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

CONTENTS

Annexes

SECTION A. General description of project activity

A.1 Title of the project activity:

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Title of project activity : AIPL WHRB 1&2

CDM document version No : 1

Date of the CDM document : 03 February 2007

A.2. Description of the project activity:

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Purpose of project activity

The purpose of the proposed project activity is to generate electricity by generating steam using waste heat contained in the waste flue gases released from two numbers of ABC (After Burning Chamber) from two numbers of 350 TPD/each DRI (Direct Reduction Iron) sponge iron kiln. The heat contained in waste gases will be transferred to water, which converts water in to steam in two numbers of WHRB (Waste Heat Recovery Boiler) producing 37.5 tph and 38 tph of steam respectively at 66 kg/cm^2 pressure and 490±5, 485±5 deg c temperature respectively. The steam produced will be fed into STGs (Steam Turbine Generators) to generate total 16 MW electricity from Waste Heat.

The purpose of the project activity is to achieve better energy efficiency, achieve sustainable development in the industry and improve the working environment of Sponge Iron-making process. The power so generated shall mainly be used to meet the captive power requirement of AIPL Plant itself.

The net result is reduction in the demand of electricity from coal based captive power supply and resultant reduction in GHG emission; from coal based captive power generation.

Background of the company

AIPL is putting up an integrated steel complex to produce Sponge Iron, Steel billets, Wire Rods; etc. The Company is implementing the project in phases. In phase -1, the company has installed 1 No. DRI sponge iron rotary kiln with 350 tonnes / day (105000 tonnes/annum) capacity using Coal as fuel, 2 numbers induction furnaces to produce steel each having 12 tonnes crucible capacity along with a CPP.In second phase another 350 tpd sponge iron kiln will be set up. The company will establish in total 37 MW capacity CPP out of which 16 MW will be WHRB power and remaining 21 MW will be Coal, Char Dolachar based power. The installed CPP is having a 12 MW TG set which presently generates 8 MW power from WHRB steam, which is the part of the project activity, the remaining 4 MW capacity of TG will be utilized to generate power after the commissioning of Coal based FBB, by drawing steam from the Coal based FBB. In the ongoing phase of expansion the company is installing another 8 MW WHRB and 21 MW Coal based fluidised boiler along with 25MW capacity TG set. This 25 MW TG will generate 8 MW power from Steam generated out of waste heat through WHRB and 17 MW power from Steam generated out of coal based Fluidised bed boiler. Thus the company is implementing the total 16 MW WHRB power plant as CDM Project activity which includes the existing 8 MW WHRB & the second 8 MW WHRB as a CDM project activity. The company will be following CDM registration procedures for the entire capacity.

It will be evident from the above, that the company is implementing 37 MW captive power plants by installing two TG sets, one with 12 MW and second with 25MW capacity. Out of which 16 MW power will be generated from waste heat recovery boiler steam, by setting up two nos. of 37.5 tph and 38 tph capacity WHRB to produce total 75.5 tph steam and the remaining steam will be generated from Coal Based Fluidised Bed Boiler. The generated power will be consumed firstly to meet the auxiliary power requirement of the WHRB, FBB and captive power plant and then balance for in house captive requirement for the associated industrial manufacturing activities such as operation of Induction furnace, Sponge Iron Plant, for production of steel and sponge Iron etc. The balance back up or standby support power required to meet the fluctuating power generation from WHRB, would be drawn from WESCO which is the local grid and which is part of eastern regional grid.

The main carbon benefit from the facility of the project arises from the replacement / displacement of an equivalent amount of electricity to the extent of 16 MW electricity generated from steam which is produced from waste heat recovered from waste gases in two WHRBs, which would have been otherwise generated by increasing the capacity of the Boiler of the Coal based captive power plant, at the same time the heat contained in the flue gases would have been let to the atmosphere without any utilisation, as the company has no other use for the waste heat and there is no legal requirement to recover the heat for any other use-full purpose.

The total CO_2 emission reduction for the entire crediting period of 10 years, have been calculated at 965889.61 Tonne CO_2 equivalents in 10 years. The other benefits being reduction of CO_2 emissions considering global scenario, sustainable development through better energy efficiency and it also leads to the improvement of local environment.

AIPL will have proper monitoring system to calculate the power generated out of the CPP and accurately record the reduction in CO_2 emissions. AIPL will follow monitoring plan to achieve complete transparency in monitoring, recording and calculating reduction in CO_2 emissions.

The Project activity achieves the following goals.

- Utilisation of heat energy of waste gas.
- Meet the power requirement without any T & D losses.
- Helps to become self reliant and less dependant on grid supply of electricity.
- Upgraded technology to achieve sustainable Industrial growth in State.
- Conserve natural resources and environment.
- Promotes the sustainable development.

The project activity will lead to sustainable development and promote sustainable Industrial growth by conserving natural resources and preventing the thermal pollution even though no such statutory requirement exists.

Social benefit to state

The project activity increases the employment within the company for skilled manpower and Professionals due to the project activity. The project activity also increases the employment outside the company for skilled manpower and Professionals due to the implementation as well as operation of the project activity.

Economical Benefits to State

The state will generate revenue out of the manufacturing activities supported by the captive power generation and due to purchase of equipment for execution of project by way of Sales Tax; Excise Duty; Entry Tax etc.

Environmental Benefit

The Project activity uses waste heat recovery based Power Plant by utilizing waste heat from flue gases coming from process and thus effectively saving environment of thermal pollution. The project activity displaces power from fossil fuel based captive power of the company and hence reduces CO_2 emission. The WHRB power saves coal combustion thus to this extent the fly ash generated pollution is saved in addition the pollution caused in the coal mining and transportation also is saved.

Reduction of T & D Losses of Power

The Power generated by the project activity will be used for in house requirement and consumption without any significant T&D losses. This is significant as grid has more than 32% T&D loss.

Reduction in SPM level in the Atmosphere and other additional Economic benefits

The proposed ESP shall remove the ash from Flue Gases which will reduce the SPM levels in the atmosphere. The ash will be collected in ash hopper and will be given free of cost to cement plants & brick manufactures for further Economic benefit and use. The ash used for production of bricks saves the valuable productive soil, also it reduces the air pollution caused by the conventional brick kilns due to the coal burning. The ash used in cement making also reduces the Coal and limestone consumption as well as reduces the CO2 emission to the extent.

A.3. Project participants:

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Name of the Party Involved (host) host party-	Private and/or Public entity (ies) Project Participant as applicable	Kindly indicate if the party involved wishes to be Considered as project participant (Yes/ No)
India (host) **Ministry of Environment and Forest**	**Action Ispat & Power (P) Ltd--** 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):

>> India

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

>> Orissa, India

A.4.1.3. City/Town/Community etc:

>> Village:Marakuta & Pandaripathar, District:Jharsuguda

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

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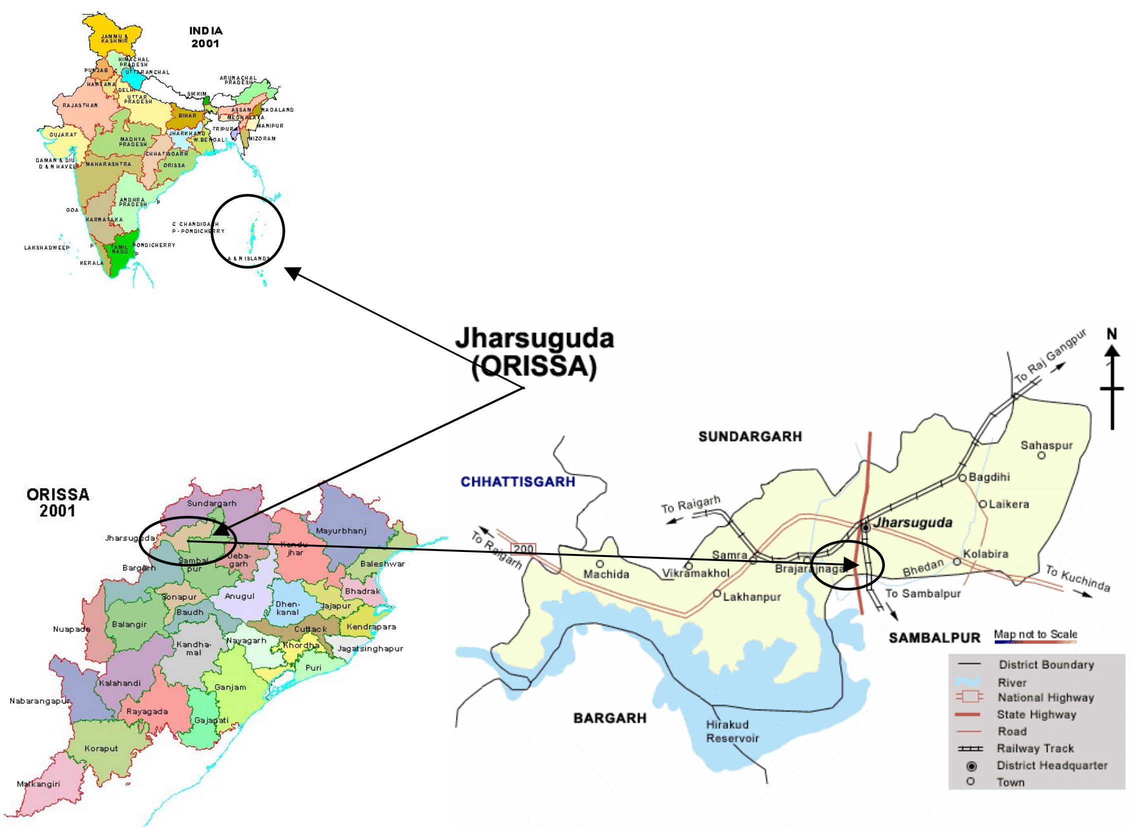
Physical Location:

The company is located at village Marakuta & Pandaripathar about 5 KM from Jharsguda town. The plant site is 3 km from national highway no.200 between Raigarh & Kuchinda.



