existing cogeneration using waste energy, but at a lower efficiency or lower recovery	The alternative is not an alternative for the project activity as cogeneration is not a requirement and no co-generation plant currently exist. The project activity is **only** waste pressure based electricity generation. Hence, the alternative under consideration does not provide same level of services and cannot be a credible alternative.	Excluded

As per ACM0012 Version 04.0.0,

For heat generation, realistic and credible alternative(s) may include, *inter alia*:

H1: The proposed project activity is not undertaken as a CDM project activity;

H2: On-site or off-site existing fossil fuel based cogeneration plant;

[7] Gas balance for 4, 7 and 10 MTPA stage.

H3: On-site or off-site Greenfield fossil fuel based cogeneration plant;

H4: On-site or off-site existing renewable energy based cogeneration plant;

H5: On-site or off-site Greenfield renewable energy based cogeneration plant;

H6: An existing fossil fuel based element process;

H7: A new fossil fuel based element process;

H8: An existing renewable energy or other waste energy based element process to supply heat;

H9: A new renewable energy or other waste energy based element process to supply heat;

H10: Any other source such as district heat;

H11: Other heat generation technologies (e.g. heat pumps or solar energy);

H12: Steam/process heat generation from waste energy, but with lower efficiency or lower recovery;

H13: Cogeneration with waste energy, but at a lower efficiency or lower recovery;

H14: On-site fossil fuel consumption to supply heat.

And

For mechanical energy, realistic and credible alternatives may include, *inter alia*:

M1: The proposed project activity is not undertaken as a CDM project activity;

M2: Steam produced by existing fossil fuel based boilers driving mechanical turbines;

M3: Steam produced by new fossil fuel based boilers driving mechanical turbines;

M4: Steam produced by existing renewable energy or other waste energy based boilers driving mechanical turbines;

M5: Steam produced by new renewable energy or other waste energy based boilers driving mechanical turbines;

M6: Waste gas pressure based mechanical energy generation;

M7: Existing electrical motors are used as motive power to generate mechanical energy.

M8: New electrical motors are used as motive power to generate mechanical energy.

Since the proposed project does not involve heat generation and/or mechanical energy generation from waste pressure, realistic and credible alternative for heat & mechanical energy generation are not taken into consideration for identification of baseline scenario.

The possible baseline options identified from the above step are:

For the use of waste pressure, the realistic and credible alternatives identified are

- W2: WECM is released to the atmosphere (for example after incineration) or waste heat is released (or vented) to the atmosphere or waste pressure energy is not utilized Waste pressure energy is not utilized
- W4: Waste pressure is used for meeting energy demands at recipient facilities which represents project activity without undertaken as CDM activity

For power generation, the realistic and credible alternatives identified are

- P1: Proposed project activity not undertaken as a CDM project activity
- P8: On-site or off-site Greenfield fossil fuel based captive plant

As per EB 69, Annex 20, the alternatives are analyzed as follows

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

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

The possible baseline options identified from the above step are:

For the use of waste pressure, the realistic and credible alternatives identified are

- W2: WECM is released to the atmosphere (for example after incineration) or waste heat is released (or vented) to the atmosphere or waste pressure energy is not utilized
- W4: Waste pressure is used for meeting energy demands at recipient facilities which represents project activity without undertaken as CDM activity

For power generation, the realistic and credible alternatives identified are

- P1: Proposed project activity not undertaken as a CDM project activity
- P8: On-site or off-site Greenfield fossil fuel based captive plant

Outcome of Step 1a:

Credible alternative W2,W4 and P1,P8 are identified as the baseline scenario for project activity

Sub-step 1b: Consistency with mandatory laws and regulations

The identified alternatives W2, W4 and P1, P8 are in compliance with all mandatory applicable legal and regulatory requirements.

There is no mandatory to implement top-pressure recovery based power generation plant using pressure energy potential of Blast Furnace Gases in India. Neither are there any planned regulations that will enforce them to implement the proposed project activity in India. JSW Steel Limited decision of implementing the proposed project activity is a voluntary endeavor which is over and above any legal or regulatory requirements. In the absence of the project activity the waste pressure would have been lost in the septum valve expansion giving kinetic energy to gas molecules. Hence there would not be scope to generate electricity out of waste pressure energy. Thus the captive power demands would have been met from the Greenfield 300MW coal based captive power plant of JSWSL (i.e. alternative P8)

Outcome of Step 1b:

Hence credible identified alternative scenario to the project activity is W2, W4 & P1, P8 which is in compliance with mandatory legislation and regulations.

Step 2: Step 2 and/or Step 3 of the latest approved version of the "Tool for the demonstration and assessment of additionality"

PP has chosen to apply Step 2 of ***"Tool for the demonstration and assessment of additionality"*** which is Investment Analysis.

STEP 2:As per ACM0012 (Version 04.0.0) methodology, the Step 2 and/or Step 3 of the ***"Tool for the demonstration and assessment of additionality"*** **(Version 06.1.0)** shall be used to identify the most plausible baseline scenario by eliminating non-feasible options.

Section B.5 will demonstrate that Scenario 2 (W4/P1) identified above is clearly not economically attractive to the PP without the CDM. Please refer to Section B.5 Step 2 and the summary of analysis is presented below

The levelised cost of electricity generation for the project activity and the identified baseline captive power plant has been calculated and the result of investment analysis is provided in the table below:

levelised cost of electricity generation for CPP-4	levelised cost of electricity generation for project activity (without CDM)	levelised cost of electricity generation for project activity (with CDM revenues)
1.74 ₹/kWh	2.02 ₹/kWh	1.44 ₹/kWh

The levelised cost of electricity generation for the project activity was found to be higher than that of CPP-4 (identified coal based captive baseline power plant). Hence, Scenario (W4/P1) is clearly not economically attractive.

Therefore Scenario 1 (W2/P8) is the only scenario that can be selected as the baseline scenario of the project.
As per the Investment Analysis step, the PP is required to use economic analysis for the identification of the baseline scenario. While doing so, PP has taken into consideration the guidance provided by ACM0012 which says:

Where the CDM waste energy recovery project is implemented in a Greenfield project facility. The investment analysis for the Greenfield projects includes the cost of the fuel that would have been used by the recipient facility (ies) in the absence of the CDM project. The fuels for such analysis should include all the fuels available in the host country, including those which can be imported in the host country.

The alternatives for the baseline scenario include project activity without CDM and 300 MW coal based Greenfield captive power plant of JSWSL. Due to the project activity, PP would be saving the cost of power generation in 300 MW coal fired JSWSL power plant equivalent to that of project activity.

As per the additionality tool, it is evident that the proposed project activity is not the most economically or financially attractive (See Section B.5). This analysis leads to the Baseline scenario 1 (combination of W2 and P8) as the most likely baseline option for the project promoter as per Table 2 of ACM0012.

Scenario	**Baseline Options**		**Description of Situation**
	Waste energy	**Power**	
1	W2	P8	The pressure of the gas would have remained unutilized and the electricity would have been obtained from a Greenfield captive power plant. (In the absence of the project activity the waste pressure would have been lost in the septum valve expansion giving kinetic energy to gas molecules and the captive power demands would have been met from the Greenfield 300MW coal based captive power plant of JSWSL.)

STEP 4: If more than one credible and plausible alternative scenario remain, the alternative with the lowest baseline emissions shall be considered as the most likely baseline scenario.
As only one credible and plausible alternative scenario has been identified, and it falls under the scenario listed in the approved methodology ACM0012, this alternative can be considered as the most likely baseline scenario.

Hence from the above details, the baseline scenario is Baseline Scenario 1 which is:

In the baseline scenario, the pressure energy would have remained unutilized and the electricity would have been obtained from JSWSL's 300 MW Greenfield coal based captive power plant.

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):

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Consideration of CDM

The starting date of the project activity is 20/11/2007 which is the date of the contract agreement between JSWSL and Shaanxi Blower (Group) Co. Ltd who is the supplier of TRT.

Thus, in line with Para 6 (a) of Annex 13 of EB 62, PP needs to demonstrate the awareness of the CDM prior to the project activity start date and that the benefits of the CDM were a decisive factor in the decision to proceed with the project activity.

Awareness of CDM prior to the project activity start date

JSW Steel Ltd. was aware of the CDM prior to the start of the project activity, as it had already registered the project below:
Generation of Electricity through combustion of waste gases from Blast furnace and Corex units at JSW Steel Limited (in CPP unit 1), at Torangallu in Karnataka, India[8]

The project mentioned above was registered on 12/01/2007 (which is before the investment decision of the present project activity) from which it is clear that the PP was aware of the CDM.

Serious consideration of CDM

PP approved the investment in the project activity in a meeting held on 03/04/2007. In this meeting, PP discussed the DPR prepared by third party consultant for the project activity. In the DPR, the financial feasibility of the project was evaluated and it was observed that IRR of the project activity yields lower returns rendering the project unviable. In the meeting, it was decided that the investment in the project activity is possible only if CDM benefits are considered and the decision to proceed with the project was taken. This is evident from the approval note dated 03/04/2007[9].

Real and Continuing Action

As per the Guidance of EB 62, Annex 13, clause No. 7 and 8,

[8] http://cdm.unfccc.int/Projects/DB/SGS-UKL1142515628.74/view

[9] The approval says "Approval granted for TRT as CDM project".

'7. Assessment of real and continuing actions shall be validated by the DOE and the validation should focus on real documented evidence as indicated in paragraph 6 (b), including an assessment by the DOE of the authenticity of the evidence.

8. In validating proposed CDM project activities where:

(a) there is less than 2 years of a gap between the documented evidence the DOE shall conclude that continuing and real actions were taken to secure CDM status for the project activity;'

Parallel actions were taken along with the project implementation to secure the CDM status for the project. The table below gives the chronology

of events that proves that continuous and real actions were taken to secure CDM status for the project activity:

No	Date	CDM Related Activity	Project Related Activity	Evidences	Applicable condition as per Para 8 (a),(b) and (c) of Annex 13 of EB 62
1	Jan 2007	-	Detailed Project Report for expansion of the steel facility to 10MTPA by MECON	Copy of DPR prepared by MECON dated 2007	-
2	Feb 2007	Detailed Project Report for installation of TRT at Blast Furnace 4 by DESCON	-	Copy of DPR prepared by DESCON dated Feb 2007	-
3	03/04/2007	Approval of the TRT 4 considering CDM revenue **(CDM consideration as per Para 6(a) of Annex 13 EB 62)**	-	Copy of the approval note dated 03/04/2007	-
4	30/04/2007	Board approval for expansion of steel facility to 10MTPA	-	Copy of extracts of Minutes of Meeting of Board of Directors held on 30/04/2007	-
5	26/05/2007	Local Stakeholder Consultation Meeting	-	-	Applicability condition 8 (a) (wrt board approval for expansion project dated 30/04/2007)

No	Date	CDM Related Activity	Project Related Activity	Evidences	Applicable condition as per Para 8 (a),(b) and (c) of Annex 13 of EB 62
6	20/11/2007	CDM start date	Contract with Shaanxi Blower Group (Co) Ltd.	Purchase contract with Shaanxi[10]	-
7	03/03/2008	Appointment of CDM consultant		Copy of contract[11].	-
8	21/07/2009	ERPA	-	Copy of ERPA	Applicability condition 8 (a) (time wrt appointment of CDM consultant dated 03/03/2008)
9	28/03/2011	Appointment of DOE	-	Contract with BVCI	Applicability condition 8 (a) (wrt ERPA dated 21/07/2009)
10	14/09/2011	-	Commission ing of the project activity	Commissioning certificate	-
11	15/11/2011	Meeting with NCDMA for Host Country Approval	-	Copy of email from NCDMA regarding invitation for meeting	Applicability condition 8 (a) (wrt appointment of DOE dated 28/03/2011)
12	14/03/2012	Host Country Approval		HCA letter	

As can be seen from the chronology above, the PP has met condition 8(a) of Annex 13 of EB 62. Hence, it can be concluded that continuing and real actions were taken to secure CDM status for the project activity. Thus, the project activity can be considered as additional.

Additionality

As per ACM00012, the additionality is assessed and demonstrated using "Tool for the demonstration and assessment of additionality" Version 06.1.0. The applicability conditions of the tool are discussed below:

Sr. no.	Applicability conditions as per the tool	Justification for the applicability of the project	Conclusion

[10] Copy of the purchase contract has been provided to the DOE

[11] Copy of the contract has been provided to the DOE

		activity	
1	This document provides for a step-wise approach to demonstrate and assess additionality. These Steps include: • Identification of alternatives to the project activity; • Investment analysis to determine that the proposed project activity is either: 1) not the most economically or financially attractive, or 2) not economically or financially feasible; • Barriers analysis; and • Common practice analysis. Based on the information about activities similar to the proposed project activity, the common practice analysis is to complement and reinforce the investment and/or barriers analysis. The Steps are summarized in the flow-chart on page 2 of this document.	PP has used the step-wise approach to demonstrate the additionality as suggested by the tool. The steps applied by PP are as follows: • Identification of alternatives to the project activity; • Investment analysis; and • Common practice analysis	The applicability condition is met.
2	The document provides a general framework for demonstrating and assessing additionality and is applicable to a wide range of project types. Some project types may require adjustments to this general framework.	The PP has used the framework provided by this tool to assess the additionality.	The applicability condition is met.
3	This tool does not replace the need for the baseline methodology to provide a step-wise approach to identify the baseline scenario. Project participants that propose new baseline methodologies shall ensure consistency between the determination of additionality of a project activity and the determination of a baseline scenario. Project participants can also use the "Tool for identification of baseline scenario and demonstration of additionality", which provides a procedure for baseline scenario identification as well as additionality demonstration.	PP has used the tool approach to identify the baseline.	This condition is met.