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

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The project activity is an electric power generation project utilising waste heat where aggregate electricity generation savings is equivalent to 88704 MWh per year. The project activity may be principally categorised in category –1 Energy Industries (Renewable /non renewable) as per Scope of Projects activities enlisted in the "list of sectoral scopes and approved base line and monitoring "methodologies" on the website for accreditation of "Designated operational Entities".

The CDM PDD is based on approved methodology ACM0004 version 02 and sectoral scope; 01 03 March 2006 "Consolidated Baseline methodology for waste gas and/or heat and/or pressure for power generation" of 03 March 2006"

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

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WHRB based captive Power Plant at AIPL is proposed to utilise the waste heat content of flue gases coming out of ABC of sponge iron kiln.

The Exhausted flue gases from rotary kiln shall be received at ABC for further incineration where the waste gas temperature likely to reach upto 950^0C after ABC. No auxiliary fuel is fired in ABC. The generated quantity and the temperature of flue gases are influenced by a number of operating parameters of the sponge iron plant. At the best operating levels this waste heat shall produce 37.5 tonnes/h and 38 tph of steam from boilers at 66 kg/cm2a pressure at 490 ± 5^0C 485 ± 5^0C temperature in WHRBs.

The outlet boxes of the WHRB, leads to ESP to remove SPM from exhaust gases. The exhaust gas temperature shall be kept at 170^0C. The feed water temperature will be maintained at the inlet to economiser 126^0C.

The high pressure steam from WHRB (75.5 tonnes/hr) will be used to operate high efficiency extraction cum condensing multi stage STGs to generate 16 MW Electricity from WHRB.

Ash collected from both WHRB hoppers & ESP will be conveyed pneumatically to ash silo.

Other systems required are circulating water, Demineralised water plant, Instrument Air Compressor and Exhaust Steam Condenser.

Steam from exhaust of STG rotor will be condensed in water cooled condenser.

Only DM (De Mineralised) water will be used in boiler to avoid scale formation on boiler tubes.

Total Waste water is recycled and reused after treatment.

The generated power shall be used to meet the captive power requirement of the company.

The technology is environmentally safe and abides all legal norms and standards for SPM, emissions.
The project activity is likely to operate maximum for 330 days in a year. No supplementary fuel is used in WHRB.

The project activity was started with equipment selection and ordering process in 15 November 2004. The First 8 MW WHRB Captive Power Plant was commissioned in 27 November 2006 and the zero date for CER calculation & quantification of CO_2 reduced by this Project activity would be from the date of registration as CDM project activity or if approved by CDM Executive Board from date 27 November 2006.

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

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Years	**Annual estimation of emission reductions in tonnes of CO_2eq**
2007-2008	51612.42
2008-2009	88478.43
2009-2010	103224.84
2010-2011	103224.84
2011-2012	103224.84
2012-2013	103224.84
2013-2014	103224.84
2014-2015	103224.84
2015-2016	103224.84
2016-2017	103224.84
Total for credit period	**965889.61**
Average per year	**96588.96**

A.4.5. Public funding of the project activity:

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

SECTION B. Application of a baseline and monitoring methodology

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

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Consolidated baseline methodology for waste gas and/or heat and/or pressure for power generation.ACM0004/ Version 02, Sectoral scope : 01, 3rd March 2006.

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

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The approved methodology applies to electricity generation project activities;

- that displaces electricity generation with fossil fuels in the electricity grid or displace captive electricity generation from fossil fuels,
- Where, no fuel switch is done in the process where the waste heat or pressure or the waste gas is produced after the implementation of project activity.

The methodology covers both new and existing facilities.

The project activity meets the applicability as it meets the above conditions set out in approved methodology

1. The steam produced by WHRB by recovering waste heat from flue gases coming out of DRI sponge iron kiln, is used to generate electricity in STG. The Power will be used in house.
3. In the absence of the Project activity, the electricity requirement would have been met by coal based captive power generation. The CO_2 emission reduction will be achieved by reduction of corresponding CO_2 emissions in fossil fuel based captive power plants of the company. .
4. There will be no fuel switch in sponge iron manufacturing process after the implementation of the project activity.
5. The base line calculations for CO_2 emission reduction are in line with approved methodology and are calculated using IPCC values and the performance data provided by the manufacturer for the TG set and the Boiler.
6. The project activity also reduces the thermal impact on the environment of the local area by recovering waste heat from flue gases.
7. By successful operation of project activity, the project activity will be able to displace/ substitute equivalent to 16 MW power from Coal based captive power plant of the company, with an average emission reduction of 96588.96 tCO_2/annum (**Ref. Section- B 6.3**).
8. The project activity adds no additional GHG emission.

Hence it is concluded that the selected methodology meets the conditions set out in approved methodology

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

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In line with methodology, the project activity is for the recovery of waste heat from flue gases for generation of steam for the electricity to be generated from CPP.

In the base line scenario, the electricity would have other wise been generated by fossil fuel based captive power plants of the company.

In line with methodology the project boundary comprises of the WHRBs, STGs, Auxiliary equipment, Power synchronising system, steam flow piping, flue gas ducts, where project participant has full Control.

Overview on emission sources included in or excluded from the project boundary

	Source	*Gas*		*Justification / Explanation*
Baseline	*Coal Based Captive Electricity generation*	*CO_2*	*Included*	*Main emission source*
		CH_4	*Excluded*	*Excluded for simplification. This is conservative.*
		N_2O	*Excluded*	*Excluded for simplification. This is conservative.*
Project Activity	*Heat of waste gas for electricity generation*	*CO_2*	*Excluded*	*In absence of the Project Activity the hot gases would have been let to the atmosphere. As well as no extra fuel or support fossil fuel is fired.*
		CH_4	*Excluded*	*Excluded for simplification*
		N_2O	*Excluded*	*Excluded for simplification*

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

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We explain below the basic assumptions of the base line methodology.

1. Project activity displaces the CO_2 emissions from fossil fuel based captive electricity generation from the captive power plant based on the coal.
2. Project activity is based on waste heat recovery to generate up-to 16MW electricity to be used for captive purposes mainly, without emitting any additional GHG.
3. There is no provision to use any other fuel in the proposed Project activity other than waste heat from flue gases coming from ABC of Rotary kiln.
4. There will be no fuel switch in rotary kiln from where the waste gases are produced and, further used in project
5. In the absence of Project activity, the electricity requirement would have been met by Coal based Captive power generation. The CO_2 emission reduction will be achieved by reduction of corresponding CO_2 emission in fossil fuel based Captive power plants of the company.
6. There is no legal binding that the waste heat is to be recovered.
7 So far any other use of waste heat in any other way would not effectively reduce the CO_2 emissions directly / indirectly. AIPL has no other alternative use for thermal energy.

As highlighted in baseline methodology we consider the following potential alternatives

1. Proposed project activity not undertaken as a CDM activity
2. Import of electricity from grid
3. New CPP based on Diesel oil as alternative fuels

4. New CPP based on Gas alternative fuels
5. New CPP based on Coal as other alternative fuels
6. A combination of 2,3,4 and 5
7. Alternative use of waste heat from flue gases
8. The continuation of the current situation

Detailed explanations of each alternative are given below:

1. Proposed project activity not undertaken as a CDM activity

In absence of the CDM benefit the proposed project activity possibly could not be implemented due to number of barriers such as Technology barrier, Financial barriers, Investment Barrier etc. as explained in B.3.

In absence of the proposed project activity the unit would meet the complete electricity requirement by generating power from Coal based captive power plant at the same time the waste heat `contained in the flue gases would have been emitted to the atmosphere.

2. Import of electricity from grid

This will meet all legal and statutory obligations of Country. As the power from WESCO grid is mainly fossil fuel based the reduction of CO2 emissions is not achieved in this situation. The electricity purchase rate is high compared to captive based power generation cost and company has to face power tripping due to poor grid infrastructure resulting in production loss. Hence, AIPL is putting up 37 MW captive power generating capacity to avoid production losses due to power interruptions.

3. New CPP based Diesel oil as alternative fuels

A CPP based on diesel oil/ furnace oil can be installed. The Diesel or any Petroleum Fuel based Power Plants are not feasible because of highly fluctuating rates and higher cost of generation, than the coal based CPP power cost and even grid power cost. Also this option will add GHG gas emissions to the existing scenario. It also involves high capital cost and high cost of operation.

4 New CPP based Gas as alternative fuels

Natural gas is not available in this area and hence ruled out as possible fuel.

5 New CPP based on Coal as alternative fuels

AIPL has already obtained necessary approval by seeking IEM to generate power from coal based thermal power plant. Coal is abundantly available fuel as the state lies within the coal belt. In addition company will be generating huge quantity of char/dolachar, which can be used. In addition char / dolachar can also be sourced from other sponge iron manufacturers at no cost. A huge quantity of washery reject coal also is available at nominal cost. The generating cost of purely coal based (based on char/ dolochar and washery reject) CPP will be lower as well as generation will be regular with +95 % PLF.

There is no legal compulsion for Sponge Iron Plant to set up the captive power generation or to set up a waste heat recovery system. In addition to this there is also no restriction to generate own power through a CPP based on 100 % Coal or based on coal mixed with Char/ Dolochar, Washery Reject. Hence Coal, Char / Dolachar, Washery Rejects based captive power plant is economically most attractive.

6 A combination of 2&3/4/ 5

The combination faces the same difficulties as in 2, 3, 4 or 5. Hence the combination is not feasible.

7. Alternative use of waste heat from flue gases

The waste heat is not useful in any form of use in the existing plant as AIPL does not have any heating requirements in the process of manufacture of sponge iron where thermic oil or hot water or Hot Steam can be used. Generally the hot gases are let out into atmosphere leading to thermal emission. So far other use for waste gases and waste heat has not been developed in sponge iron manufacturing.

8 The continuation of current situation

Currently the AIPL is drawing power from WESCO grid. It can continue to do the same. However the company does not want to depend only on grid power as grid has frequent tripping of power which result in production losses.
Other alternatives common to similar units:

1. Most of the units operating induction furnaces independently have opted for grid power. But due to frequent power cuts and high tariff of power, they are facing problem.
2. Many units have put up coal based captive power generation while only a few have put WHRB based CPP due to the CDM strength.

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In view of the above, the only flexible alternative to AIPL is to select a coal based captive power plant which can run on Char/ Dolochar / Washery Rejects. Since WHRB based power is not consistent, Plant can not run only on WHRB power alone. Annualised generation cost of WHRB power is found to be higher than coal based CPP power due to poor PLF and other indirect costs.

Economical Analysis of alternatives

Alternative	**Capital Cost**	**Cost Comparison**	**Comment**
1.Project activity not as CDM activity but installed just as WHRB based power plant	Rs 45.00 million/MW	Annualized per unit cost of power is found higher than fossil fuel based FBC boiler CPP due to poor PLF and uncertain fluctuation.	Various technology, investment & financial barriers will hinder the implementation of the project. Also annualized cost of power will become higher due to poor plant load factor and uncertain fluctuation.
2. Import from grid	Will require payment for line laying cost +	Power procurement cost is higher (including the	AIPL will face power tripping due to poor

	deposit as security for 16 MW supply	weighted average of Demand Charge) than coal, char/dolochar, washery reject based captive power.	transmission system in grid power. This option faces no barrier.
3Alternative fuel HSD	Rs.30.00 Million/MW	Above Rs 8/- unit. ref TISCO diesel power cost	HSD prices escalate regularly and generating cost high. Economically not attractive
4 Alternative fuel GAS	Rs.30.00 million/MW	Not applicable	Not an option as GAS is not available in Orissa state
5 Alternative fuel Coal+ Char/ Dolachar, Washery reject	Rs.35.00 million/MW	Cost of power consumed from captive generation will be lowest because of better PLF and availability of Coal, Char/ Dolochar / Washery reject.	AIPL can put up 16 MW coal based CPP instead of WHRB with lower capital cost, lower generation cost and higher PLF. Company is putting 21 MW coal based AFBC along with 16 MW WHRB based CPP. Coal based CPP is economically most attractive.
6.Combination of grid and coal power	Will require payment for line laying cost + deposit as security for 16 MW supply & Rs.35.00 million/MW for coal based CPP Power.	AIPL will be paying demand charges for the contract demand even if it is not required to draw power as well as incur the power generation cost in captive power plant hence the ultimate cost of power will be higher.	AIPL will be paying much higher cost compared to the coal based captive generation cost. AIPL will also bear power cuts and resultant production loss. .This option faces no barrier
7.Alternative use of waste heat	Not applicable	Not applicable	AIPL has no alternative use for heat energy.
8.Continuation of current situation	Same as alternative 2	Same as alternative 2	This is same situation as Alternative 2.this option faces no barrier

The analysis of the above 8 alternatives shows that the best options available to AIPL is to go for alternative-5 i.e. Coal, Char / Dolochar, washery rejects based power plant. The methodology requires AIPL to select the baseline which is economically most attractive and faces no barrier. Normal choice for baseline is coal based CPP as per methodology.

The project activity displaces CO_2 emissions from the fossil fuel based captive power plant and hence achieves reduction of CO_2 emissions. We select Coal based captive electricity generation as base line to calculate the base line emissions. In line with methodology emission factor will be calculated as in ACM 0002.

Summarization of National Policy on the Environment and Energy Conservation:

(A) <u>National Policy</u>

In India the environment issues are regulated by a number of Acts, such as Environment Protection act 1986, Air (Prevention and Control of Pollution) Act 1981 and Water (Prevention and Control of Pollution) Act 1974, the above acts are enforced by the Ministry of Environment of Forest Govt. of India, Central Pollution Control Board and the State Pollution Control Board, (in Orissa State it is known as Orissa State Pollution Control Board). There are a number of notifications issued by Govt. of India as well as State Govt. towards the control of Air Pollution, Water Pollution and protection of the Environment. In addition to the above the govt. and the above agencies also issue certain guidelines and policies for better Environment protection and pollution control. But these policies and guidelines do not form the part of the Law and Rules to be enforced by the govt.

As per the prevailing Rule and Regulations it is not mandatory to establish WHRB Power Plant with Sponge Iron Plant. The Central Pollution Control Board New Delhi, had issued a draft code on Environment Standard Code of practice for Pollution Prevention of Sponge Iron Plants in November 2005. In which the board has proposed to the entrepreneurs having more than 100 TPD Kiln to establish the WHRB Power generation. But the same is not legally mandatory.

The above code is mainly the suggestive practice which the entrepreneurs can adopt and it is not the part of the Air (Prevention and Control of pollution) Act 1981. Hence this can not be considered as the legal requirement.

(B) <u>Status of the Company</u>

The company has entered into MOU with Government of Orissa on 27 November 2004 after firming up the project plan and subsequently applied for obtaining consent under Air Act and Water Act. Since any industrial activity is required to seek permission to establish & consent to operate from the State pollution Control Board before commencement of the activity . Hence the company applied for the same to OSPCB and the company sought clearances from OSPCB, in line with MOU with the mention of WHRB in the application and so OSPCB clearances mention WHRB, however there exists no regulation or the legal requirement in the present laws to establish WHRB captive power plant by the Sponge Iron Industry.

Key methodological Steps followed in determining the baseline scenario

1. The methodology requires AIPL to establish base line scenario by considering all possible options that provide or produce electricity for in house consumption and /or sale to grid and/or other consumers. The methodology also identifies six possible alternative scenarios.

   We have discussed above, each alternative and shown that the Coal based captive electricity generation as base line scenario**.**

2. The methodology requires us to demonstrate the additionality of project activity using the "latest version of Tool for demonstration and assessment of additionality".

   We have shown the additionality of project activity using the "Tool for demonstration and assessment of additionality version-02 of 28 November 2005'' In Section B.5

3. The methodology applies to electricity generation project activities; that displaces electricity generation with fossil fuels in the electricity grid or displaces captive electricity generation from fossil fuels, where no fuel switch is done in the process where the waste heat or pressure or the waste gas is produced after the implementation of project activity.

   We have established that project activity generates the electricity from waste heat and this electricity displaces Coal based captive electricity generation which is mainly fossil fuel power and there is no fuel switch being done in the Sponge Iron Rotary kiln where the waste gases are produced.

   In Section B.5; we have demonstrated the project activity is additional by using the tool for the demonstration of additionality.

Key Information and data used to determine the baseline scenario

Key information data like generation of electricity, turbine efficiency, steam consumption, steam parameters and steam enthalpy, Calorific value of fuel, oxidation factor emission factors are taken from the following sources to determine the baseline scenario:

1) Steam consumption in TG set per MW of power Generation from the original equipment supplier specification.
2) IPCC Guidelines.
4) The base line calculations for CO_2 emission reduction are in line with approved methodology and data drawn from IPCC and 25 MW turbine specification of manufacturer as it is more efficient in generation of electricity per tonne of steam. Coal based AFBC captive power plant efficiency is conservatively calculated after considering boiler efficiency as 100% in line with Option- B of methodology.

These data are given in Annex-3 under Base line information (Baseline calculations)

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): >>

Explanation of how and why the project activity is additional in accordance with the baseline methodology

It is required to describe how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of registered CDM activity the proposed CDM project activity is designed to generate power from the waste heat only contained in the flue gases emitting out of an established industrial manufacturing process i.e. ABC of Sponge Iron Kiln, only the waste heat in the flue gases will be utilised to generate power without adding any GHG emission whereas in the absence of the proposed project activity power requirement would have been met by the unit by generating power from Coal based captive power plant at the same time the waste heat `contained in the flue gases would have been emitted to the atmosphere.

Hence the project activity achieves reduction in CO_2 emission by displacing the fossil fuel based captive power of the company by WHRB based captive power which does not generate any CO_2.

It is required to explain how and why the proposed project activity is additional and therefore not the baseline scenario in accordance to the selected baseline methodology.

As per the decision 17/CP.7 AND 18/CP.9 a CDM activity is additional, if anthropogenic emissions of GHGs by sources are reduced below those that would have occurred in the absence of registered project activity. The tool for the demonstrations and assessment of additionality (version 2) of 28 November 2005 approved at the 22nd meeting of CDM executive board requires the project participant to demonstrate and assess additionality, as per the steps given below:

1) Identification of alternative to project activity.
2) Investment analysis to determine that the project activity is not the most or financially attractive.
3) Barrier analysis.
4) Common practice analysis.
5) Impact of registration of proposed activity as CDM project activity.

We have discussed realistic and credible alternatives available to project activity in B.2 and have come to conclusion that the-generation of power from Coal based Captive power plant is the baseline scenario. We hereby proceed to establish the additionality of proposed project activity using “the tool for the demonstration and assessment of additionality” (version 02) dated 28 November 2005.

We show that the project activity faces significant technology, financial and investment barriers and in the absence of CDM finance these barriers would impact the project activity.

The base line methodology outlines five steps to demonstrate additionality.