Step 1 has already been covered in section B.4. This section deals with Step 2 and 4 of the tool.

Step 2: Investment Analysis

As per the tool, PP has to identify whether the project activity is not:

- The most economically or financially attractive or
- Economically or financially feasible, without the revenue from the sale of certified emission reductions (CERs).

To conduct the investment analysis, PP has used the following Sub-steps:

Sub-step 2a: Determine appropriate analysis method

This step determines the whether to apply simple cost or investment comparison or benchmark analysis. Since the project activity results in saving of cost of power generation, simple cost analysis cannot be

applied. As per guidance 19 of Annex 5 of EB 62, Investment Comparison Analysis is applicable in the cases where PP has no other choice than to invest in the baseline scenario that provides same level of output. Since the baseline scenario selected is 300 MW power plant of JSWSL, comparing the investment in this plant against the project activity will not be appropriate as the magnitude of the baseline plant is not equivalent to that of the project activity. Therefore, this analysis is not done.. As per para 5 of EB 51 , Annex 59 *"The project activities to which this note applies are those which utilize the waste heat and/or waste gas of an industrial facility to produce electricity. These proposed CDM project activities applied investment analysis (benchmark approach) to demonstrate additionality. In accordance with the "Tool for the demonstration and assessment of additionality" the IRR of the project activities was assessed against a government approved benchmark. This benchmark was related to investments on the core business of the project developer; either iron/steel or cement production"* Therefore, PP has used Benchmark Analysis and IRR is chosen as a financial indicator.

Sub-step 2b: Option III. Apply benchmark analysis

In the context of the project activity, the most suitable financial indicator is Project IRR. As the IRR is a widely used indicator for capital budgeting to measure and compare the profitability of investments, the same indicator has been selected by PP.

The benchmark selected by PP is Weighted Average Capital Cost (WACC). The WACC is calculated using CAPM model using the following formula:

WACC= E/V * Re + D/V *Rd * (1-Tc)

Where:

Re = Cost of equity
Rd = Cost of Debt
E = Market value of firm's equity
D = Market value of the firm's debt
V = E+D
E/V = Percentage of financing that is equity
D/V = Percentage of financing that is debt
Tc = Corporate tax rate

CoE – Cost of Equity:

The Capital Asset Pricing Model (CAPM) approach is a generally accepted methodology for determining the Cost of Equity. CAPM is based on the portfolio theory of finance in which risks are classified into:

- Systematic risk - risk applicable to the market as a whole, such as inflation, tax rises, interest rates, etc.
- Specific risk - residual risk unique to an individual firm or a small group of companies that form a subset of the market.

The theory stipulates that specific risks can be eliminated through diversification and hence, only systematic risks determine the return expectation of investors. The basis of CAPM is the relationship between risk and return. Whilst there has been considerable debate on the strength of the risk/return relationship, evidence indicates that there is a strong linear and positive relationship over the long term, which can be expressed by the following formula[12]

$E(r_e) = r_f + Equity\ Beta\ (\beta) * [E(r_m) - r_f]$

[12] *Cost of Capital for Central Sector Utilities by CRISIL Advisory Services*

Where:
$E(r_e)$ - the expected rate of return on equity (cost of equity)

r_f - the risk-free rate of return (e.g. return on government bonds)

$E(r_m)$ - the expected rate of return on a market portfolio

Equity Beta (β) - coefficient reflecting the volatility (risk) of the stock relative to the market, which measures the systematic risk of the stock

The ***Risk free rate (r_f)*** has been taken from the long term government bond rates at the time of the investment decision of the project activity in 2007. The weighted average yield on Central Government date Securities i.e. bond rate during the financial year March 2007 is 8.08%[13].

The ***Market Risk Premium ($E(r_m) - r_f$)***, as measured and applied in practice, is the premium above the risk-free rate of return that investors expect to earn on a well-diversified portfolio of equities.

The ***expected rate of return on a market portfolio ($E(r_m)$)*** has been calculated as the compounded annual growth rate of the market portfolio. In calculating market risk premium, it is usual to use an established stock market index as a proxy for the market portfolio. In India, a choice of possible indices are available – BSE 30, BSE 100, BSE 500, S&P CNX 500, Nifty etc.

Choice of stock market index will also be considerably influenced by the availability of historical data. The base year of BSE 100 is taken as 1983-84 and thus it has the sufficient historical data available. The index comprises of 100 component stocks representing large, well established and financially sound companies across key sectors. Moreover, it is designed based on the "free-float market capitalization-weighted" methodology which is a widely followed index construction methodology on which the majority of the global equity indices are based. This can be confirmed from http://www.bseindia.com/about/abindices/bse100.asp . There are other indices like BSE 30, BSE 500 available in the market. BSE 30 and BSE 500 has inception year of 1979 and 1999 and consists of 30 and 500 stocks respectively. As long term return of the market is being measured, it is important to select a longer time period that covers all phases of economy and various types of investors, while also including a broad set of stocks so as to be representative of the economy. BSE 100 reflects longer available time period from the date of investment decision (23 years) and contains sufficient stocks (100) including power sector stocks (3 companies) and is therefore considered more appropriate than BSE 30 (Which offers longer vintage but less number of power companies (only 2) listed in power sector) or BSE 500 (which contains more number of power companies but sufficient vintage of 6 years).

Equity Beta is the measure of the expected volatility of a particular stock relative to a well-diversified market portfolio. It measures the systematic risk of a stock, i.e. the risk that cannot be eliminated in a well-balanced, diversified portfolio. The beta of equity is calculated as the covariance between its return and the return on a well-diversified market portfolio, divided by the variance of the return on a well-diversified market portfolio.

As the project activity is supplying power for the captive purpose, as per Annex 59 of EB51, the investment was considered to be in the steel sector and hence beta for listed steel sector companies has been taken into account.

[13] http://rbidocs.rbi.org.in/rdocs/Bulletin/PDFs/76735.pdf

The listed companies whose beta value available at the time of investment decision (year 2007) is given in the table below. Beta value for the period of three[14] years has been used for the computation of Expected Return on Equity.

Companies	Equity beta value	Period
TATA Steel	1.35	01/04/2004 to 01/04/2007
SAIL	1.04	
Mahindra Ugine Steel Co. Ltd.	1.51	
Kalyani Steel Ltd.	1.54	
JSW Steel and Power Ltd	1.01	
Average	1.29	

The equity beta of the each stock is then un-levered with the help of tax rate and D/E of each stock. The average of the un-levered beta is less than re-levered with the D/E and tax rate of the project activity. The re-levered beta value comes to 2.29. Therefore, on a conservative basis average of equity beta i.e. 1.29 is used. The calculations are given in the financial worksheet.

The ***Cost of Debt*** has been considered as *Prime Lending Rate (PLR)* available at the time of investment decision of the project activity. The PLR as published by Reserve Bank of India (RBI) is in the range of 11.50% to 12%[15]. The average of the PLR which is 11.75% is used for calculation.

The above approach is also in accordance with Para 9 of EB 51 , Annex 59 i.e. *"For projects in which the electricity was being produced for captive consumption the benchmark of the core business was considered to be appropriate, as the project was considered to be an investment in the operation of the core business "*

The ***Debt Equity ratio*** has been considered as 70:30.

Calculation of WACC:

WACC = E/V * Re + D/V * Rd * (1-Tc)
= 12.68%

Sub-step 2c: Calculation and comparison of financial indicators
The IRR of the proposed project activity was found to be less than the benchmark value of 11.66%. The additionality of the project is demonstrated based on the following assumptions:

Key Parameters	Units	Value	Source
Total Project Capacity	MW	12.4	Project Report dated Feb 2007
Operations			
Plant Load Factor		60%	Project Report dated Feb 2007, 08.4
Operation & Maintenance Cost	(INR Million)	48.9	Project Report dated Feb 2007, 08.4
Tariff			
Cost of power generation from 300MW coal fired	INR./kWh	1.53	Financial model for 10 MTPA expansion project appraised by SBI

[14] http://reuters-en.custhelp.com/app/answers/detail/a_id/1075/~/what-method-does-reuters-use-to-calculate-the-beta-displayed-on-your-website%3F

[15] http://www.rbi.org.in/scripts/BS_ViewBulletin_Test.aspx?Id=8261

power plant of JSWSL			Cap
Project Cost			
Total Project Cost	INR Million	583.2	Project Report dated Feb 2007, 08.2
Means of Finance			
Equity	%	30	Board approval dated 30/04/2007
Debt		70	
Equity	INR Million	175.0	Calculated
Debt		408.2	Calculated
Loan Repayment Schedule			
Interest Rate	%	11.50	http://www.rbi.org.in/scripts/BS_ViewBulletin_Test.aspx?Id=8261
Tenure	Years	8	Project Report dated Feb 2007
Moratorium		1	
No of Installments		14	
Book Depreciation Rate (Machinery)	%	5.28	http://asa-india.com/asa/Depreciation%20Rates%20Companies%20Act.pdf
Book Depreciation Rate (Buildings)		3.34	http://asa-india.com/asa/Depreciation%20Rates%20Companies%20Act.pdf
Depreciation under IT Act (Plant & Machinery)		15	http://www.caclubindia.com/forum/depreciation-rate-chart-52539.asp
Depreciation under IT Act (Buildings)		10	http://www.caclubindia.com/forum/depreciation-rate-chart-52539.asp
Corporate tax		30	http://indiabudget.nic.in/ub2005-06/bh/bh1.pdf
Surcharge		10%	http://indiabudget.nic.in/ub2006-07/bh/bh1.pdf
Cess		3%	http://indiabudget.nic.in/ub2007-08/bh/bh1.pdf
MAT		10%	http://indiabudget.nic.in/ub2006-07/bh/bh1.pdf
Corporate tax inclusive of surcharge and cess		33.99%	Calculated
MAT inclusive of surcharge and cess		11.33%	Calculated
Project Lifetime	Years	20	As per the technical specification of TRT-4

The IRR for the project activity has been calculated and the summary is provided in the table below:

Project IRR (Without CDM revenues)	Benchmark	Project IRR (With CDM revenues)
6.45%	12.68%	12.77%

The IRR for the project activity was found to be viable only with consideration of CDM revenues.

Sub-Step 2d: Sensitivity analysis

As per the guidance 17 of Annex 58 EB51, sensitivity analysis is carried out for the following parameters:

- PLF
- Project cost
- Tariff rate
- O&M

Parameter	10%	-10%
PLF	8.57	4.04
Tariff Rate	7.63	5.23
Project Cost	5.37	7.73
O&M	5.13	7.65

The sensitivity analysis confirms that IRR for the project activity remains below the benchmark considered for the project activity in circumstances subject to reasonable variations in the critical techno-economic parameters. Therefore, it may be concluded that the project activity is not economically viable in the business as usual scenario.

Likelihood of the occurrence of the scenarios in which the benchmark will be crossed is discussed below:

PLF: When the PLF is increased by 31.0% i.e. when PLF becomes 78.60%, the IRR becomes 12.76% and crosses the WACC. The project activity is commissioned in Sept 2011 and thus has insufficient data to calculate the actual PLF (which requires data for at least one year). PP is presently operating a similar kind of project where the pressure of the blast furnace 3 gas is used to generate power of 12.4 MW through TRT. The technology supplier for TRT in both the projects is same. Thus, the data of this project can be used to study the expected PLF of the project activity. From the historic data of this project, it can be seen that the PLF for period of Feb 2010 to Dec 2010 is around 60.62%. Hence, this scenario is unlikely to happen.

Project cost: When the project cost is reduced by 36% i.e. when the project cost becomes INR 372.03 million, the IRR becomes 12.74% and thus crosses the WACC. The actual project cost incurred by PP is INR 570.9 million and thus this scenario is unrealistic. The actual cost incurred by PP can be verified from the purchase orders placed by the PP for the project activity.

O&M: When the O&M is decreased by 56% i.e. when it becomes INR 21.52 million, the IRR becomes 12.73% and thus crosses the WACC. The project activity is commissioned in month of September 2011 and thus there is an insufficient data for calculating the actual O&M. If we study the actual O&M expense for the existing similar kind of project, the O&M cost for year 2010-11 is INR 46 million. Thus, this scenario is not a realistic scenario.

Tariff rate: When the tariff rate is increased by 54% i.e. when it becomes INR 2.07/kWh in the base year, the IRR becomes 12.71% and crosses the WACC. From the data available on the tariff rate of similar coal based power plant, the tariff rate is INR. 1.53/kWh and therefore this is an unrealistic scenario.

Step 4. Common practice analysis:
The credibility check is performed to complement the barrier analysis by identifying existing common practice through following steps:

Sub Step 4a. Analyze other activities similar to the proposed project activity:
The common practice scenario discussed below further substantiates the fact that Alternative-1 faces investment risks and is therefore not a widespread proposition for integrated iron and steel manufacturing

sectors under similar socio-economic environment in India. Here similar activities to the project activity are identified and analysed. Projects are considered similar if they are in the same country/region and/or rely on a broadly similar technology, are of a similar scale, and take place in a comparable environment with respect to regulatory framework, investment climate, access to technology, access to financing, etc.

The common practice scenario discussed below further substantiates the fact that Alternative-1 faces investment risks and is therefore not a widespread proposition for integrated iron and steel manufacturing sectors under similar socio-economic environment in India. Here similar activities to the project activity are identified and analysed. Projects are considered similar if they are in the same country/region and/or rely on a broadly similar technology, are of a similar scale, and take place in a comparable environment with respect to regulatory framework, investment climate, access to technology, access to financing, etc.