STEP 0 - Preliminary screening based on the starting date of project activity

a.	Provided evidence of the starting date of CDM project activity	The board resolution of 15 November 2004 considered as starting date of project activity. The company recognises that CDM crediting period shall commence after registration or if approved by the CDM-EB from dated 27 November 2006.
b.	Provide evidence that incentive from the CDM was seriously considered in the decision to proceed with the project activity.	The board meeting discussed in details regarding CDM benefit. The extracts of the board meeting of 15 November 2004 will be made available to DOE.

STEP 1 - Identification of the alternatives to the project activity considered with current law and regulations

Step 1.a

	Identify realistic and credible alternatives	In section B.4 all the possible alternatives have been discussed for the alternatives recognised were: 1) Project activity not as CDM activity. 2) Import from Grid. 3) Alternative fuel HSD. 4) Alternative fuel Gas. 5) Alternative fuel Coal + Dolochar + Washery reject. 6) Combination of grid and coal power. 7) Alternative of Waste heat. 8) Continuation of current situation. AIPL has concluded that use of fossil fuel like coal, char/dolochar, washery reject as fuel is the most attractive option economically, as per ACM 0004. The grid power is being used by the company at the moment and company is also installing coal based CPP. We select coal based captive electricity generation being economically most attractive.

Step 1.b Enforcement of applicable laws and regulations:

1	Alternative shall be in compliance with legal and regularly requirements.	All the alternatives are in compliance with current legal and regulatory requirements.

AIPL select Step 3 Barrier Analysis

STEP-3 AIPL selects step 3(barrier analysis) to show additionality

STEP –3 Barrier analysis to show additionality

Sub-Step 3.a Identification of barriers that would prevent the implementation of the type of the project *activity.*

3.a.1	**Investment barriers**	
	Debt funding is not available for this type of innovative project activity.	The finance for stand alone WHRB power plant is not available due to poor viability 1) WHRB captive power project does not fall under essential services. 2) As WHRB stand alone project is not economically feasible. Hence the finance is not available for WHRB CPP alone..
	No access to international capital markets due to real or perceived risks.	AIPL have not received any foreign assistance and they are not in a position to access the international capital markets.
3.a.b	**Technological barrier**	
	Skilled and or properly trained labour not available Lack of infrastructure for implementation of the technology	1) As per Joint Plant Committee report "Survey of Sponge Iron Industry 2005-06". A. 77 units out of 147 coal based unit are going in for expansion in capacity. B. Jharkhand, Chhatisagarh and Orissa are states where majority of expansion activities will be installed. C. Constraints faced by sponge iron industry are: a) Raw Material b) Power c) Finance d) Labour Company has to procure iron ore from the market from various sources. Due to change of sources the iron ore quality is not consistent. The company is required to use coal of Grade "A" to achieve better efficiency. As the availability of grade "A" coal is problematic. Hence Coal of various grades such as "B", "C", "D", "E" or "F" as per availability is used. The variation in quality of coal also creates operational problem.

		All the above pose technological problem as the variations in iron ore and coal quality lead to variations in flue gas temperature and quantity. This has impact on WHRB power generation. As so many units are expanding in the area, the availability of skilled technical personnel is a problem. Company has to hire the untrained personnel and impart the training as per training schedule. 2) Company has to procure all the necessary equipment required for proper implementation of the project. Extra synchronisation infrastructure was also required due to the requirement of remaining connected to WESCO grid . So when 16 MW WHRB power has to be synchronised with grid power, company has to install grid synchronisation system resulting in additional cost. 3) Company has started venture in integrated steel project as a green field project. They did not have any previous experience in manufacturing of sponge iron. Hence having no previous experience neither in sponge iron making and power generation, acts as technical barrier 3) The Sponge Iron Rotary Kiln operation is dependant on many factors such are Iron Ore quality, Coal quality etc., the flue gas temperature and quantity variations result in lowered steam generation and hence reduced power generation. Due to the variations observed, the PLF of WHRB is low and is around 60% only. 4) The Sponge Iron Kiln has to take frequent shut down due to the raw

		material quality problem. This results in about 3 or more shut down in a year and this results in WHRB shut down also and hence the power generation loss. Due to the inconsistency of WHRB power generation, company has to maintain the agreement with WESCO for supply of backup power. 5) The documentation in the form of WESCO agreement is available. 6) If the temperature of flue gas exceeds 1000^0C , then the boiler is in danger as the higher temperatures are damaging to the boiler tubes. As no control is there on exit temperatures of kiln, this acts as technical barriers. The company has procedures laid out to encounter flue gas high temperatures where in DCS instructs for carrying out remedial measures like water spraying, opening steam drains and finally opening of stack cap to release hot gases to atmosphere bypassing WHRB. This leads to loss of power generation. 7) The inlet temperature to ESP has to be maintained at about 160^0C, as the higher or much lower temperature of flue gas will damage ESP. Hence the boiler has to work at its design parameters as any disturbance in performance of boiler due to any reasons affects the ESP and also power generation. This acts as a technological barrier.
	Barriers due to prevailing practice.	
	Discuss the project activity in host country.	Joint Plant Committee report as “ Survey of Indian Sponge Iron Industry 2005-06” lists the following: 1) Out of 147 surveyed Sponge Iron Industry surveyed only 16 have captive power generation, 8 out of 16 them are in adjoining state Chhattisgarh. Balance states of India have 89 Sponge Iron Units (out of 147 Surveyed) and only 8 have captive power generation

		2) In the state of Orissa almost every sponge iron plant who has put up WHRB power is based on CDM strength. 3) CDM activity can not be treated as common practice. 4) The captive power generation based on WHRB (without CDM) is not sufficiently diffused in the region/ country, thus WHRB based captive power project is not prevailing practice. JPC Report can be made available and the units going is for CDM benefit can be checked from UNFCC website.
	Regulatory Barriers	1) The provision to export surplus power for sale to the grid is not available,. 2) The demand charges payable even if WESCO is not in position to supply power for any reason. Hence these act as regulatory barrier

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

As above the identified barriers are:

1) 3.a.a. investment barrier
2) 3.a.b technological barrier
3) 3.a.c prevailing practice barrier
4) 3.a.d operational barrier
5) 3.a.e regulatory barrier.

The identified other alternatives are:

1) **Drawing power from existing WESCO grid (Alternative-2)**
None of the above barriers act as barriers in this alternative and WESCO would be having no objections to continue to supply the additional demand of power as already and presently the required power is being provided by WESCO. But the grid power is costlier than coal based captive power. As well as the grid infrastructure being poor, results into frequent tripping.

2) **CPP based on HSD/Gas (alternatives 3 and 4)**
None of the above as a barrier in this alternative. However CPP based on HSD will have additional GHG emissions from the plant. Availability of Gas is not there in the region.

3) **Alternative 5 CPP based on coal**
None of the above barriers act as barriers in this alternative. This option is economically most attractive as increasing the capacity of coal based 21 MW CPP Boiler can be achieved with minimum cost to meet the total steam requirement of the CPP.

4) Alternative use of Waste Heat from Flue Gases: There is no use of waste heat from flue gas, as AIPL has no such heat requirement in the plant. No other beneficial use of the Waste Heat is in practice in the region.

5) Continuation of the current situation, as shown above the continuation of current situation is to draw more power from grid. This option will face no barrier but company has to face power tripping by grid.

STEP-4 Common practice analysis

We identify and discuss the existing Common practice through the following sub-steps which Complements additionality tests.

Sub-Step-4.a Analyse other activities similar to project activity.

1.	Provide an analysis of any other activity implemented	In Orissa state Tata Steel, Orissa Sponge, Orissa Cement are a few pioneers which have gone ahead to establish WHRB power plant based on CDM strength, to the best of information available there is no sponge iron plant in the state which has implemented waste heat recovery boiler based power plant without the CDM support.
2	Activities in similar scale.	The project activity is 350 TPD Sponge Iron capacity. As per the available information all 350 TPD sponge iron projects who are putting up WHRB power are in the process of CDM validation or PDD preparation stage to seek the CDM support. All these projects have drawn initially grid power to establish the plant.

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

1.	Discussion of similar activities	The project activity is 350 TPD Sponge Iron capacity. As per the available information all 350 TPD sponge iron projects who are putting up WHRB power are in the process of CDM validation or PDD preparation stage to seek the CDM support.

JOINT PLANT COMMITTEE REPORT ON "SURVEY OF INDIAN SPONGE IRON INDUSTRY 2005-06"

Under the aegis of the Ministry of steel joint plant committee (JPC) was constituted by Government of India is the sole custodian of authentic database on the Indian iron and steel industry. The following are major findings:

Report in the "Survey of Indian Sponge Iron Industry 2005-06" has the following statement on Page-3 of 11.

"growth of domestic steel demand, vigorous growth in domestic steel production in secondary steel making sector, techno economic like relative low cost of investment, ease of setting of sponge iron plant, clear cut technology of direct reduction, better quality in end product, availability of mineral resources, abundant labour as well as professional/ technical expertise, frequent problem of scrap, all operating in the facilitating backdrop provided by a free market economy have boosted the growth of the industry"

Indian sponge iron industry summarised table given in JPC report

Table 1	**Indian Sponge Iron Industry : Both Coal & Gas Segments**					
	Data Collected		**Additional / Industry/ Field sources^**		**Total**	
	No of units	**Capacity (Unit :mt)**	**No. of units**	**Capacity# (unit:mt)**	**No. of units**	**Capacity (unit:mt)**
Operating						
Coal	147	11	56	2	203	13
Gas	3	6	-	-	3	6
Total	150	17	56	2	206	19
Under commissioning (Coal)	58	6	167	12*	225	18
Brownfield Expansion : 77 out of 147 working coal based unit	-	7	-	-	-	7
^=State DI Offices; #=Estimated, *=included units in proposal/ planning stage						

Raw materials:

JPC survey list the following the main constraints faced by sponge iron industry, on Page 7 of 11.