For the common practice analysis, PP has chosen following crude steel industries:

1. SAIL
2. TATA Steel
3. RINL

Steel Authority India Limited (SAIL)[16] is one of the leading public sector steel making company in India. SAIL consists of the following integrated steel plants:

- Bhillai Steel Plant
- Durgapur Steel Plant
- Rourkela Steel Plant
- Bokaro Steel Plant
- IISCO Steel Plant

SAIL is planning to install the TRT at BF 7 &8 at BSP, BF 5 at RSP, BF 2 at BSL and BF 5 at ISP. SAIL is undertaking all these projects as CDM projects[17].

Established in 1907, TATA Steel[18] is involved in the production of crude steel and is private sector steel making company in India. TATA Steel has its steel plant located at Jamshedpur, Jharkhand. TATA Steel installed TRT at blast furnace 'H' at its Jamshedpur works in Jharkhand and undertook this project as CDM project[19].

Rashtriya Ispat Nigam Limited (RINL)[20] is a public sector crude steel company having its plant at Vishakhapatanam. The company has the two Gas Expansion Turbines installed since 1993[21] however these turbines are having different technology than project activity hence not considered for common practice analysis. The company is planning to install TRT at BF 3 at Vishakhapatanam steel plant and undertaken the same as CDM project[22].

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

[17] http://www.teamorissa.org/Convention_%20Presentations_%20Sessionwise/Session-1/Session1-2%20Energy_Efficiency%20_PPT_2.pdf

[18] http://www.tatasteel.com/

[19] https://cdm.unfccc.int/Projects/DB/DNV-CUK1204542486.08/view

[20] http://www.vizagsteel.com/index.asp

[21] http://www.vizagsteel.com/index.asp?tm=1&url=code/Infrastr/ccp.asp

[22] https://cdm.unfccc.int/Projects/Validation/DB/RHHY5P68N9YML6KY3BZOVMT7IBCDT1/view.html

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

This step is required to discuss if any similar non-CDM activities are observed in the region. As discussed in the sub-step 4a, all the identified similar activities are in the CDM pipeline and hence not considered for the analysis.

Outcome:

The common practice scenario demonstrates that there is a low penetration of this technology in the Indian steel sector which can be attributed to the various investment risks associated with the implementation of the proposed project activity. Thus, it is not a common practice.

The above discussion clearly establishes that the proposed project activity would otherwise have not happened without the revenue that can be availed by registration of the same with UNFCCC under Kyoto Protocol-Clean Development Mechanism.

The project activity is also demonstrated to be not a common practice using EB 69, Annex 8, Guidelines on Common Practise and step wise analysis is presented below.

According to the guidelines on common practice (version 02.0), it requires the following definitions as follows:

1) Applicable geographical area:
2) Measure:
3) Output: ·
4) Different technologies:

To comply with the above requirements, it is clarified as follows:

1) Applicable geographical area:

India

2) Measure:

Recover the pressure of the Blast Furnace gas and to generate electricity through operation of TRT.

3) Output:

Electricity generated by Top Pressure Recovery Turbine

4) Different technologies:

Different technologies are those that deliver the same output and differ by at least one of the following (as appropriate in the context of the measure applied in the proposed project and applicable geographical area):

(i) Energy source/fuel: Waste pressure from Blast Furnace gas
(ii) Feed stock: Not applicable
(iii) Size of installation: 12.4 MW
(iv) Investment climate in the date of the investment decision: Without subsidies or other financial flows

(v) Other features: Not applicable

Stepwise approach for Common Practice

1) Step 1: Calculate applicable output range as +/-50% of the design output or capacity of the proposed project activity:

The project activity is a 12.4 MW power plant. Thus, the applicable range in ±50% of this capacity is 6.2 MW and 18.6 MW.

2) Step 2: identify similar projects (both CDM and non-CDM) which fulfil all of the following conditions:

(a) The projects are located in the applicable geographical area; (India)
(b) The projects apply the same measure as the proposed project activity; (TRT)
(c) The projects use the same energy source/fuel and feedstock as the proposed project activity, if a technology switch measure is implemented by the proposed project activity; (Blast Furnace Gas pressure)
(d) The plants in which the projects are implemented produce goods or services with comparable quality, properties and applications areas (e.g. clinker) as the proposed project plant;

(e) The capacity or output of the projects is within the applicable capacity or output range calculated in Step 1;

(f) The projects started commercial operation before the project design document (CDM-PDD) is published for global stakeholder consultation or before the start date of proposed project activity, whichever is earlier for the proposed project activity

Commissioning	Company	BF	BF Capacity (MTPA)	TRT	TRT Capacity,MW	CDM Project
Apr-05	Tata Steel	BF - G	2.20	Yes	8.10	Yes [23]
1-May-08	Tata Steel	BF - I	2.50	Yes	14.50	Yes[24]
18-Feb-09	JSW Steel	BF - 3	2.80	Yes	12.40	Yes [25]
20-Sept-11	Essar Steel	-	1.73	Yes	10.0	Yes[26]

[23] https://cdm.unfccc.int/Projects/DB/DNV-CUK1204542486.08/view

[24] http://www.cdmindia.in/reports_list_details.php?id=Jharkhand&reporttype=2&page=2

[25] https://cdm.unfccc.int/Projects/Validation/DB/UU4PSSWDP26L57L55ZN9PP8M3DY9WT/view.html

[26] https://cdm.unfccc.int/Projects/Validation/DB/2Q2WOBBOCA0MX5A3WGJGHCUHKZPEKU/view.html

24-Apr-12	RINL	BF-3	2.5	Yes	14.0	Yes[27]

Step 3: within the projects identified in Step 2, identify those that are neither registered CDM project activities, project activities submitted for registration, nor project activities undergoing validation. Note their number Nall.

Since all the projects are under CDM, Nall = 0

Step 4: within similar projects identified in Step 3, identify those that apply technologies that are different to the technology applied in the proposed project activity. Note their number *Ndiff*.

Technologies different from project activities is zero. Hence Ndiff = 0

Step 5: calculate factor F=1-*Ndiff*/*Nall* representing the share of similar projects (penetration rate of the measure/technology) using a measure/technology similar to the measure/technology used in the proposed project activity that deliver the same output or capacity as the proposed project activity.

F cannot be computed since Nall & Ndiff is zero. It's clear that Nall=0 and Ndiff = 0 which shows project activity is not common practice among the sector.

The proposed project activity is a "common practice" within a sector in the applicable geographical area if the factor *F* is greater than 0.2 and *Nall-Ndiff* is greater than 3.

Nall-Ndiff = 0

Hence the project activity is not common practice.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

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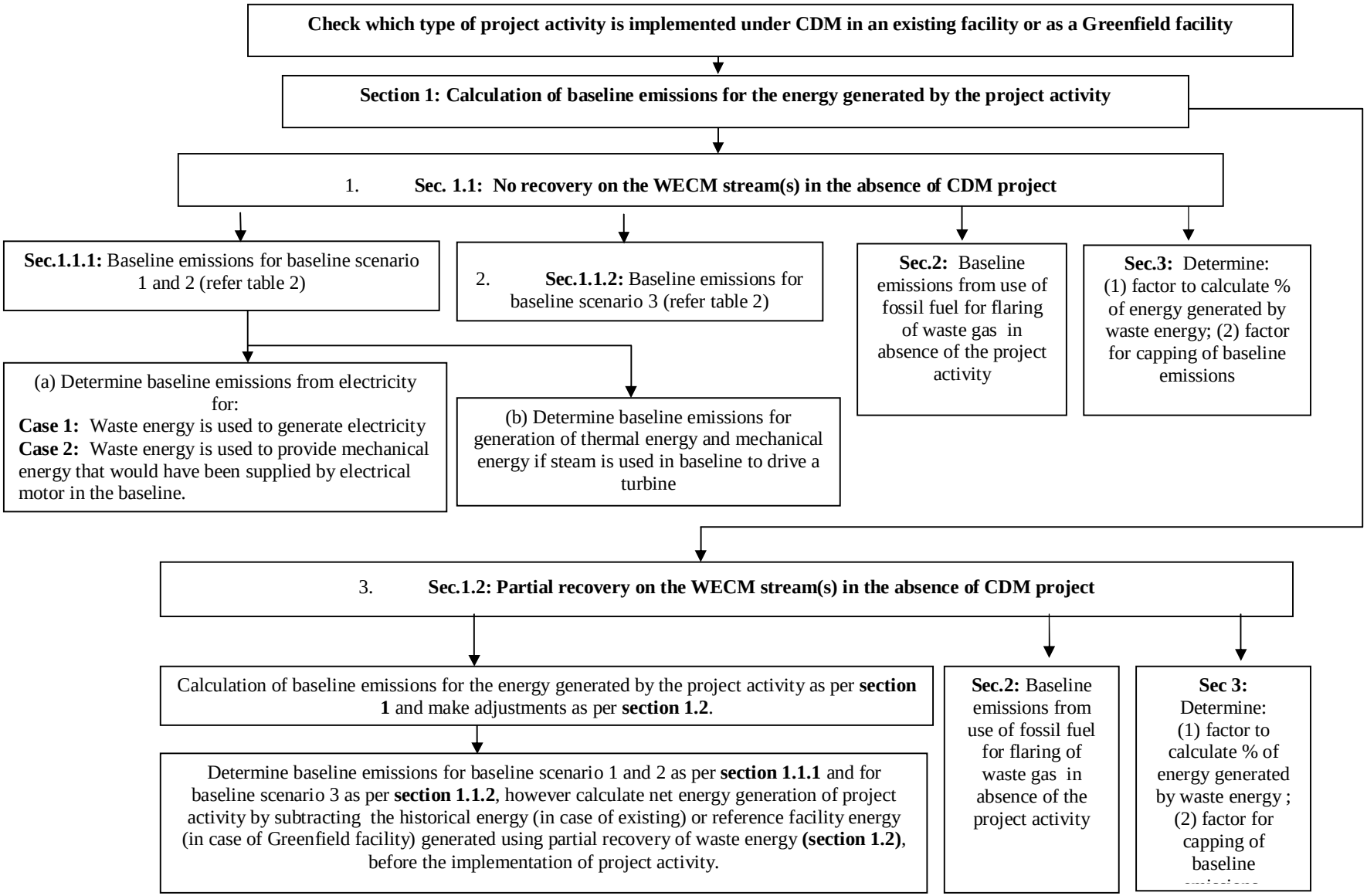
ACM0012 provides flow chart to identify the sources of baseline emissions based on the type of project activity. The flow chart is given below.

[27] https://cdm.unfccc.int/Projects/Validation/DB/RHHY5P68N9YML6KY3BZOVMT7IBCDT1/view.html


Check which type of project activity is implemented under CDM in an existing facility or as a Greenfield facility
Section 1: Calculation of baseline emissions for the energy generated by the project activity
1. Sec. 1.1: No recovery on the WECM stream(s) in the absence of CDM project
Sec.1.1.1: Baseline emissions for baseline scenario 1 and 2 (refer table 2)
2. Sec.1.1.2: Baseline emissions for baseline scenario 3 (refer table 2)
Sec.2: Baseline emissions from use of fossil fuel for flaring of waste gas in absence of the project activity
Sec.3: Determine: (1) factor to calculate % of energy generated by waste energy; (2) factor for capping of baseline emissions
(a) Determine baseline emissions from electricity for:
Case 1: Waste energy is used to generate electricity
Case 2: Waste energy is used to provide mechanical energy that would have been supplied by electrical motor in the baseline.
(b) Determine baseline emissions for generation of thermal energy and mechanical energy if steam is used in baseline to drive a turbine
3. Sec.1.2: Partial recovery on the WECM stream(s) in the absence of CDM project
Calculation of baseline emissions for the energy generated by the project activity as per section 1 and make adjustments as per section 1.2.
Determine baseline emissions for baseline scenario 1 and 2 as per section 1.1.1 and for baseline scenario 3 as per section 1.1.2, however calculate net energy generation of project activity by subtracting the historical energy (in case of existing) or reference facility energy (in case of Greenfield facility) generated using partial recovery of waste energy (section 1.2), before the implementation of project activity.
Sec.2: Baseline emissions from use of fossil fuel for flaring of waste gas in absence of the project activity
Sec 3: Determine: (1) factor to calculate % of energy generated by waste energy ; (2) factor for capping of baseline

The sources of the baseline emissions were evaluated with the help of the flow chart given in ACM0012 as discussed below.

The project activity is implemented in the added production capacity of 3.2MTPA (Total steel plant capacity of 10MTPA). Therefore, as per ACM0012 the project activity is categorized as **Greenfield project activity**.
In accordance with option 1 of Annex 1 of ACM0012, the extent of use of pressure of blast furnace gas was evaluated in existing "reference facilities" selected based on the criteria provided in Annex 1. From the evaluation, it is evident that more than 50% of the facilities are not utilizing the pressure of the blast furnace gas. Hence, in the baseline scenario, there would have been no recovery of pressure of blast furnace.

Thus, as per the flow chart, for baseline scenario 1, PP needs to evaluate
(a) Baseline emissions from electricity for:
Case 1: Waste energy is used to generate electricity
Case 2: Waste energy is used to provide mechanical energy that would have been supplied by electrical motor in the baseline.
(b) Determine baseline emissions for generation of thermal energy and mechanical energy if steam is used in baseline to drive a turbine

Since there is no mechanical or thermal energy production in the project activity, case 2 of source (a) and source (b) need not be evaluated.

Therefore, as per equation (2) of ACM0012, baseline emissions consist of:

$$BE_{En,y} = BE_{Elec,y} + BE_{Ther,y} \quad \textbf{(1)}$$

Where:

$BE_{Elec,y}$ = Baseline emissions from electricity during the year *y* in tCO_2

$BE_{Ther,y}$ = Baseline emissions from thermal energy (due to heat generation by elemental processes) during the year *y* (tCO_2)

(a) Baseline emissions from electricity ($BE_{Elec,y}$) generation

Case 1: Waste energy is used to generate electricity

$$BE_{Elec,y} = f_{cap} * f_{wcm} * \sum_{j} \sum_{i} (EG_{i,j,y} * EF_{Elec,i,j,y}) \quad \textbf{(2)}$$

Where:

$BE_{elec,y}$ = Baseline emissions due to displacement of electricity during the year *y* (tCO_2)

$EG_{i,j,y}$ = The quantity of electricity supplied to the recipient *j* by generator, which in the absence of the project activity would have been sourced from source *i* (the grid or an identified source) during the year *y* in MWh. $EG_{i,j,y}$ is equivalent to the electricity generation in the project activity.

$EF_{elec,i,j,y}$ = The CO_2 emission factor for the electricity source *i* (gr for the grid, and is for an identified

source), displaced due to the project activity, during the year *y* (tCO_2/MWh)

f_{wcm} = Fraction of total electricity generated by the project activity using waste energy.
The project activity is purely electricity generation from waste pressure which is measurable. Hence this fraction is 1 by default.

f_{cap} = Factor that determines the energy that would have been produced in project year *y* using waste energy generated at a historical level, expressed as a fraction of the total energy produced using waste source in year *y*.
The project activity is Greenfield project. As shown in the Annex 5 of the PDD, more than 50% of the existing "reference facilities" were not using the pressure of the blast furnace and hence it can be established that the waste pressure would not have been recovered in the baseline scenario. Hence, there is no need to apply $f_{practice}$ and a default value of 1 is selected.

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

As per ACM0012 ,the displaced electricity for the recipient facility is supplied by a internal grid systems , the CO_2 emission factor of the internal grid $EF_{elec,i,j,y}$ is determined by following the guidance provided in the " Tool to calculate the emission factor for an electricity system".

As per tool, project participants shall apply the following six steps:

STEP 1. Identify the relevant electricity systems;

STEP 2. Choose whether to include off-grid power plants in the project electricity system (optional);

STEP 3. Select a method to determine the operating margin (OM);

STEP 4. Calculate the operating margin emission factor according to the selected method;

STEP 5. Calculate the build margin (BM) emission factor;

STEP 6. Calculate the combined margin (CM) emission factor

STEP 1. Identify the relevant electricity systems

Internal grid of JSWSL is identified as relevant electricity systems where CPP-1, CPP2, CPP3, SBU-I & SBU-II is connected. CPP-1, CPP-2 are BF gas fired, CPP-3 is coal fired, SBU-I is coal & Corex fired and SBU-II is coal fired power plant

STEP 2. Choose whether to include off-grid power plants in the project electricity system (optional)

Internal grid is selected as relevant electricity system where emission factor of grid connected power plants are considered and project activity is reducing the coal consumption in CPP-4 (baseline power plant) which is connected to internal grid and it's not reducing the coal consumption in any off-grid

power plants. Hence off grid power plants are not chosen and there is no off grid power plants with JSWSL.

Hence $EF_{elec,i,j,y}$ is determined by Step 3 and Step 4 of the tool

As per Step 3 : Select a method to determine the operating margin (OM), Simple OM is used and the emission factor is calculated using Ex post option.

As per Step 4 : Calculate the operating margin emission factor according to the selected method .

The simple OM emission factor is calculated as the generation-weighted average CO2 emissions per unit net electricity generation (tCO2/MWh) of all generating power plants serving the system, not including low-cost/must-run power plants/units.

The simple OM may be calculated by one of the following two options:

Option A: Based on the net electricity generation and a CO2 emission factor of each power unit; or

Option B: Based on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system.

Option B can only be used if:

(a) The necessary data for Option A is not available; and

(b) Only nuclear and renewable power generation are considered as low-cost/must-run power sources and the quantity of electricity supplied to the grid by these sources is known; and

(c) Off-grid power plants are not included in the calculation (i.e. if Option I has been chosen in Step 2).

The option A is chosen to calculate the simple OM based on the available data of net electricity generation of all internal grid connected power plants and CO_2 emission factor of power plants connected to internal grid.

Option A - Calculation based on average efficiency and electricity generation of each plant

Under this option, the simple OM emission factor is calculated based on the net electricity generation of each power unit and an emission factor for each power unit, as follows:

$$EM_{grid,OMsimple,y} = \frac{\sum_{m} EG_{m,y} \times EF_{ELm,y}}{\sum_{m} EG_{m,y}} \quad (3a)$$

Where:

$EFgrid_{OMsimple,y}$ = Simple operating margin CO2 emission factor in year *y* (tCO2/MWh)
$EG_{m,y}$ = Net quantity of electricity generated and delivered to the grid by power unit *m* in year *y* (MWh)
$EFEL_{,m,y}$ = CO2 emission factor of power unit *m* in year *y* (tCO2/MWh)
M = All power units serving the grid in year *y* except low-cost/must-run power units
Y = The relevant year as per the data vintage chosen in Step 3

Determination of $EF_{EL,m,y}$

The emission factor of each power unit m should be determined as per Option A1 since fuel consumption and electricity generation is available for all power units:

• Option A1. If for a power unit m data on fuel consumption and electricity generation is available, the emission factor ($EF_{EL,m,y}$) should be determined as follows:

$$EF_{EL,m,y} = \frac{\sum_i FC_{i,m,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{EG_{m,y}} \quad (3b)$$

Where:
EFEL,m,y = CO2 emission factor of power unit *m* in year *y* (tCO2/MWh)
FCi,m,y = Amount of fossil fuel type *i* consumed by power unit *m* in year *y* (Mass or volume unit)
NCVi,y = Net calorific value (energy content) of fossil fuel type *i* in year *y* (GJ/mass or volume unit)
EFCO2,i,y = CO2 emission factor of fossil fuel type *i* in year *y* (tCO2/GJ)
EGm,y = Net quantity of electricity generated and delivered to the grid by power unit *m* in year *y* (MWh)
m = All power units serving the grid in year *y* except low-cost/must-run power units

i = All fossil fuel types combusted in power unit *m* in year *y*
y = The relevant year as per the data vintage chosen in Step 3

Determination of capping factor

Methodology requires determination of the capping factor using any one of the approach in the following hierarchy:

(i) Method-1 can be used to estimate the capping factor if required data is available;

(ii) if the project activities implemented in a Greenfield facility, or in existing facilities where the required data is unavailable Method-2 shall be used;

(iii) If the project proponents demonstrate technical infeasibility in direct monitoring of waste heat / pressure of waste energy carrying medium (WECM), then Method-3 is used.

Method 1 can not be used due to unavailability of three-year historical data. Therefore, PP has selected Method 2 which is applicable for Greenfield projects where the data is not available.

Method 2

Under this method, the following equations are used to estimate f_{cap} using manufacturer's data:

$$f_{cap} = \frac{Q_{WCM,BL}}{Q_{WCM,y}} \quad \textbf{(3)}$$

$$Q_{WCM,BL} = Q_{BL,product} \times q_{wcm,product} \quad \textbf{(4)}$$

1. Where:

$Q_{WCM,BL}$ = Quantity of waste energy generated prior to the start of the project activity (kg or m^3 at NTP or TJ or MWh of WECM or other relevant unit)

$Q_{WCM,y}$ = Quantity of WECM used for energy generation during year *y* (kg or m^3 at NTP or TJ or MWh of WECM or other relevant unit)

$Q_{BL,product}$ = Production associated with the relevant waste energy generation as it occurs in the baseline scenario. The minimum of the following two figures should be used: (1) average annual historical production data from start-up of the facility, if the facility's operational history is less than three years, or (2) the most relevant manufacture's data for normal operating conditions. In the case of Greenfield facilities or where data is not available, the manufacture's data for normal operating conditions shall be used (Units for product can be in no. of pieces, tons, m^3 or other appropriate unit)

$q_{wcm,product}$ = Amount of waste energy per unit of product generated by the process (that generates waste energy) in the facility (Units in kg or m^3 at NTP/unit product, MWh/unit product or TJ/unit product or other appropriate unit)

For the project activity, the f_{cap} is 1.

Project emissions

Project Emissions include emissions due to (1) combustion of auxiliary fuel to supplement waste gas/heat and (2) electricity emissions due to consumption of electricity for cleaning of gas before being used for generation of energy or other supplementary electricity consumption.

$$PE_y = PE_{AF,y} + PE_{EL,y} \quad \textbf{(5)}$$

Where:

PE_y = Project emissions due to the project activity (tCO_2)

$PE_{AF,y}$ = Project activity emissions from on-site consumption of fossil fuels by the unit process (es) and/or co-generation plant(s) if they are used as supplementary fuels due to non-availability of waste energy to the project activity or due to any other reason (tCO_2). Since the project activity does not involve recover of waste gas or heat, this emission source is not applicable.

$PE_{EL,y}$ = Project activity emissions from on-site consumption of electricity for gas cleaning

equipment or other supplementary electricity consumption (tCO_2). Since these emissions would have also occurred in the baseline, the emission source is neglected from baseline as well as project emissions.

Leakage

No leakage is applicable under this methodology.

Emission reductions

Emission reductions due to the project activity during the year *y* are calculated as follows:

$$ER_y = BE_y - PE_y \quad \textbf{(6)}$$

Where:

ER_y	=	Total emissions reductions during the year *y* in tons of CO_2
PE_y	=	Emissions from the project activity during the year *y* in tons of CO_2
BE_y	=	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:

Data / Parameter:	$\eta_{Plant,j}$
Data unit:	%
Description:	Baseline efficiency of the baseline captive power plant in recipient plant *j*
Source of data used:	Default value as per option 2 a
Value applied:	41.95
Justification of the choice of data or description of measurement methods and procedures actually applied :	Highest of the efficiency values provided by two manufacturers
Any comment:	

Data / Parameter:	$Q_{WCM,BL}$
Data unit:	kg/cm^2
Description:	Quantity of waste pressure of the gas generated from the blast furnace in the baseline scenario
Source of data used:	Calculated
Value applied:	2.5
Justification of the choice of data or description of measurement methods and procedures actually applied :	Calculated as per the equation 39 of ACM0012.

Any comment:	

Data / Parameter:	$Q_{BL,product}$
Data unit:	Million tons/year
Description:	Quantity of the hot metal produced from the blast furnace 4 in a year
Source of data used:	Manufacturer's specification
Value applied:	2.7
Justification of the choice of data or description of measurement methods and procedures actually applied :	Since the project activity is a Greenfield facility, the data by SIEMENS VAI for the normal operating conditions has been used
Any comment:	

Data / Parameter:	$q_{wcm,product}$
Data unit:	Nm^3 per ton of hot metal production
Description:	Quantity of gas generated per ton of hot metal produced
Source of data used:	Calculated based on the manufacturer's specification
Value applied:	1,640
Justification of the choice of data or description of measurement methods and procedures actually applied :	Since the project activity is a Greenfield facility, the data by SIEMENS VAI for the normal operating conditions has been used. This is calculated by dividing the total gas generation per hour and tons of hot metal production per hour.
Any comment:	

Data / Parameter:	$EF_{CO2,rs,j}$
Data unit:	Tonnes CO_2/TJ
Description:	CO_2 emission factor per unit of energy of the fossil fuel (Coal) used in the baseline generation source i providing energy to recipient *j*
Source of data used:	CO_2 baseline database for Indian Power Sector provided by the Central Electricity Authority (CEA)
Value applied:	95.8
Justification of the choice of data or description of measurement methods and procedures actually applied :	As per the methodology ACM0012 Version 04.0,country specific data has been used (CEA CO_2 Baseline Database Version 07, January 2012)

Data / Parameter:	$EF_{CO2,corex,y}$
Data unit:	Tonnes CO_2/GJ

Description:	CO_2 emission factor per unit of energy of the fuel (Corex gas) used in the baseline generation source i providing energy to recipient *j*
Source of data used:	CO_2 baseline database for Indian Power Sector provided by the Central Electricity Authority (CEA)
Value applied:	0
Justification of the choice of data or description of measurement methods and procedures actually applied :	As per "Tool to calculate the emission factor for an electricity systems" Regional or national average default Values documented in regional or national energy statistics can be used. (CEA CO_2 Baseline Database Version 07)

Data / Parameter:	$EF_{CO2,BFG,y}$
Data unit:	Tonnes CO_2/GJ
Description:	CO_2 emission factor per unit of energy of the fuel (Blast Furnace Gas) used in the baseline generation source i providing energy to recipient *j*
Source of data used:	Default value from IPCC GHG Inventory Guide Volume 2, 2006 (260000 kg/TJ)
Value applied:	0.26
Justification of the choice of data or description of measurement methods and procedures actually applied :	As per "Tool to calculate the emission factor for an electricity systems" IPCC default values at the lower limit of the uncertainty at a 95% confidence interval as provided in table 1.4 of Chapter1 of Vol. 2 (Energy) of the 2006 IPCC A guideline on National GHG Inventories is used.