"Analysis of the data shows that our of 147 units surveyed, raw material (availability and prices), accounts for the largest(96%) amongst the nature of constrains faced by a coal based sponge iron unit today, followed by power (cost), and to lesser extent finance (availability), and labour negligible".

JPC survey on page 5 & 6 of 11 :

"**Coal Linkage**: Analysis of the data shows that out of the 147 units surveyed, 60% has their own coal linkage. The state wise picture shows Orissa and Chhattisgarh tops the list with West Bengal close behind. But the scenario in the other states is not much encouraging, indicating the Indian coal based sponge iron producers are dependent on market sources for procuring this key raw material.

Iron Ore: Analysis of thee data shows that out of 147 units surveyed, iron ore from mines, be it captive (virtually nil) or leased (minimal), plays an insignificant part in meeting iron ore requirements of the domestic coal based sponge iron segment. In other words, this indicates that in case of iron ore also, Indian coal based sponge iron producers are dependent on market sources"

Captive power generation

On page-7 of 11 of JPC report under the heading "captive generation facility"

"Analysis of the data shows that out of the 147 units surveyed, the number of units with captive power generation facility is quite low; total of such units being only 16, with maximum concentration occurring in Chhattisgarh (8 units)"

Expansion

"77 out of 147 coal based units are going in for expansion of existing capacity."
Jharakhand, Chattisgarh and Orissa are states where majority of this fresh capacity will be installed

JPC report is enclosed as part of proof for the following barriers

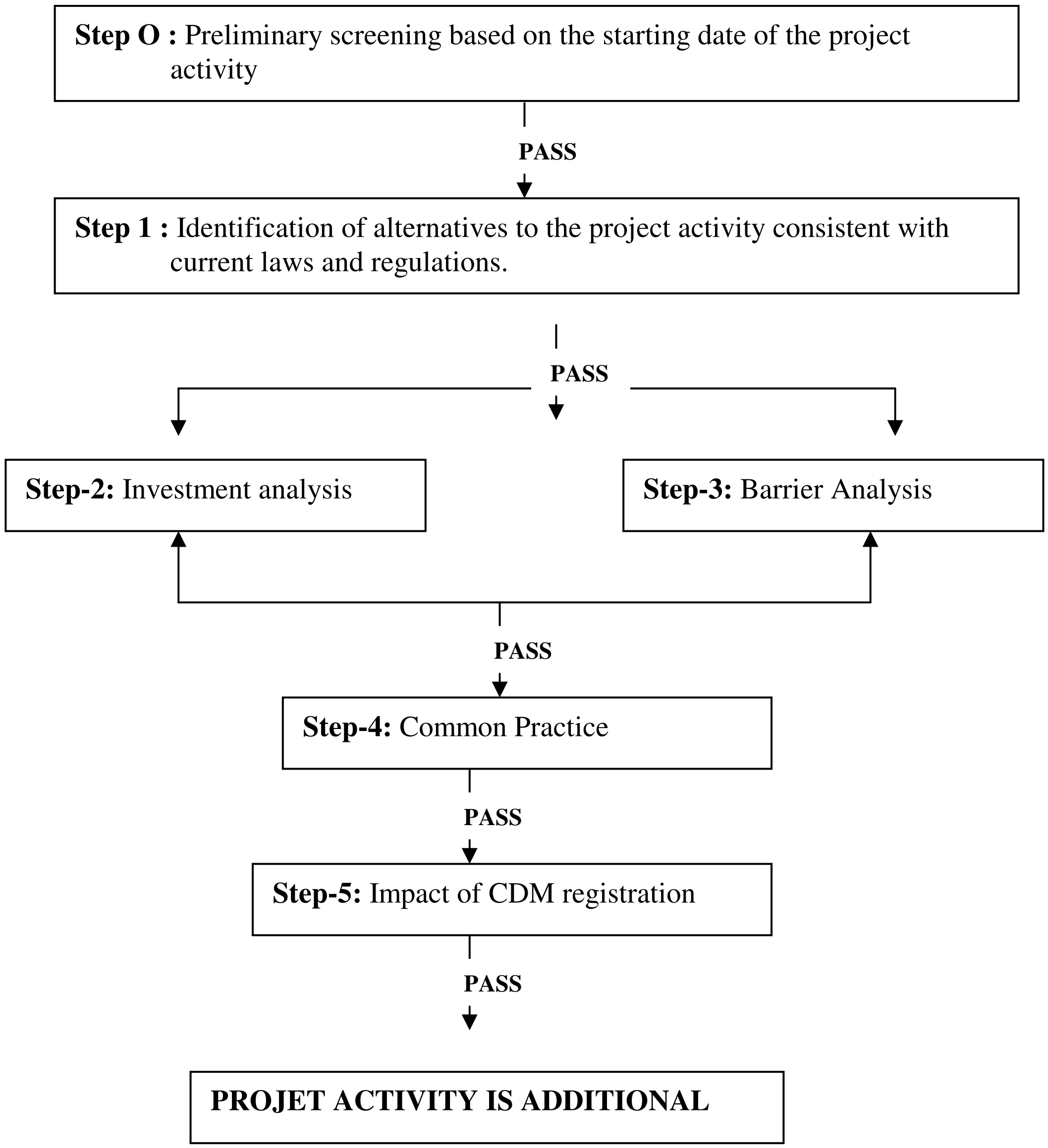
1. Investment barrier due to shortage of iron ore and coal and market variation
2. Common practice analysis/prevailing practice.
3. Technological barrier due to shortage of technical manpower due to heavy expansion in sponge iron industry

STEP – 5. Impact of CDM registration:

1) As explained in the above steps, through CDM registration project participant hopes to lower the risks of the investment associated with this kind of Project Activity where no actual sales and hence no direct income is achieved.
2) The possible income generated through sale of CERS will help in achieving sustainable Power generation.
3) The other benefits are
   * Reduction of GHG emissions
   * A successful CDM project activity will encourage unwilling companies due to prevailing practice to put up the WHRB based power plant or other renewable clean energy systems as CDM project activity.
4) An additional Social benefit will be clean environment in the area of Project activity resulting in to environmental improvement all around the Project site.
5) Earning of foreign exchange for the Country as sale proceeds of CERS will be received in international currency.

6) The CDM benefit will also help to improve the overall productivity of Sponge iron plant by procuring the better grade inputs at higher cost. This can subsequently help to improve the WHRB power generation also.

Flow Chart : Additionality Scheme



B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

>>
Selected methodology is ACM 0004 Version 02, 03 March 2006.
The project activity meets the applicability conditions of baseline methodology, namely.

1. Project activity generates 16 MW electricity from waste heat, without adding any GHG emission.
2. The project activity displaces CO_2 emissions from the fossil fuel based Captive power plant and hence achieves reduction of CO_2 emissions.
3. There will be no fuel switch in rotary kiln that produces flue gases with waste heat after completion of project activity.

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

(Copy this table for each data and parameter)

Data / Parameter:	EG_{GEN} / Electricity
Data unit:	MWh
Description:	Gross
Source of data used:	Electronic meter
Value applied:	100%
Justification of the choice of data or description of measurement methods and procedures actually applied :	The electronic meter provided at the outlet of turbine. The meter reading will be available on DCS continuously and same will be transferred to log book to be maintained by shift engineer , approved by shift in charge as the daily report This meter will be sealed by Orissa government electrical as company has to pay cess on any power generated in CPP. The meter is calibrated by government department.
Any comment:	Nil

Data / Parameter:	EG_{AUX} / Electricity
Data unit:	MWh
Description:	Gross
Source of data used:	Electronic meter/ calculated
Value applied:	100%
Justification of the choice of data or description of measurement methods and procedures actually applied :	The electronic meters provided at the feeder to each auxiliary consumption source. The meters readings will be available on DCS continuously and same will be summed up by DCS to arrive total auxiliary consumption. This data is transferred to log book to be maintained by shift engineer, approved by shift in charge as the daily report.
Any comment:	Nil

Data / Parameter:	EG y / Electricity
Data unit:	MWh
Description:	Gross
Source of data used:	Calculated
Value applied:	100%
Justification of the choice of data or description of measurement methods and procedures actually applied :	$EG_y = EG_{GEN} - EG_{AUX}$
Any comment:	Nil

B.6.3 Ex-ante calculation of emission reductions:

>>

We have followed the approved baseline methodology ACM0004 for formulas used is estimating base line emissions:

If the baseline scenario is determined to be captive power generation either (existing or new) ,the Emissions factor for displaced electricity is calculated as follows;

Calculation of emission factor for captive power baseline :

$$EF_{captive,y} = EF_{CO2,i} / Eff_{captive} \times 44/12 \times 3.6\ TJ/1000\ MWh$$

Where.

$EF_{captive,y}$: Emission factor for captive power generation (tCO_2/MWh)
$EF_{CO2,i}$: CO_2 emission factor of fuel used in captive power generation tC/TJ
$Eff_{captive}$: Efficiency of captive power generation (%)
44/12 : Carbon to Carbon Dioxide conversion factor
3.6/1000 : TJ to MWh conversion factor

To estimate boiler efficiency, project participants may chose between the following two options

Option A

1. Measured efficiency prior to project implementation
2. Measured efficiency during monitoring.
3 Manufacturers nameplate data for efficiency of existing boilers

Option B

Assume a boiler efficiency of 100% based on the net calorific values as a conservative approach

We have selected Option B .

Leakage (Ly)

There is no leakage in the project activity

Emission Reductions

Project activity mainly reduces CO_2 through substitution of coal based captive electricity generation.

The emission reduction ER_y by the project activity during a given year y is the difference between the baseline emissions through substitution of electricity generation with fossil fuels (BE_y) and project emissions (PE_y), as follows:

$$ER_y = BE_y - PE_y$$

Where,

ER y = are the emission reduction of the project activity during the year y in tons of CO_2.