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

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Baseline emission (BE):

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

For calculating baseline emission factor , $\boldsymbol{EF_{Elec,i,j,y}}$ (the CO_2 emission factor for the electricity source *i* (internal grid), displaced due to the project activity, during the year *y* ,tCO2/MWh) is 0.95 tCO_2/MWh. The calculation of internal grid $\boldsymbol{EF_{Elec,i,j,y}}$ is done as per " Tool to calculate the emission factor for an electricity system" and the detail is presented in Annex 8.

$$\boldsymbol{BE_{Elec,y} = fcap * fwcm * \sum_j \sum_i (EG_{i,j,y} * EF_{Elec,i,j,y})}$$

$$= 1 * 1 * 53{,}032 * 0.95$$

$$= 50{,}380\ tCO_2/\ yr$$

Capping of Baseline emissions:

For Greenfield facilities, fcap is 1.

Project emission (PE):

$PE_y = 0$ **tCO_2e/year**

Leakage (LE):
No leakage is applicable under this methodology. Therefore,

$L = 0$ **tCO_2e/year**

Emission Reductions(ER):

Emission reductions due to the project activity during the year *y* are calculated as follows:
i
$ER_y = BE_y - PE_y - L$

$= 50{,}380 tCO_2/ yr$

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

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Year	Estimation of project emissions (tonnes of CO_2e)	Estimation of Baseline emissions (tonnes of CO_2e)	Estimation of leakage (tonnes of CO_2e)	Estimation of overall emission reductions (tonnes of CO_2e)
2013	0	50,380	0	50,380
2014	0	50,380	0	50,380
2015	0	50,380	0	50,380
2016	0	50,380	0	50,380
2017	0	50,380	0	50,380
2018	0	50,380	0	50,380
2019	0	50,380	0	50,380
2020	0	50,380	0	50,380
2021	0	50,380	0	50,380
2022	0	50,380	0	50,380
Total (tonnes of CO_2 e)	0	503,800	0	503,800

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

Title of Monitoring Methodology:
Consolidated monitoring methodology for GHG emission reductions from waste energy recovery projects

Reference of Monitoring Methodology:
Approved consolidated baseline and monitoring methodology ACM0012, Version 04.0.0 Sectoral Scope: 01 and 04.

B.7.1 Data and parameters monitored:

Data / Parameter:	$EG_{i,j,y}$
Data unit:	MWh/year
Description:	Quantity of electricity supplied to the recipient *j* by generator, which in the absence of the project activity would have been sourced from JSWSL coal based power plant.
Source of data to be used:	Measured by energy meters and recorded in the Plant Log Book
Value of data applied for the purpose of calculating expected emission reductions in section B.5	53032
Description of measurement methods and procedures to be applied:	The net electricity generation by the project activity will be measured by energy meters and will be recorded by the DCS. Measurement Equipment- Energy meter. Measurement process – DCS Calibration procedure – As per applicable ISO standard procedure Accuracy of the measurement – ±0.5% Responsible person for measurement – Recording by Shift in charge Measurement interval– continuous measurement with monthly recording
QA/QC procedures to be applied:	The energy meters will be calibrated once in a year according to the applicable ISO standard procedure
Any comment:	Data will be monitored and measured online by using energy meter. The data will be archived electronically as well as on paper and will be kept at least for 2 years beyond the crediting period.

Data / Parameter:	$P_{WCM,y}$
Data unit:	$kg/cm^2(g)$
Description:	Pressure of the BF gas
Source of data to be used:	Measured by pressure transmitter and recorded in the plant log book
Value of data applied for the purpose of calculating expected emission reductions in section B.5	2.5

Description of measurement methods and procedures to be applied:	The quantity of waste gas produced will be measured by pressure transmitter and recorded continuously by DCS. Measurement Equipment- Pressure transmitter. Measurement process – DCS Calibration procedure – As per applicable ISO standard procedure Accuracy of the measurement – ±0.065% Responsible person for measurement – Recording by Shift in charge Measurement interval– continuous measurement with monthly recording
QA/QC procedures to be applied:	The Pressure transmitter will be calibrated once in a year according to the applicable ISO standard procedure.
Any comment:	Data will be monitored and measured online by using flow meter. The data will be archived electronically as well as on paper and will be kept at least for 2 years beyond the crediting period.

Data / Parameter:	Abnormal operation of the project facility including emergencies and shut down
Data unit:	Hours
Description:	The hours of abnormal operation of parts of project facility that can have an impact on waste energy generation and recovery
Source of data:	Operation of project facility
Value of data applied for the purpose of calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	The data will be monitored on daily basis and will be aggregated annually
QA/QC procedures:	
Any comment:	This parameter has to be monitored to demonstrate that no emission reduction is claimed for the hours during the abnormal operation of the part of project facility which have impact on waste energy generation and recovery. The abnormality can be in terms of violation of operational parameters, poor quality product, emergencies or shutdown

Data / Parameter:	$Q_{WCM,y}$
Data unit:	Nm^3/hr
Description:	Quantity of Waste Gas used for energy generation during year *y*
Source of data to be used:	Measured by flow meter and recorded in the plant Log Book
Value of data applied for the purpose of	512,000

calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	The quantity of waste gas produced will be measured by flow meter and recorded continuously by DCS. Measurement Equipment- Flow meter. Measurement process – DCS Calibration procedure – As per applicable ISO standard procedure Accuracy of the measurement – ±1% of flow rate Responsible person for measurement – Recording by Shift in charge Measurement interval– Every hour
QA/QC procedures to be applied:	The flow meter will be calibrated once in a year according to the applicable ISO standard procedure.
Any comment:	Data will be monitored and measured online by using flow meter. The data will be archived electronically as well as on paper and will be kept at least for 2 years beyond the crediting period.

Data / Parameter:	$FC_{corex,m,,y}$
Data unit:	KNm^3/annum
Description:	Amount of fuel type *i(Corex)* consumed by power plant/unit *m (CPP1)*, (or in the project electricity system in case of *FCi,y*) in year *y* or hour *h*
Source of data to be used:	From CPP log book or measured electronic readings.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	685250
Description of measurement methods and procedures to be applied:	The quantity of corex gas consumed will be measured by flow meter. Measurement Equipment- Flow meter. Measurement process – DCS Calibration procedure – As per applicable ISO standard procedure Accuracy of the measurement – ±1% of flow rate Responsible person for measurement – Recording by Shift in charge Measurement interval– Every hour
QA/QC procedures to be applied:	The flow meter will be calibrated once in a year according to the applicable ISO standard procedure.
Any comment:	Data will be monitored and measured online by using flow meter. The data will be archived electronically as well as on paper and will be kept at least for 2 years beyond the crediting period.

Data / Parameter:	$FC_{BFG,m,,y}$
Data unit:	KNm^3/annum
Description:	Amount of fuel type *i(BFG)* consumed by power plant/unit *m (CPP1)*, (or in the project electricity system in case of *FCi,y*) in year *y* or hour *h*

Source of data to be used:	From CPP log book or measured electronic readings.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	853397
Description of measurement methods and procedures to be applied:	The quantity of BFGconsumed will be measured by flow meter. Measurement Equipment- Flow meter. Measurement process – DCS Calibration procedure – As per applicable ISO standard procedure Accuracy of the measurement – ±1% of flow rate Responsible person for measurement – Recording by Shift in charge Measurement interval– Every hour
QA/QC procedures to be applied:	The flow meter will be calibrated once in a year according to the applicable ISO standard procedure.
Any comment:	Data will be monitored and measured online by using flow meter. The data will be archived electronically as well as on paper and will be kept at least for 2 years beyond the crediting period.

Data / Parameter:	$FC_{corex,n,,y}$
Data unit:	KNm^3/annum
Description:	Amount of fossil fuel type *i(Corex)* consumed by power plant/unit *n (CPP2)*, (or in the project electricity system in case of *FCi,y*) in year *y* or hour *h*
Source of data to be used:	From CPP2 log book or measured electronic readings.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	98249
Description of measurement methods and procedures to be applied:	The quantity of corex gas produced will be measured by flow meter. Measurement Equipment- Flow meter. Measurement process – DCS Calibration procedure – As per applicable ISO standard procedure Accuracy of the measurement – ±1% of flow rate Responsible person for measurement – Recording by Shift in charge Measurement interval– Every hour
QA/QC procedures to be applied:	The flow meter will be calibrated once in a year according to the applicable ISO standard procedure.
Any comment:	Data will be monitored and measured online by using flow meter. The data will be archived electronically as well as on paper and will be kept at least for 2 years beyond the crediting period.

Data / Parameter:	$FC_{BFG,n,,y}$
Data unit:	KNm^3/annum

Description:	Amount of fuel type *i(BFG)* consumed by power plant/unit *n (CPP2)*, (or in the project electricity system in case of *FCi,y*) in year *y* or hour *h*
Source of data to be used:	From CPP log book or measured electronic readings.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	1385909
Description of measurement methods and procedures to be applied:	The quantity of BFGconsumed will be measured by flow meter. Measurement Equipment- Flow meter. Measurement process – DCS Calibration procedure – As per applicable ISO standard procedure Accuracy of the measurement – ±1% of flow rate Responsible person for measurement – Recording by Shift in charge Measurement interval– Every hour
QA/QC procedures to be applied:	The flow meter will be calibrated once in a year according to the applicable ISO standard procedure.
Any comment:	Data will be monitored and measured online by using flow meter. The data will be archived electronically as well as on paper and will be kept at least for 2 years beyond the crediting period.

Data / Parameter:	$FC_{Corex,k,,y}$
Data unit:	KNm^3/annum
Description:	Amount of fuel type *i(Corex gas)* consumed by power plant/unit *k (SBU I)*, (or in the project electricity system in case of *FCi,y*) in year *y* or hour *h*
Source of data to be used:	From SBU I log book or measured electronic readings.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	984956
Description of measurement methods and procedures to be applied:	The quantity of corex gas consumed will be measured by flow meter. Measurement Equipment- Flow meter. Measurement process – DCS Calibration procedure – As per applicable ISO standard procedure Accuracy of the measurement – ±1% of flow rate Responsible person for measurement – Recording by Shift in charge Measurement interval– Every hour
QA/QC procedures to be applied:	The flow meter will be calibrated once in a year according to the applicable ISO standard procedure.
Any comment:	Data will be monitored and measured online by using flow meter. The data will be archived electronically as well as on paper and will be kept at least for 2 years beyond the crediting period.

Data / Parameter:	$FC_{Coal,k,,y}$
Data unit:	Tons/annum
Description:	Amount of fuel type *i(Coal)* consumed by power plant/unit *k (SBU I)*, (or in the project electricity system in case of *FCi,y*) in year *y* or hour *h*
Source of data to be used:	From CPP log book or measured electronic readings.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	478090
Description of measurement methods and procedures to be applied:	The quantity of Coal consumed will be measured by weigh meter. Measurement Equipment- Weigh Meter. Calibration procedure – As per applicable standard procedure Accuracy of the measurement – ±1% Responsible person for measurement – Recording by Shift in charge Measurement interval– Every hour
QA/QC procedures to be applied:	The weigh meter will be calibrated once in a year according to the applicable standard procedure.
Any comment:	Data will be monitored and measured online by weigh meter. The data will be archived electronically as well as on paper and will be kept at least for 2 years beyond the crediting period.

Data / Parameter:	$FC_{Coal,L,,y}$
Data unit:	Tons/annum
Description:	Amount of fuel type *i(Coal)* consumed by power plant/unit *L (SBU II)*, (or in the project electricity system in case of *FCi,y*) in year *y* or hour *h*
Source of data to be used:	From CPP log book or measured electronic readings.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	1568446
Description of measurement methods and procedures to be applied:	The quantity of Coal consumed will be measured by weigh meter. Measurement Equipment- Weigh Meter. Calibration procedure – As per applicable standard procedure Accuracy of the measurement – ±1% Responsible person for measurement – Recording by Shift in charge Measurement interval– Every hour
QA/QC procedures to be applied:	The weigh meter will be calibrated once in a year according to the applicable standard procedure.
Any comment:	Data will be monitored and measured online by weigh meter. The data will be archived electronically as well as on paper and will be kept at least for 2 years beyond the crediting period.

Data / Parameter:	$FC_{Coal,j,,y}$
Data unit:	Tons/annum
Description:	Amount of fuel type *i(Coal)* consumed by power plant/unit j *(CPP III)*, (or in the project electricity system in case of *FCi,y*) in year *y* or hour *h*
Source of data to be used:	From CPP log book or measured electronic readings.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	874265
Description of measurement methods and procedures to be applied:	The quantity of Coal consumed will be measured by weigh meter. Measurement Equipment- Weigh Meter. Calibration procedure – As per applicable standard procedure Accuracy of the measurement – ±1% Responsible person for measurement – Recording by Shift in charge Measurement interval– Every hour
QA/QC procedures to be applied:	The weigh meter will be calibrated once in a year according to the applicable standard procedure.
Any comment:	Data will be monitored and measured online by weigh meter. The data will be archived electronically as well as on paper and will be kept at least for 2 years beyond the crediting period.

Data / Parameter:	$NCV_{corex,m,,y}$
Data unit:	GJ/Nm^3
Description:	Net calorific value (energy content) of fuel (Corex gas) type *i* in year *y at CPP 1*
Source of data to be used:	Calculated from the GCV figures
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.00705 (1870 $Kcal/Nm^3$)
Description of measurement methods and procedures to be applied:	GCV is measured by Gas Chromatography and its done by plant management. NCV is calculated based on measured GCV value.
QA/QC procedures to be applied:	Gas chromatography will be calibrated once in a year (annually).
Any comment:	Data will be monitored and documented. The data will be will be kept at least for 2 years beyond the crediting period.

Data / Parameter:	$NCV_{BFG,m,,y}$

Data unit:	GJ/Nm^3
Description:	Net calorific value (energy content) of fuel (Blast Furnace gas) type *i* in year *y at CPP 1*
Source of data to be used:	Calculated from the GCV figures
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.00301 (800 Kcal/Nm^3)
Description of measurement methods and procedures to be applied:	GCV is measured by Gas Chromatography and its done by plant management. NCV is calculated from measured GCV value.
QA/QC procedures to be applied:	Gas chromatography will be calibrated once in a year (annually).
Any comment:	Data will be monitored and documented. The data will be will be kept at least for 2 years beyond the crediting period.

Data / Parameter:	$NCV_{corex,n,,y}$
Data unit:	GJ/Nm^3
Description:	Net calorific value (energy content) of fuel (Corex gas) type *i* in year *y at CPP 2*
Source of data to be used:	Calculated from the GCV figures
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.00704 (1869.19 Kcal/Nm^3)
Description of measurement methods and procedures to be applied:	GCV is measured by Gas Chromatography and its done by plant management. NCV is calculated from measured GCV value.
QA/QC procedures to be applied:	Gas chromatography will be calibrated once in a year (annually).
Any comment:	Data will be monitored and documented. The data will be will be kept at least for 2 years beyond the crediting period.

Data / Parameter:	$NCV_{BFG,m,,y}$
Data unit:	GJ/Nm^3
Description:	Net calorific value (energy content) of fuel (Blast Furnace gas) type *i* in year *y at CPP 2*
Source of data to be used:	Calculated from the GCV figures
Value of data applied	0.00322 (854.22 Kcal/Nm^3)

for the purpose of calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	GCV is measured by Gas Chromatography and its done by plant management. NCV is calculated from measured GCV value.
QA/QC procedures to be applied:	Gas chromatography will be calibrated once in a year (annually).
Any comment:	Data will be monitored and documented. The data will be will be kept at least for 2 years beyond the crediting period.

Data / Parameter:	$NCV_{Coal,k,,y}$
Data unit:	GJ/Kg
Description:	Net calorific value (energy content) of fuel (coal) type *i* in year *y at SBU I*
Source of data to be used:	Calculated from the GCV figures
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.023 (5705.45 Kcal/Kg)
Description of measurement methods and procedures to be applied:	GCV is measured by bomb calorimeter and its done by plant management cum fuel supplier. NCV is calculated from measured GCV value.
QA/QC procedures to be applied:	Bomb will be calibrated once in a year (annually).
Any comment:	Data will be monitored and documented. The data will be will be kept at least for 2 years beyond the crediting period.

Data / Parameter:	$NCV_{Coal,L,,y}$
Data unit:	GJ/Kg
Description:	Net calorific value (energy content) of fuel (coal) type *i* in year y *at SBU II*
Source of data to be used:	Calculated from the GCV figures
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.0211 (5052.73 Kcal/Kg)
Description of measurement methods and procedures to be applied:	GCV is measured by bomb calorimeter and its done by plant management cum fuel supplier. NCV is calculated from measured GCV value.
QA/QC procedures to	Bomb will be calibrated once in a year (annually).

be applied:	
Any comment:	Data will be monitored and documented. The data will be will be kept at least for 2 years beyond the crediting period.

Data / Parameter:	$NCV_{Coal,j,y}$
Data unit:	GJ/Kg
Description:	Net calorific value (energy content) of fuel (coal) type *i* in year *y at CPP 3*
Source of data to be used:	Calculated from the GCV figures
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.022 (5322.66 Kcal/Kg)
Description of measurement methods and procedures to be applied:	GCV is measured by bomb calorimeter and its done by plant management cum fuel supplier. NCV is calculated from measured GCV value.
QA/QC procedures to be applied:	Bomb will be calibrated once in a year (annually).
Any comment:	Data will be monitored and documented. The data will be will be kept at least for 2 years beyond the crediting period.

Data / Parameter:	$EF_{elec,i,j,y}$
Data unit:	Tonnes CO_2/MWh
Description:	Emission factor of source i (Internal Grid) of electricity that has (or would have) supplied electricity to recipient facility j in year y
Source of data to be used:	Calculated based on "Tool to calculate the emission factor for an electricity system "
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.95
Description of measurement methods and procedures to be applied:	As per the methodology ACM0012 Version 04.0, "Tool to calculate the emission factor for an electricity systems" is used.
QA/QC procedures to be applied:	Not applicable as its calculated parameter. This parameter is calculated as per the methodology discussed in Annex 8.
Any comment:	This value is used for estimation and will be monitored ex-post throughout the crediting period and archived electronically for crediting period + 2 years.

B.7.2. Description of the monitoring plan:

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The monitoring plan defines a standard against which the performance in terms of the project emission reductions during the crediting period can be monitored and verified.

A. Purpose of the monitoring plan

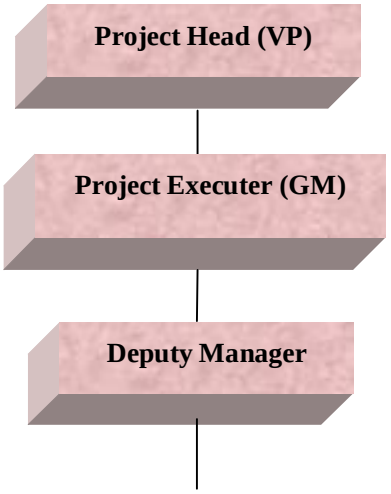
Monitoring is a key procedure to verify the actual and measurable emission reductions from the proposed project. The project owner established monitoring plan in order to guarantee the actual long-term measurement of GHG emission reductions of the proposed project.

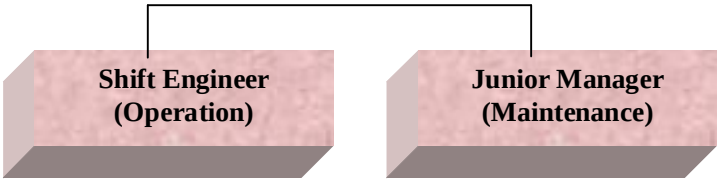
A. The organizational structure of monitoring

In order to effectively monitor and acquire the real, measurable, permanent GHG emission reductions generated by the project, the project proponent has developed a credible, transparent and adequate monitoring plan and a formal set of monitoring procedures. These procedures detail the organization, control and steps required for certain key monitoring system features including:

1. Management structure:

JSW has an International monitoring system (ISO 14001). It has planned an operation and management structure for the project activity with roles and responsibilities of individual defined. The management would be responsible for monitoring and reporting of the parameters involved. The project participant will form a special CDM team, this team will be responsible for monitoring of all the data required to estimate emission reduction and leakage if any. Before the crediting period starts, the organization of the monitoring team will be established and clear roles and responsibilities will be assigned to all staff involved in the CDM project. The hierarchical set up that will run the plant and will be responsible for monitoring all the data required to estimate emission reduction is described below in the following flow chart. The roles of each position are described in brief as well. Proper training program will also be conducted right from beginning to make the people who will be working in the plant well conversant with the technology and monitoring system of various parameters.





2. Roles and Responsibilities of the monitoring Team:

Designation	Responsibility
Project Head (Vice-President)	Registration
Project Executer (General Manager)	Project Execution and operation. Control of Documents.
Deputy Manager	Monitoring and Verification of data (Once in a day), Operation.
Junior Manager (Maintenance)	Mechanical Maintenance, Energy meter monitoring and Maintenance, TRT Maintenance
Shift Engineer (Operation)	Data collection, data recording and data storage.

3. Monitoring Management

The required monitoring equipment is installed, maintained and regularly calibrated by the project operator. All the instruments will be calibrated using ISO standards and marked at regular intervals so that the accuracy of measurement can be ensured all the time. Installed meters will be initially calibrated by the manufacturer before installation of the meter and then recalibrated annually. Monitoring and measurement can be carried out internally and externally by independent laboratory which has been accredited by the government or internationally. The verification of the monitoring results of the project activity is required for each crediting period. The monitoring results will be combined in a monitoring report that will be served as a basis for project verification in each crediting year.

4. Data collection and storage

All monitoring data will be collected and stored according to the procedures described in the Section B.7.1.The shift in charge will be responsible for recording all the data in the plant logbooks. Also there will be a DCS to continuously monitor and record the data electronically which will be stored in the computer.

For measurement of all the parameters and maintenance of records due care is to be taken and to prepare elaborated format for data collection; methodology is described for measurement and collection of each of the parameter; proper training being provided to concerned personnel; inventory and other instruments are calibrated; and verification of the data, measurement and test shall be carried out.

All the recorded data will be stored electronically and will be kept for the entire crediting period and two years after the crediting period.

5. QA/QC procedures

- All the monitoring instruments applied in the project shall meet the measurement accuracy and shall be subject to regular maintenance and testing regime to ensure accuracy according to relevant laws and regulations. The monitoring equipment should be calibrated in accordance with the relevant national and industrial regulations periodically by a qualified calibration entity. The monitored data recorded and collected by the responsible person shall be internally verified to guarantee the data validity before handing to the Project Executor. The responsible person will archive the data after cross checking.
- Monitoring teams are responsible for monitoring the instruments, checking and maintenance to guarantee the normal operation.
- Regular meetings will be commenced for discussing and solving the monitoring problems during the operation period

6. Internal Audit

All reported results and measurements shall be periodically reviewed by the Project head and any discrepancy shall be corrected with authorization from the Project head.

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):

>>

Date of the completion of the application of the baseline study and monitoring methodology:
25/04/2011

Name of the responsible person (s)/ entities:

JSW Steel Ltd.

JSW Steel Ltd. is the project participant (Contact details are given in Annex 1).

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:

>>
20/11/2007, the date of the agreement with Shaanxi Blower Group (Co) Ltd.

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

>>
20 years 0 months

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:

>>
01/02/2013 or the date of registration with UNFCCC, whichever later.

C.2.2.2. Length:

>>
10 years 0 months.

SECTION D. Environmental impacts

>>

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

>>
The Ministry of Environment and Forests (MoEF), Government of India has issued the Environmental Impact Assessment Notification, 14th September 2006, which makes environmental clearance mandatory for the development activities listed in its schedule. The details of these activities are available at: http://envfor.nic.in/divisions/iass/notif/notif.htm

As per the list of the activities for which EIA is mandatory, the project activity does not fall into this category.

However, the corporate policy of JSW requires them to undertake Environmental Impact Assessment (EIA) for all new projects. The EIA was done mainly to study the impacts for "Utilization of pressure energy of waste gas of Blast Furnace 4 by Top pressure Recovery Turbine (TRT)

The objective of EIA-EMP study was to evaluate the benefits and/or the adverse impacts of the proposed activity on the neighbourhood environment. The specific objectives were as follows:

- To assess the potential impacts associated with the proposed project on the Environment.
- To develop measures through which potential negative impacts can be mitigated and positive benefits can be enhanced;

JSW have entrusted the responsibility of preparing EIA and Environmental Management Plan (EMP) for this project to Zenith Energy Services (P) Limited.

The impacts assessed on the surrounding environment from the project activity are as follows:

1. **Impacts during Siting**
   The proposed project is within the acquired land area of the existing integrated steel plant of JSW. No displacement of people or equipment is needed for setting up of this project. Thus no impact is envisaged during this phase.

2. **Impacts during Construction**
   The construction of the proposed project will involve engagement of labor force and construction activities related to excavation, construction, erection of equipment, laying and routing of pipelines, commissioning and testing activities etc. Air, water, noise and soil / land are likely to be affected by the above activities. Marginal impact is anticipated on aesthetics and Socio Economic pattern. The green belt projects already taken up by JSW will have positive impact on the flora and fauna. The labor force employed will have a positive impact on the socio-economic structure in the area.
   The major construction activities like excavation, construction and erection of equipment, all will take place in a short period of time. Thus, there will be short term negative impact on the AAQ, noise levels, water bodies. However, there will be short term positive impact on the socio-economic environment as the construction phase of the project will involve deployment of manpower, both direct and indirect. But these impacts will be temporary in nature.

3. **Impacts during Operation**
   The following paragraphs describe the impacts on various environmental factors during the operational phase.

   Impact on Water Environment
   Water is used only for indirect cooling during project operation. This will be recycled after cooling hence there will be no adverse impact on water environment due to proposed project.

   Impact on the Air Environment
   The proposed activity utilizes pressure energy of BF gases for power generation. In the absence of the project this energy would have been wasted due to expansion of gases before use as fuel in the plant. The gases are cleaned in gas cleaning plant to remove dust to less than 5 mg/Nm3 before entering the project boundary. Hence, there is no generation of any primary and secondary pollutants.

   Noise levels & its Impact
   The major source of noise identified due to the proposed activity would be from turbines and generators. The noise from these sources may have a resonating effect.

   Impact on land Environment
   The project activity would be within the existing premises of JSW, thus there would not be any critical land use changes. There will be no displacement of habitat. The proposed utility would be an entirely waste free activity (no ash generation), as it is based on waste gas utilization. Also, the utilities would deal only with gases and does not utilize any other raw material which otherwise can be evaluated as a hazardous waste.

Ecological Environment
Project activity would have no adverse impact on ecological environment as the same would not have any adverse impact on water, air or land environment.

Socio-economic Environment
The contribution of JSW towards provisions of employment and livelihood opportunities has improved the quality of life of the people in the surrounding habitations. The proposed activity would add to this, through its contribution of providing social and economic benefits in terms of employment opportunities during operation and maintenance of the plant. The impact can be positive due to higher productivity and profitability due to the proposed project.