BE y = are the baseline emissions due to displacement of electricity during the year y in tons of CO_2,

PE y = are the project emission during the year y in tons of CO_2

No project emission is considered and no leakage is considered

Where the baseline emissions

BE_y in tCO2 $= EF_{captive,y} \times EG_y$

$EG_y = E_{GEN} - E_{AUX}$ = Net electricity supplied by project activity

No project emission and no leakage is considered inline with methodology

We have followed the approved baseline methodology ACM0002 for formulas used is estimating base line emissions:

Calculation of Baseline Emission Factor

Base line emission factor will be constant as Ex ante based and fixed for the entire credit period.

Calculation of Net Emission Reduction:

Installed capacity of power generation	16 MW
Number of working days/year	330
number of working hours/day	24
Gross generation of electricity at 100% PLF	126720 MWh
Gross Generation at 70% PLF	88704 MWh
Auxiliary consumption	10%
Net Generation (Gross Generation – Auxiliary consumption)	79833.6
Emission Factor (EFy)	1.293 tCO_2e/MWh
Emission Reduction/Year	103224.84 tCO_2e/Year

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

>>

YEAR	Capacity In MW)	Gross Gen. (MWh)	Aux. Cons. @ 10%	Net Gen (MWh)	Emission factor t CO2 Per MWh	Net CO2 Reduction (tCO2)
1st	8	44352	4435.2	39916.8	1.293	51612.42
2nd	16	63360	6336	57024	1.293	88478.43
3rd	16	88704	8870.4	79833.6	1.293	103224.84
4th	16	88704	8870.4	79833.6	1.293	103224.84
5th	16	88704	8870.4	79833.6	1.293	103224.84
6th	16	88704	8870.4	79833.6	1.293	103224.84
7th	16	88704	8870.4	79833.6	1.293	103224.84
8th	16	88704	8870.4	79833.6	1.293	103224.84
9th	16	88704	8870.4	79833.6	1.293	103224.84
10th	16	88704	8870.4	79833.6	1.293	103224.84
TOTAL ::		**817344**	**81734.4**	**735609.6**		**965889.6128**
					Average Reduction per Year	**96888.96**

Note : The second HWRB of 8 MW is likely to be commissioned in September 2008 hence the total installed capacity at the end of 2008-09 will reach 16 MW, therefore the average PLF for the whole year based on 16 MW has been considered at 50%.

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

B.7.1 Data and parameters monitored:

(Copy this table for each data and parameter)	
Data / Parameter:	EG_{GEN} / Electricity
Data unit:	MWh
Description:	Gross electricity generated
Source of data to be used:	The electronic meter provided at the TG output. The meter reading will be available on DCS continuously and same will be transferred to log book to be maintained by shift engineer , approved by shift in charge as the daily report This meter is sealed by Orissa government electricity department as company has to pay cess on any power generated in CPP.
Value of data applied for the purpose of	100%

calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	Log book maintained based on DCS data which receive data from meters
QA/QC procedures to be applied:	Log book signed by plant manager daily. Meters calibrated regularly. As Orissa government sealed meter is provided the meters are regularly under QC/QA procedure for any variation. If variation is noticed recalibration will be done immediately.
Any comment:	Nil
(Copy this table for each data and parameter)	

Data / Parameter:	EG_{AUX} / Electricity
Data unit:	MWh
Description:	Auxiliary electricity consumption
Source of data to be used:	The electronic meters provided at the feed to each auxiliary consumption source. The meters readings will be available on DCS continuously and same will be summed up by DCS to arrive total auxiliary consumption. This data is transferred to log book to be maintained by shift engineer , approved by shift in charge as the daily report
Value of data applied for the purpose of calculating expected emission reductions in section B.5	100%
Description of measurement methods and procedures to be applied:	Log book maintained based on DCS data which receive data from meters connected to DCS.
QA/QC procedures to be applied:	Log book signed by plant manager daily. Meters calibrated regularly
Any comment:	Nil

(Copy this table for each data and parameter)	
Data / Parameter:	EG_y / Electricity
Data unit:	MWh
Description:	Net electricity generated
Source of data to be used:	calculated $EG_y = EG_{GEN} - EG_{AUX}$
Value of data applied for the purpose of	100%

calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	Log book maintained based on DCS data which is based on data from meters connected to DCS.
QA/QC procedures to be applied:	Log book signed by plant manager daily. Meters calibrated regularly
Any comment:	Nil

B.7.2 Description of the monitoring plan:

>>

(A) Purpose

To define the procedures and responsibilities for GHG Performance, monitoring, measurement, reporting of data, dealing with uncertainties, and covers the responsibilities regarding plant operation and maintenance.

(B) Scope

This procedure is applicable to 16 MW waste heat based WHRB power project of AIPL

(C) Responsibilities

Shift Engineer (Operations): Responsible for proper operation of the mechanical equipments, reporting shift wise or eight hourly data of steam generated from WHRB, steam fed to turbines, parameters of steam and flow meter reading of the captive power plant. The report is then sent to the Manager (O & M) for his review.

Shift Engineer (Electrical): Responsible for proper operation of electrical equipment and taking meter reading for electricity generation

Shift Engineer (maintenance): Responsible for proper maintenance management.

Manager (Plant): Responsible for operation, maintenance and management of plant will be reviewing the monitored parameters shift-wise and presenting a daily executive summary report, duly signed by himself, to the General Manager (Plant).

General Manager/DGM : Responsible and in charge of complete operation, maintenance and management of all plant and CDM related matters

He will be in charge of all CDM related matters and CDM officer will be directly reporting to him

CDM Officer : He will be reporting to General Manager and will be responsible for preparing required documentation and reviewing the accuracy of various reports with counter checks along with project developer. He will be responsible for internal audit regarding CDM project matters.

Details of monitoring plan is provided in Annexure 4

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 Completion of application and baseline study 10TH February 2007
Preparation of this document has been done by "Indus Financial and Technical Consultants Ltd.", whose address is :

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Shri Vikas Thakur
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Mobile: 094252-08189, 093011-93400

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:

>> 15th November 2004

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

>> 15 Years

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

Project activity will use a fixed crediting period of 10 years.

C.2.1. Renewable crediting period

Not applicable

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:

Project activity will use a fixed crediting period of 10 years.

C.2.2.1. Starting date:

>> From the date of registration or from 27 November 2006.

C.2.2.2. Length:

>> 10 Years

SECTION D. Environmental impacts

>>

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

>>

The Project activity is to produce 16 MW power based on waste heat recovery based steam generation (WHRB) and steam turbines. There are no additional GHG emissions other than the existing GHG emissions in the absence of project activity.

The installation of WHRB and CPP requires approvals of IBR (Indian Boiler Regulation) and Orissa State Pollution Control Board (OSPCB) and both the approvals will be received before the Commissioning of project activity.

Environmental impact is negligible as the project activity benefits the local, regional and global environment by,

1. Reducing the thermal pollution which could have been caused by emitting waste gases at 950^0C into atmosphere. Project activity recovers the waste heat and save; energy and reduces thermal emission by controlling gas temperature below 200^0C.
   i) Generates electricity without adding any additional GHG emissions..
   ii) The power generated the new project activity will be used for in house activity will be used for in house requirement and consumption without any T&D losses as the location of power generation is in the same premises.
2. Noise level from equipments shall be kept within legal limits.
3. The project will not generate any Fly Ash on its own due to Power generation from the project activity. But ash contained in flue gases will be collected in ash hoppers provided in WHR boiler.
4. The proposed ESP shall remove the ash from flue gases which will be collected in Ash Hopper. This ash will be given free of cost to cement plants and brick manufacturers for further Economics benefits and use. The ash used for production of bricks saves the valuable productive soil; also it reduces the Air Pollution caused by the conventional brick kilns, due to the coal burning. The Ash consumed in Cement making reduces the limestone and coal consumption, thus natural resources are saved.

As per regulation EIA study was not required for investment below Rs. 1000 Million. Hence, AIPL have not carried out EIA Study for the existing capacity. An environment impact assessment is under study for the planned increase in capacity expansion. The same is also under the consideration of MOEF for granting environment clearance.

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:

>>

Environmental impact are considered in-significant, No adverse impact on environment will be there due to project activity.

Noise Pollution

Equipments like Boiler and STGs shall be provided with noise depressing facilities to dampen and to reduce the noise level to permissible levels at the nearest village. In the plant the noise level will be kept below 90dB.

Thermal Pollution:

In current situation the hot flue gases will be let out causing considerable thermal pollution.

The heat shall be recovered in the boiler and the flue gases be let out by stack of 70 m height below 200^0C and hence thermal pollution shall be reduced considerably.

Air emission:

An ESP provided at the outlet of boiler effectively reduces the flue dust level below to 100 mg/nm^3 while acceptable legal standard is 150 mg/nm^3 .

Impact on Water environment

Blow down water shall be used for plantation. Sources of waste water are DM Plant and Blow down.

All the waste water will be neutralized before using for plantation.

Monitoring of waste water will be done to limit pH, BOD and COD levels within the stipulated levels.

No discharge will be there outside the premises. Hence due to the zero discharge condition, no adverse impact will be there in the water regime.

Solid waste management

Ash collected from bottom of hopper of ESP shall be transported to Ash Silo equipped with bag filters to ensure clean air.

Ash collected shall be supplied to cement manufacturing/ brick manufacturing units and as backfill material for filling o the low lying area.

Safety Management

To ensure safe working conditions:

1) All moving parts shall be provided with guards/ hoods.
2) Insulation of all hot parts shall be done.
3) Full fledged maintenance department shall ensure the healthy condition of equipments.
4) A On site emergency plan is made to handle crisis situation.

All efforts will be done to create clean environment.

Parameters like Noise, Fugitive Emission as well as point source emissions will be monitored regularly.

Conclusion:

Project activity is environment friendly and creates employment and other benefits and promotes sustainable developments.

SECTION E. Stakeholders' comments

>>

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

>>

AIPL identifies the following as stake holders to keep the transparency in the operational activity of the project promoter and thereby meeting local, environmental regulations

1) Local public representative (Member of Legislative Assembly of Orissa)
2) Local authority of Village –Marakuta &Pandaripathar Gram Panchayat
3) Western Electricity Supply Company of Orissa ltd (WESCO)
4) State Pollution Control Board, Orissa (OSPCB)
5) Ministry of Commerce and Industry.

E.2. Summary of the comments received:

>>

AIPL management apprised the representatives of village Panchayat of village-Marakuta & Pandaripathar about the project activity. The members of Panchayat appreciated and had expressed their no objection for project activity. Marakuta & Pandaripathar Gram Panchayats have issued no objection certificate.

Similarly AIPL management apprised MLA regarding the project activity that also appreciated and expressed no objection for the project activity.

Sarapanch, village Marakuta & Pandaripathar raised the points of activities required to be carried out by company during periphery development committee meeting.

Permission have been sought from the State agencies like WESCO,OSPCB, etc. wherever required legally and have been received and other State agencies have been apprised of the project activity.

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

>>

The relevant comments and important clauses mentioned in the project documents/ Detailed project report, clearance from OSPCB (State Pollution Control Board) were considered while preparation of CDM Project Design Document. AIPL management representatives met various stake holders for appraisal regarding project activity and sought the support.

All the stake holders appreciated the energy efficient environment friendly project activity which has sustainable contribution to the development.
No adverse comment was received.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	ACTION ISPAT & POWER (P) LTD.
Street/P.O.Box:	-
Building:	-
City:	MARAKUTA & PANDARIPATHAR, DISTT-JHARSUGUDA
State/Region:	Orissa
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Telephone:	91-06645-227201
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Represented by:	Mr. Naresh Agrawal
Title:	Director
Salutation:	Mr.
Last Name:	Agrawal
Middle Name:	-
First Name:	Naresh
Department:	Board of Director
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Direct FAX:	91-06645-227202
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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No Public Funding is available from Annexure-I Country

Annex 3

BASELINE INFORMATION

Base line information (sources of information)

S.No.	Parameter	Source
1	Steam parameters considered	From AFBC Boiler Specification.
1	Boiler Efficiency	Consider 100% as per methodology on conservative side.
2	Steam consumption / MWh	Turbine manufacturer's performance guarantee data.
3	Steam enthalpy	ISI Steam Table in SI Units
4	Emission factor (EF_{CO2}) for coal	IPCC default value
5	Carbon to Carbon-di-oxide conversion factor	IPCC default value

Technical Specification of Turbine as per Manufacturer:

TG-1 – 12 MW

1. Capacity of Turbine : 12 MW
2. Inlet Steam pressure : 64 kgf/cm^2
3. Inlet Steam Temperature : 480^{0}C
4. Steam Consumption : 49.00 T/hr

TG-2 – 25 MW

1. Capacity of Turbine : 25 MW
2. Inlet Steam pressure : 64 kgf/cm^2
3. Inlet Steam Temperature : 480^{0}C
4. Steam Consumption : 99.81 T/hr

Specification of AFBC boiler

1. Capacity of Boiler : 80 T/hr.
2. Steam pressure : 66 kgf/cm^2
3. Steam Temperature : 485±^{0}C

Formulae used to estimate baseline emissions (units of CO_2 equ.)

We have followed the approved baseline methodology ACM0004 for formulas used is estimating base line emissions:

If the baseline scenario is determined to be captive power generation either (existing or new) ,the Emissions factor for displaced electricity is calculated as follows;

Calculation of emission factor for captive power baseline :

$$EF_{captive,\ y} = EF_{CO2},i / Eff_{captive} \ X \ \ 44/12 \ X \ \ 3.6 \ TJ/1000 \ MWh$$

Where.

$EF_{captive\ ,y}$: Emission factor for captive power generation (tCO_2/MWh)

$EF_{CO2.}i$: CO_2 emission factor of fuel used in captive power generation tC/TJ

$Eff_{captive}$	:	Efficiency of captive power generation (%)
44/12	:	Carbon to Carbon Dioxide conversion factor
3.6/1000	:	TJ to MWh conversion factor

To estimate boiler efficiency, project participants may chose between the following two options

Option A

1. Measured efficiency prior to project implementation
2. Measured efficiency during monitoring.
3 Manufacturers nameplate data for efficiency of existing boilers

Option B

Assume a boiler efficiency of 100% based on the net calorific values as a conservative approach

We have selected Option B .

Annex 4
MONITORING INFORMATION

Calculation of Steam Generation and Consumption per day.

ID number *(Please use numbers to ease cross-referencing to D.3)*	Data type	Data variable	Data unit	Measured (m), calculated (c) or estimated (e)	Recording Frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	For how long is archived data kept	Comment
1. St_{WHRB-1}	Quantitative	Steam generated from WHRB-1 (F_1)	M^3/hr.	Measured (m)	Continuously	100%	Electronic / Paper	Crediting Period + 2 Years	Monitoring Location : meter at plant and DCS will measure the data. Manager-In-Charge would be responsible for regular calibration of the meter.
2. St_{WHRB-2}	Quantitative	Steam generated from WHRB-2 (F_2)	M^3/hr.	Measured (m)	Continuously	100%	Electronic / Paper	Crediting Period + 2 Years	Monitoring Location : meter at plant and DCS will measure the data. Manager-In-Charge would be responsible for regular calibration of the meter.
3. St_{AFBC}	Quantitative	Steam generated from AFBC (F_3)	M^3/hr.	Measured (m)	Continuously	100%	Electronic / Paper	Crediting Period + 2 Years	Monitoring Location : meter at plant and DCS will measure the data. Manager-In-Charge would be responsible for regular calibration of the meter.
4. St_{TG1}	Quantitative	Steam fed in to TG1 (F_4)	M^3/hr.	Measured (m)	Continuously	100%	Electronic / Paper	Crediting Period + 2 Years	Monitoring Location : meter at plant and DCS will measure the data. Manager-In-Charge would be responsible for regular calibration of the meter.
5. St_{TG2}	Quantitative	Steam fed in to TG2 (F_5)	M^3/hr.	Measured (m)	Continuously	100%	Electronic / Paper	Crediting Period + 2 Years	Monitoring Location : meter at plant and DCS will measure the data. Manager-In-Charge would be responsible for regular calibration of the meter.

ID number *(Please use numbers to ease cross-referencing to D.3)*	Data type	Data variable	Data unit	Measured (m), calculated (c) or estimated (e)	Recording Frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	For how long is archived data kept	Comment
6. T_1	Quantitative	Temperature of Steam generated from WHRB-1 (T_1)	^0C	Measured (m)	Continuously	100%	Electronic / Paper	Crediting Period + 2 Years	Monitoring Location : meter at plant and DCS will measure the data. Manager-In-Charge would be responsible for regular calibration of the meter.
7. T_2	Quantitative	Temperature of Steam generated from WHRB-2 (T_2)	^0C	Measured (m)	Continuously	100%	Electronic / Paper	Crediting Period + 2 Years	Monitoring Location : meter at plant and DCS will measure the data. Manager-In-Charge would be responsible for regular calibration of the meter.
8. T_3	Quantitative	Temperature of Steam generated from AFBC (T_3)	^0C	Measured (m)	Continuously	100%	Electronic / Paper	Crediting Period + 2 Years	Monitoring Location : meter at plant and DCS will measure the data. Manager-In-Charge would be responsible for regular calibration of the meter.
9. P_1	Quantitative	Pressure of Steam generated from WHRB-1 (P_1)	kg/cm^2	Measured (m)	Continuously	100%	Electronic / Paper	Crediting Period + 2 Years	Monitoring Location : meter at plant and DCS will measure the data. Manager-In-Charge would be responsible for regular calibration of the meter.
10. P_2	Quantitative	Pressure of Steam generated from WHRB-2 (P_2)	kg/cm^2	Measured (m)	Continuously	100%	Electronic / Paper	Crediting Period + 2 Years	Monitoring Location : meter at plant and DCS will measure the data. Manager-In-Charge would be responsible for regular calibration of the meter.

ID number (Please use numbers to ease cross-referencing to D.3)	Data type	Data variable	Data unit	Measured (m), calculated (c) or estimated (e)	Recording Frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	For how long is archived data kept	Comment
11. P_3	Quantitative	Pressure of Steam generated from AFBC (P_3)	kg/cm^2	Measured (m)	Continuously	100%	Electronic / Paper	Crediting Period + 2 Years	Monitoring Location : meter at plant and DCS will measure the data. Manager-In-Charge would be responsible for regular calibration of the meter.
12. St_{TOTAL}	Quantitative	Steam fed in to TG1 &2 (F_4 + F_5)	M^3/hr.	Calculated (c)	Continuously	100%	Electronic / Paper	Crediting Period + 2 Years	The data will be calculated after collecting data from plant and DCS. Manager In-charge would be responsible for daily calculation
13. H1	Quantitative	Enthalpy of Steam generated from WHRB-1 (H1)	Kcal/kg	Calculated (m)	Daily	100%	Electronic / Paper	Crediting Period + 2 Years	Calculated from Thermodynamic data of steam from Mollier Chart/ Steam Table.
14. H2	Quantitative	Enthalpy of Steam generated from WHRB-2 (H2)	Kcal/kg	Calculated (m)	Daily	100%	Electronic / Paper	Crediting Period + 2 Years	Calculated from Thermodynamic data of steam from Mollier Chart/ Steam Table.
15. H3	Quantitative	Enthalpy of Steam fed to TG1 (H3)	Kcal/kg	Calculated (m)	Daily	100%	Electronic / Paper	Crediting Period + 2 Years	Calculated from Thermodynamic data of steam from Mollier Chart/ Steam Table.
16. H4	Quantitative	Enthalpy of Steam fed to TG2 (H4)	Kcal/kg	Calculated (m)	Daily	100%	Electronic / Paper	Crediting Period + 2 Years	Calculated from Thermodynamic data of steam from Mollier Chart/ Steam Table.
17. H5	Quantitative	Enthalpy of Steam fed to TG1 and TG2 (H5)	Kcal/kg	Calculated (m)	Daily	100%	Electronic / Paper	Crediting Period + 2 Years	Calculated from Thermodynamic data of steam from Mollier Chart/ Steam Table.