Objectives of EMP:
The objectives of the proposed EMP are aimed for meeting three basic requirements, namely

- To ensure continuous compliance with the environment protection regulations,
- To ensure that adverse environmental impacts on the baseline are minimized, and
- To fulfil the Corporate Responsibility on Environment Protection (CREP).

Environment Management Plan at Construction Stage:

Environmental Issue	Mitigation Measures
Vehicular Pollution and Spillage	All vehicles delivering materials to the site shall be covered with tarpaulin to avoid material spillage.
Watering to controlling dust at site.	During construction stage, the site should be watered periodically to minimize fugitive dust generation.
Noise Level	• It is recommended that while procuring equipment for construction purpose, it shall be checked that the manufacturers have taken adequate measures to attenuate the noise level below the prescribed standards. • All the equipment and machines used during construction should be properly lubricated & maintained.
Waste Handling	All wastes produced during construction stage should be properly handled, segregated, stored and disposed off in accordance with the recommended waste management practices

Environment Management Plan at Operation & Maintenance Stage:

Environmental Issue	Mitigation Measures
Air Quality Impact	Ambient air concentrations of various pollutants shall be monitored at regular intervals as per the stipulations of Pollution Control Boards.
Noise Pollution	• Acoustic measures, dampers, insulators will be provided in the steam turbine generator, boiler house and such other areas to reduce vibrations and resonating effect of gas flow. Ear plugs & ear muffs will be used where the exposure to noise is more than 85 dB(A). • Monitoring of noise levels at sensitive receptors as per monitoring Plan

Land Pollution	The blow down water should not be discharged as such without meeting the statutory norms.
Socio-economic Environment	The JSW may explore opportunities in promoting socio-economic activities like providing health check-up to the nearby villagers, providing education facilities to the needy children and promoting cultural activities. The infrastructure in the surrounding area may be given a facelift for better living condition of the villagers.
Health Hazards	Safety measures to be implemented among the employees to prevent and reduce accidents. Workspace air quality and noise levels should be monitored and adequate control measures to be provided to reduce exposure of the employees.

The EIA-EMP study clearly indicates that the project activity will not have any adverse impact on the environment. Moreover, it will contribute towards:

- Maintenance of regional air quality, and subsequently ecosystem and human health;
- Conservation of natural resources such as coal and water;
- Mitigate emission of greenhouse gases;
- Contribute towards regional developmental goals;
- Socioeconomic development through provision of employment opportunities for local population; and
- Thermal impacts are mitigated due to the project activity.

In conclusion, the proposed activity will not have any adverse impact on environment. It would result in benefits like socio-economic wellbeing, promotion of developmental activities due to additional power generation in the state and mitigation of greenhouse gas emissions.

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

>>

The proposed project activity will utilise the pressure energy of the top gas of the Blast Furnace-4 to generate electrical energy. Therefore it will lead to a cleaner mode of generation of electrical energy and hence will not have any negative impact on the environment.

The project activity does not fall in the list of categories listed in the Schedule of the notification dated 14th September 2006 by the Ministry of Environment and Forests (MoEF), Government of India has under the Environmental (Protection) Act 1986 which makes environmental clearance mandatory for the construction of new projects or activities or the expansion or modernization of existing projects. The impact assessment for the proposed project activity under consideration (as explained above) reveals that this will contribute positively towards the environment and the negative impacts associated with its implementation will be insignificant.

SECTION E. Stakeholders' comments

>>

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

>>

JSW, as a matter of conscious policy decision has always considered the consultation of local stakeholders an integral component of any new project or up-gradation or modernisation of existing facilities.

A combined local stakeholder consultation meeting was held at JMax, JSW Township, Vidyanagar, on 26th May, 2007 at 11.00 a.m. for all the CDM projects of JSWSL (which included CDM project activity). Invitation letters with brief description of the project were sent on 7th May, 2007 to the stakeholders. The participants present in the meeting comprised from various levels, including local people from the surrounding villages, representative of village administrative, representatives from non-governmental organizations (NGOs), employees of JSW steel, CDM consultants, Equipment Suppliers for the proposed project activity, Members of the Gram Panchayat, Environment officer of Karnataka State Pollution Control Board.

The meeting started with the welcoming of the respected Guests and other Participants by the Mr. SMR Prasad which was then followed by electing Mr. Sharana Gouda, Deputy Tahsildar of Snadur Taluka, as the Chairman of the meeting.

The Schedule and Agenda of the Local Stakeholders' Meeting has been:

- Election of the Chair of the meeting and approval of the proposed Agenda
- Presentation of the details of CDM Project that is to be implemented and commissioned at JSW
- Presentation about Kyoto Protocol and role of local stakeholder
- Discussion and Articulation of concerns and issues about the CDM project activity
- Chairman summarizing the local stakeholders' concerns
- Vote of Thanks.

After the chairman announced the schedule and agenda of the stakeholder meeting he requested the participants to suggest any further items to be included in the agenda. As there were no further suggestions for inclusion in the agenda and there was consensus on the item of the agenda, the chairman called upon Ms. Yashaswini to make a presentation on CDM projects to be undertaken and the presentation on CDM-Kyoto Protocol.

The rationale behind taking up these CDM activities was made known to the various stakeholders. A general overview briefly describing the project activity was presented.

After the presentation, the chairman once again highlighted the role of the local stakeholders in the CDM process and requested the stakeholders to articulate any concerns that they may have on all the CDM projects. He also requested the project proponents to provide clear and direct answers to the concerns raised by the stakeholders.

The stakeholders viewed JSW Steel as a reputed company contributing to local environmental benefits and socio-economy through such initiatives. Overall there was unanimous agreement that the project activity was really a proactive initiative by the project party, which contributes, to the sustainable development.

Mr. Srinivas Rao proposed the vote of thanks and the meeting ended with thanks to the chair.

E.2. Summary of the comments received:

The local stakeholders appreciated the CDM initiative and applauded the fact that it would be without additional resource use and also without emissions of harmful gases. They put forth their concerns as tabulated below:

Stakeholder concern / question / comment	Answer / outcome
ENVIRONMENTAL	
Does this project lead to increase in discharge of gaseous, liquid and/or solid wastes? If yes, what are the impacts? Name: Mr. C.B. Singh	By using waste heat, we are reducing the use of fuel. Thus there will be reduction in the release of gaseous emissions, which will mean fewer effluents and much fewer wastes. The impact is positive to the environment.
The process of CDM was requested to be elaborated Name: Mr. G. Krishnamurthy	The question was addressed and process explained in local language ie. Kannada.
Will the emissions from the project affect the life of flora in the region? Name: Mr. K.J. Sivakumar	No. Since there are no discharges which would effect nearby villages from this project, there is no impact on the surrounding flora.
How do CO_2 emissions contribute to global warming? Name: Mr. A.V Achar	The increase in CO_2 emissions in the region causes the trapping of Sun rays that enter earth's atmosphere. As the quantum of emission rises it makes it more difficult for the trapped heat to escapes earth's atmosphere, causing global warming.
What is the timeline of the project utilization of pressure energy of waste gases by TRT process from Blast furnace-3? Name: Mr. K.S Shankar	September, 2008.
Why should you reduce GHG emissions while it is the commitment of developed nations? Name: Mr. S. Shibu	All the nations ratifying Kyoto Protocol have recognized the need to reduce emissions of GHG's. Since Government of India has ratified the protocol, we have taken these initiatives which would also improve the local environment
What is the adverse impact of waste heat and waste gas which was being flared or emitted into the atmosphere? Name: Mr. Joy. A. Paul	Waste heat is "energy" wasted. If we are able to utilize this waste heat, the requirement of fuel in steel making comes down. This means that our process becomes efficient, our costs comes down and more importantly, less use of fuel reduces the carbon dioxide to the atmosphere, which is a green house gas.
Which division of the ministry in environment and forest handles climate change? Name: Mr. Sunil. Kumar. S	There is a climate change division in MoEF and Mr. R.K. Sethi, Director, heads this Division. You can know more details by logging on to www.envfor.nic.in
ECONOMIC	
Does this project lead to cost savings in energy production?	The project does not lead to any cost saving for energy production. On the other hand even though being not so economically attractive, JSW has proceeded with the project keeping in mind the long term benefits of reducing the green

Stakeholder concern / question / comment	Answer / outcome
Name: Mr. Vinay Kumar Kalmath	house gas emissions.
What is the technology to be employed? Name: Mr. S.Irfan	Blast furnace Top Gas Pressure Recovery Turbine (TRT) for Power generation
What is the projected timeline? Name: Ms. Salma Bhisti	20 years
Do you anticipate any new work contracts for local contractors? Name: Mr. Basha	All these projects can only be implemented through involvement of several agencies. Yes we will require many contractors to execute these projects.
Does the project increase employment opportunities in the area? Name: Mr. Vilas. P. Salwe	The implementation of these projects will mean installation of new equipment, facilities and systems. We will require men to operate these facilities efficiently.
SOCIAL	
What safety measures are there for its transportation so that gas does not leak and cause safety hazards? Name: Mr. J. Ramesh	All the pipelines are designed, fabricated and erected as per the relevant codes. Thus there are no chances of leak. In case of minor leaks, the gases will be diluted making them non toxic. In case of an accident, due to unforeseen circumstances, there could be release of gases. We have in practice what is called the onsite and off site emergency plans to take care of such emergencies. Off site emergency plans relate to the surrounding community.
What development in the region can be availed from the projects? Name: Mr. G. Prakash	The implementation of these projects will lead to direct and indirect employment to the people in the surrounding areas. Development of any kind will lead to improvements in infrastructure, local economy and the quality of life in the area.
Are there any poisonous components in waste gas? Name: Mr. S.K. Suhail	Fortunately, the waste gases from the steel industry are not toxic. The gases contain mainly nitrogen, carbon dioxide, oxygen etc. The gases also contain pollutants like sulphur dioxide, nitric oxides, dust, which are kept under control as per the norms regulated by the statutory authorities.

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

>>

The stakeholders viewed JSW Ltd as a reputed company contributing to the local economy. The participants sought clarifications on Kyoto Protocol and Clean Development Mechanism processes. The different groups of stakeholders were unanimous in their opinion that the proposed project had no adverse effects on people or their livelihood and that the project is a beneficial one.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	JSW Steel Limited
Street/P.O.Box:	5-A, Dr. G. Deshmukh Marg
Building:	Jindal Mansion
City:	Mumbai
State/Region:	Maharashtra
Postcode/ZIP:	400 026
Country:	India
Telephone:	0091 22 23513000
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E-Mail:	naresh.lalwani@jsw.in ; alok.vijayvergiya@jsw.in
URL:	www.jsw.in
Represented by:	
Title:	Deputy General Manager
Salutation:	Mr.
Last name:	Lalwani
Middle name:	
First name:	Naresh
Department:	Corporate Strategy & Development
Mobile:	-
Direct FAX:	0091 22 23526400
Direct tel:	0091 22 23513000
Personal e-mail:	naresh.lalwani@jsw.in

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

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

Annex 3

BASELINE INFORMATION

Assessment of extent of use of WECM and determination of baseline practice factor for CDM project activity implemented in Greenfield facilities using a reference waste energy generating facility (or "reference facility" for the purpose of this annex) and manufacturer's specifications.

The assessment has to be carried out to determine the extent of use of the waste pressure in the baseline scenario. Since the project activity is implemented in a Greenfield facility (i.e. in the Blast Furnace 4), as per Annex 1 of ACM0012, option 1 is applied.

As per option 1, the project facility i.e. the Blast Furnace 4 should be categorised based on following criteria:

- Industry sector
- Product manufactured, its specification and applications
- Production capacity
- Quality of raw material used
- Process flow or technology type
- Configuration of the facility
- Facilities implemented in previous 10 years

As per the above criteria, Blast Furnace 4 is categorized into the above mentioned criteria. Facilities which meet these criteria are also identified. Summary of the same is provided in the table below.

	Project Facility	**Facilities other than the project facility**				
Criteria	**JSW Steel BF- 4 (project facility)**	**TATA Steel- Blast Furnace 'H'**	**TATA Steel- Blast Furnace 'I'**	**RINL**	**Bhushan Steel**	**JSW Steel BF-3**
Industry sector	Steel	Steel	Steel	Steel	Steel	Steel
Product manufactured, its specification and applications	Product manufactured: Hot metal Application: Used for steel production	Product manufactured: Hot metal Application: Used for steel production	Product manufactured: Hot metal Application: Used for steel production	Product manufactured: Hot metal Application: Used for steel production	Product manufactured: Hot metal Application: Used for steel production	Product manufactured: Hot metal Application: Used for steel production
Production capacity	2.7 MTPA[28]	2.5 MTPA[29]	2.9 MTPA[30]	2.5 MTPA[31]	2.5 MTPA[32]	2.7 MTPA[33]

[28] As per the tech specs by supplier

[29] Capacity of Blast Furnace 'H' http://www.steel-grips.com/newsdesk/asia/Blow-in_of_new_TATA_Steel_H_blast_furnace.html

Quality of raw material used	Sinter, sized ore, quartzite, coke and injection coal	Sinter, sized ore, quartzite, coke and injection coal	Sinter, sized ore, quartzite, coke and injection coal	Sinter, sized ore, quartzite, coke and injection coal	Sinter, sized ore, quartzite, coke and injection coal	Sinter, sized ore, quartzite, coke and injection coal
Process flow or technology type	See footnote[34]	See footnote[35]	See footnote[36]	See footnote[37]	See footnote[38]	See footnote[39]
Configuration of the facility	The steel is manufactured through BF route.	The steel is manufactured through BF route.	The steel is manufactured through BF route.	The steel is manufactured through BF route.	The steel is manufactured through BF route.	The steel is manufactured through BF route.
Implementation year	14/09/2011[40]	May 2008[41]	2010[42]	20/05/2006[43]	Dec 2007[44],[45]	29/01/2010[46]
Equipped with TRT	Yes	Yes	Yes	Yes	Yes	Yes
Use of waste energy	Waste pressure is fully used	Waste pressure is fully used	Waste pressure is fully used	Waste pressure is fully used	Waste pressure is used for	Waste pressure is fully used

[30] http://www.tatasteel.com/investors/annual-report-2010-11/html/expansion-initiatives-india.html

[31] http://www.vizagsteel.com/index.asp?sm=1&url=code/expansion/expansion.asp

[32] http://articles.economictimes.indiatimes.com/2007-09-05/news/27684910_1_blast-furnace-l-t-paul-wurth-turnkey-construction

[33] As per tech specs by supplier

[34] http://www.jsw.in/companies/steel_process_flow.shtml

[35] http://www.tatasteelindia.com/products-and-processes/processes/steel-making-process.asp

[36] http://www.tatasteelindia.com/products-and-processes/processes/steel-making-process.asp

[37] http://www.vizagsteel.com/code/Infrastr/ccp.asp (the link provides details of the units installed at Vishakhapattanam plant)

[38] http://www.bhushanltd.com/orissa-plant.htm

[39] http://www.jsw.in/companies/steel_process_flow.shtml

[40] Date of commissioning

[41] http://www.steel-grips.com/newsdesk/asia/Blow-in_of_new_TATA_Steel_H_blast_furnace.html

[42] http://www.tatasteel.com/investors/annual-report-2010-11/html/expansion-initiatives-india.html

[43] http://www.vizagsteel.com/code/expansion/expansion.asp (Date of official launching of the expansion programme of the Visakhapatanam Steel Plant from 3.6 MTPA to 6.3 MTPA by PM)

[44] http://articles.economictimes.indiatimes.com/2007-09-05/news/27684910_1_blast-furnace-l-t-paul-wurth-turnkey-construction (Expected date of commissioning while the implementation started before this)

[45] http://bhushan-group.org/pdf/Annual-Report-2009-10.pdf

[46] Date of commissioning

	for power generation	for power generation	for power generation	for power generation	power generation.	for power generation
TRT project under CDM validation or registered	Under validation	Registered[47]	Under validation[48]	Under validation[49]	NA[50]	Under validation[51]

From the above list it can be seen that, all 5 facilities have TRT to produce power by utilizing the pressure of the BF gas. However, 4 facilities have taken their respective projects under CDM.

Thus, from the above table it can be said that more than 50% (i.e. 80%) of the facilities do not use waste energy (without the implementation of the project as CDM project) and the remaining 20% facility i.e. presence of TRT in Bhushan Steel will not create issue in this analysis because its commercial operation period is after the start date of project activity[52], therefore the proposed project facility also would not have used the waste pressure of the gas in the baseline scenario. Therefore,

$f_{practice} = 0$.

For use of option 1, it is necessary that at least five facilities are analysed to arrive at "reference facility" practice. However, most of the identified facilities are under CDM. Hence project participants is not able to arrive at five facilities of similar type as the Greenfield project facility .Thus PP has evaluated Option 2.

Option 2: Assessment of alternative design of the project facility

The manufacturer of the project facility was invited to submit an alternative design including the usage of WECM that is recovered under project. As per manufacturer of the project facility (i.e. Siemens VAI), there is no alternative design to utilize the waste pressure as it is very low (2.2 bar) other than TRT technology. Siemens VAI says "TRT plant is the only process adopted on Blast Furnace plants to utilize the pressure energy and there is no alternative design to use the waste energy"[53]. In the absence of the project activity, the pressure of the BF-4 gas would have been lost through septum valve and thus would have remained unutilized.

[47] http://cdm.unfccc.int/UserManagement/FileStorage/U13POFKA9XZ5M2JV604EN8BRIDWLHG

[48] http://cdm.unfccc.int/Projects/Validation/DB/PYO9GYGQWE7N9B8YKYVMUM70OX4RR8/view.html

[49] www.vizagsteel.com/code/press/pressrelfiles/28707.07.10-polution.pdf

[50] Presence of TRT in Bhushan steel will not have impact in Common Practise Analysis (CPA) , because Annual report 2009-10 of Bhushan steel says BF 2 is under construction and the TRT is based on BF 2. So Bhushan steel will get eliminate in CPA by commercial operation date criteria (i.e. commercial operation should before the start date of project activity which is 2007).

[51] http://cdm.unfccc.int/Projects/Validation/DB/PMWKY4W12YD4ED4OPBLEP30U5YLS6D/view.html

[52] As per para 47, step 2 of EB 69,Annex 20.

[53] Document on Alternative design for project activity by Siemens VAI

Annex 4

MONITORING INFORMATION

The information related to the monitoring of parameters has been provided in section B.7.1 above.

Annex 5

MONITORABLE ACTION PLAN TO ALLOCATE 2% OF CDM REVENUE FOR SUSTAINABLE DEVELOPMENT

The Project activity involves the installation of top pressure recovery turbine (TRT) to utilize the pressure energy in the blast furnace gas (BF-4) that is currently being wasted, for electricity generation. The power generated in the process would supplement the captive power generation unit to meet the in-house power requirement of the steel plant. In the absence of the project activity, this power demand would have been met from coal based power plant. Thus, the project activity contributes to GHG emission reductions by displacing power generation from GHG intensive fossil fuel (i.e. fuel produced by coal-combustion) with that of zero-GHG emitting fuel.

The project contributes in sustainable development of the nation as follows.

Socio-economic development:

- The project activity will result in positive social return (e.g. Employment growth, improved education, improved facilities) in the neighbourhood of the plant.
- The facilitation of the proposed project activity will generate skilled and unskilled employment opportunities for people during the execution phase of the project which will have a direct bearing on improving their professional skills as well as qualify their lives.
- By promoting rapid technological advancement, the project activity will contribute to capacity building in terms of technical know-how and vocational skills.

The project proponent commits to contribute 2% of the revenue from the sale of CERs on realization, towards the social welfare activities and implement the following.

1. Conducting free medical camps in rural areas nearby
2. Medical assistance to weaker section of the society
3. Educational assistance for poor and handicap children in villages
4. Employment opportunities for physically handicapped
5. Assisting in improvement of infrastructure like lighting, water supply etc.
6. Participating in other social welfare scheme of own or conducted by others.
7. Funding to the Non Governmental Organization for the social welfare activities

These activities will be implemented either directly or by equivalent monetary donations to the organizations working in these areas and sectors. The allocation of committed money to be spent will be decided by the PP on realization of revenue from sale of CERs and as per the needs realized in future.

ANNEX 6

POWER SCENARIO AT THE TIME OF INVESTMENT DECISION

JSWSL Steel plant capacity			**JSWSL Power scenario**		
Steel plant capacity mtpa (blast furnace)	**Investment decision date**	**Year of commissioning**	**JSWSL power source**	**JSWSL power source (MW)**	**Year of commissioning**
BF-1,2 ; 3.8MTPA	2003-2004	April 2004/ September 2006	CPP-1	100 (BF Gas)	April 2005
BF-3; 7MTPA	October 2006	February 2009	CPP-2	130 (BF Gas)	September 2006
BF-4; 10MTPA	April 2007	September 2011	CPP-3	300 (Coal)	September 2010
			CPP-4	300 (Coal)	March 2012

ANNEX 7

POWER BALANCE REPORT

At 10 MTPA expansions, the total power available with JSW Steel Ltd is 830 MW. The power requirement of 10 MTPA expansion is met by 300 MW coal based CPP-4 (as per 10 MTPA expansions DPR). The operation of TRT-4 i.e. 12.4 MW would reduce the equivalent power generation from CPP-4 (Coal based 300 MW power plant) and saving the equivalent coal consumption in CPP-4. The power balance of JSW Steel Limited with TRT-4 is presented in below table.

Unit	Production in Million Tonnes	Sp. Power kWh/T-Product	Actual load in MW at 4MT Stage	Actual load in MW at 7 MT stage	Actual load in MW at 10 MT stage
Sinter Plant I	**2.5**	**40**	**11.42**	**11.42**	**11.42**
Sinter Plant II	**2.5**	**40**		**11.42**	**11.42**
Sinter Plant III	**5.57**	**40**		**11.42**	**11.42**
Pellet Plant	**5**	**65**	**37.1**	**37.1**	**37.1**
Pellet Plant II	**5**	**65**			**37.1**
Ore beneficiation Plant	**16**	**18**		**16.44**	**32.88**
Coke Oven - I &II	**1**	**13**	**1.48**	**1.48**	**1.48**
Coke Oven - III	**1.55**	**50**		**8.85**	**8.85**
Coke Oven - IV	**2**	**50**			**11.42**
Corex I&II	**1.8**	**82**	**16.85**	**16.85**	**16.85**
Blast Furnace I&II	**2.5**	**56**	**15.98**	**15.98**	**15.98**
Blast Furnace III&IV	**6**	**56**		**19.18**	**38.36**
Blowers	**6**	**92**		**31.51**	**63.01**
BOF[54]-CCP-1	**4**	**62**	**28.31**	**28.31**	**28.31**
BOF-CCP-II	**6**	**62**		**21.23**	**42.47**
HSM[55]-I	**3.2**	**110**	**40.18**	**40.18**	**40.18**
HSM-II	**5**	**110**		**43.95**	**62.79**
Bar Mill	**1**	**110**		**12.56**	**12.56**
Wire and Rod Mill	**0.6**	**165**	**17.12**	**17.12**	**17.12**
CRM[56]-I	**1**	**150**			**34.25**
CRM-II	**2**	**150**			**34.25**
Others			**6.85**	**4.57**	**6.85**
Total JSW			**175.29**	**349.57**	**576.07**

[54] BOF - Basic Oxygen Furnace

[55] HSM – hot strip mill

[56] CRM – Cold Roll Mill

Slag Grinding Unit			**2.05**	**2.05**	**2.05**
Oxy Plant -JPOCL[57]-I&II			**76**	**76**	**76.03**
BOC-I			**17**	**17**	**17**
BOC-II				**30.6**	**30.6**
PIPL					**42.24**
Addt 850 TPD O2 Plant					**20**
850 TPD O2 Plant (for coal beneficiation)					**20**
Total Power Required			**270.34**	**475.22**	**783.99**
Power generation details					
CPP-I & CPP-II (Gas based)			**230**	**230**	**230**
CPP-III & IV (Coal based)			**0**	**300**	**600**
Total Generation (without TRT)			**230**	**530**	**830**
Net Power Generation @ 95% of gross power (without TRT)			**218.5**	**503.5**	**788.5**
TRT III & IV				**12.4**	**24.8**
Total Generation (with TRT)			**230**	**542.4**	**854.8**
Net Power Generation @ 95% of gross power (with TRT@60%)			**218.5**	**515.28**	**803.38**

JSW SL (at 10 MTPA capacities) is self sufficient in meeting its power requirements by mean of its own CPPs (CPP-1, CPP-2, and CPP-3 & CPP-4). In the absence of complete installation of all CPPs or breakdown of any CPP, JSW Steel Ltd has option to source power from JSW Energy Ltd for uninterrupted operation of its steel plant. Hence on conservative basis, PP has accounted the associated emission factor of JSW Energy Ltd power units in computation of internal grid emission factor.

[57] Jindal Praxair Oxygen Co. Ltd

ANNEX 8

EX-POST- EMISION FACTOR CALCULATION FOR ELECTRICITY SYSTEM –

Power Plant	$EF_{Grid\ OM\ simple}$						
	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12
CPP1	0.44	0.71	0.72	0.92	0.98	0.94	0.92
CPP2	0	0	0	0	1.08	1.19	1.41
CPP3	0	0	0	0	0	0.90	0.91
SBU I	0	0	0	0	0.66	0.69	0.59
SBU II	0	0	0	0	0.92	0.90	0.92
$EF_{grid,OM-ave,y}$	0.09	0.14	0.14	0.18	**0.73**	**0.92**	**0.95**

The project activity TRT-IV displaces the coal consumption in CPP-4 by utilizing waste pressure of BF-4 gas for power generation. CPP-4 is connected to internal grid where CPP-1, CPP-2, CPP-3 ,SBU-I and SBU-II also feeding the power . The CPP- 4 got commissioned in late 2012, hence emission factor of CPP-4 is not considered due to insufficient data availability.. On availability of operational data, CPP-4 data/parameters will be monitored and used in computing emission factor of internal grid in ex-post. The emission factor for internal grid is calculated as per "Tool to calculate the emission factor for an electricity system" based on actual operational parameters. The calculation steps are presented below and it's been followed for all above mentioned power plants to establish emission factor. Detailed calculation spread sheet for emission factor of internal grid is provided separately.

Model calculation for CPP 3 (2011-12)

$$EF_{EL,m,y} = \frac{\sum_i FC_{i,m,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{EG_{m,y}}$$

= [(874,265,000 kg/yr) *(0.02 GJ/kg)*(0.10 tCO_2/GJ)] / 2050910 MWh

= 0.91 tCO_2/MWh

$$EF_{grid,OMsimple,y} = \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}}$$

= (2050910 MWh * 0.91 tCO2/MWh) / 2050910 MWh

= 0.91 tCO_2 / MWh

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