Calculation of Power Generation

ID number (Please use numbers to ease cross-referencing to D.3)	Data type	Data variable	Data unit	Measured (m), calculated (c) or estimated (e)	Recording Frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	For how long is archived data kept	Comment
18. $EG_{GEN\ TG-1}$	Quantitative	Total Electricity generated from TG-1	MWh /year	Measured (m)	Daily	100%	Electronic/ Paper	Credit Period + 2 Year	Monitoring Location: The data will be measured online from meters (Me_1 & Me_2) at plant and DCS and added together. Manager In-charge would be responsible for calibration of the meters.
19. $EG_{GEN\ TG-2}$	Quantitative	Total Electricity generated from TG-2	MWh /year	Measured (m)	Daily	100%	Electronic/ Paper	Credit Period + 2 Year	Monitoring Location: The data will be measured online from meters (Me_1 & Me_2) at plant and DCS and added together. Manager In-charge would be responsible for calibration of the meters.
20. $EG_{AUX\ CPP}$	Quantitative	Total Auxiliary Electricity Consumption by CPP	MWh /year	Measured (m) online and continuously measured data	Daily	100%	Electronic/ Paper	Credit Period + 2 Year	Monitoring Location: The data will be measured online from meters (Me_3 at 2 locations) at plant and DCS and added together. Manager In-charge would be responsible for calibration of the meters. See Annex-4 for details.
21. $EG_{GEN\ CPP}$	Quantitative	Total Electricity generated from CPP	MWh /year	Calculated (c) from $EG_{Gen\ TG-1}$ and $EG_{GEN\ TG-2}$	Daily	100%	Electronic/ Paper	Credit Period + 2 Year	Monitoring Location: The data will be measured online from meters (Me1 & Me2) at plant and DCS and added together. Manager In-charge would be responsible for calibration of the meters.

ID number (Please use numbers to ease cross-referencing to D.3)	Data type	Data variable	Data unit	Measured (m), calculated (c) or estimated (e)	Recording Frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	For how long is archived data kept	Comment
22. EGY_{CPP}	Quantitative	Net Electricity Generation by CPP	MWh /year	Calculated (c)	Daily	100%	Electronic/ Paper	Credit Period + 2 Year	The data will be calculated after collecting data from plant and DCS. Manager In-charge would be responsible for daily calculation
23. $EG_{GEN\ WHRB}$	Quantitative	Gross Electricity generated by WHRB-1& 2	MWh /year	calculated (c)	Daily	100%	Electronic/ Paper	Credit Period + 2 Year	The data will be calculated after collecting data from plant and DCS. Manager In-charge would be responsible for daily calculation
24. $EG_{AUX\ WHRB}$	Quantitative	Auxiliary electricity Consumption by WHRB-1 & 2	MWh /year	calculated (c)	Daily	100%	Electronic/ Paper	Credit Period + 2 Year	The data will be calculated after collecting data from plant and DCS. Manager In-charge would be responsible for daily calculation
25. EGy	Quantitative	Net Electricity Generation by WHRB-1 & 2	MWh /year	calculated (c)	Daily	100%	Electronic/ Paper	Credit Period + 2 Year	The data will be calculated after collecting data from plant and DCS. Manager In-charge would be responsible for daily calculation.

3. Calculation of Net Power Generated from WHRB-1 & 2 Project Activity:

To achieve the above we follow the steps below (as per instrumentation plan given in the schematic diagram enclosed):

(i) Calculation of Net Power Generation:

Calculation of Net Power generation from the Project activity i.e. AIPL WHRB- 1 & 2 power plant.

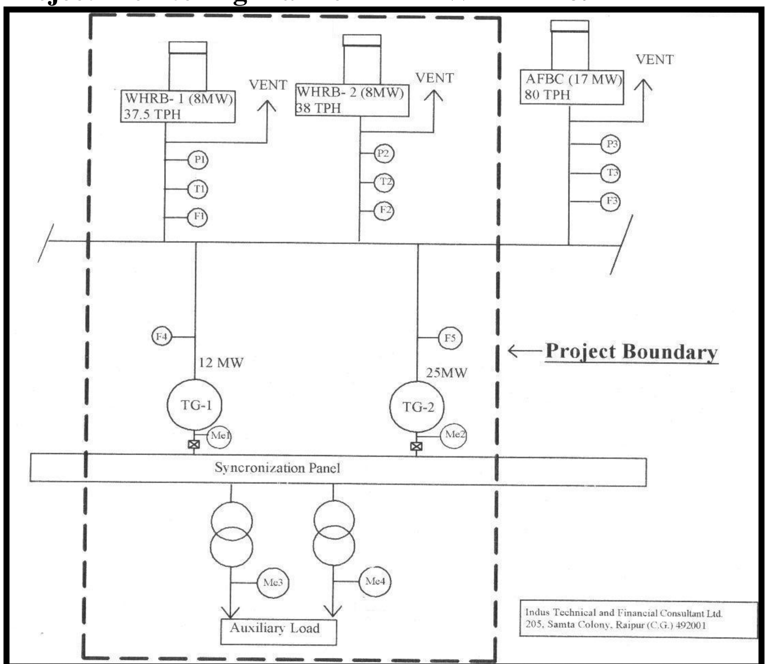
A	Calculation of Enthalpy of Steam fed from WHRB-1 (H_1)	=	E_{nt} X F_1 = H_1
B	Calculation of Enthalpy of Steam fed from WHRB-2 (H_2)	=	E_{nt} X F_2 = H_2
C	Calculation of Total Enthalpy of Steam fed from WHRB-1 and WHRB2 (H_3)	=	H1 + H2 = H6
D	Calculation of Enthalpy of steam fed in to TG-1 (H_3)	=	E_{nt} X F_4 = H_3
E	Calculation of Enthalpy of steam fed in to TG-2 (H_4)	=	E_{nt} X F_5 = H_4
F	Calculation of total Enthalpy of Steam fed to TG-1 and TG-2 ($H_3 + H_4$)	=	H4 + H5 = H_5
G	Gross Electricity generated by the TG-1 and TG-2 ($EG_{GEN\ CPP}$)	=	$Me_1 + Me_2$
H	Gross Auxiliary Load / self power consumed by the CPP ($EG_{AUX\ CPP}$)	=	$Me_3 + Me_4 = E_3$
I	Percentage Contribution in Enthalpy of Steam from WHRB-1&2 in total enthalpy of steam used for power generation = Enthalpy of Steam from (WHRB-1 + WHRB2 X 100) / Total Enthalpy of steam fed into TG-1 & TG-2	=	(C/F) X 100
J	Gross Electricity Generation from WHRB-1&2 = % Contribution of Enthalpy of Steam from WHRB-1& 2 X Gross Electricity Generated (EG_{GEN})	=	I X G
K	Proportionate Auxiliary Electricity consumption, due to WHRB-1 & 2 (EG_{AUX}) = % contribution of enthalpy of steam from (WRHB-1&2 X Gross Auxiliary Load)/ Auxiliary Power consumed by CPP	=	I X H
L	Net Electricity generated by WHRB-1 & 2 (EGy)	=	J - K

Note : (1) Steam enthalpy E_{nt} in K Cal/Kg is arrived by using thermodynamic steam tables, based on the pressure and temperature readings.

(2) Since the temperature and pressure at TG1 and TG2 inlet are maintained at same level as that of WHRB-1& 2 outlet, hence separate monitoring of temperature and pressure at TG1, TG2 inlet is not required.

(ii) Schematic Drawing and Details of Monitoring Plan and Metering Points :

Project Monitoring Plan for AIPL WHRB 1 & 2



Steam Monitoring Parameter	**Metering Point**
Pressure at Outlet of WHRB-1	P_1
Pressure at Outlet of WHRB-2	P_2
Pressure at Outlet of AFBC	P_3
Temperature of Outlet of WHRB-1	T_1
Temperature at Outlet of WHRB-2	T_2
Temperature at Outlet of AFBC	T_3
Flow of steam of Outlet of WHRB-1 (after vent)	F_1
Flow of steam of Outlet of WHRB-2 (after vent)	F_2
Flow of steam of Outlet of AFBC (after vent)	F_3
Net of Flow of steam in to TG-1	F_4
Net of Flow of steam in to TG-2	F_5

Electrical Parameter

Electrical Monitoring Parameter	
Gross Power Generation from TG-1	Me_1
Gross Power Generation from TG-2	Me_2
Gross Power consumed in Auxiliary loads	Me_3
Gross Power consumed in Auxiliary loads	Me_4

I. Table for monitoring

Serial No.	Activity
1.0	**GHG Performance Parameter**
1.1	The monitoring protocol requires AIPL to monitor the following GHG Performance parameters for estimating the emissions reductions from the waste heat based CPP: • Gross generation of electricity by the CPP • Auxiliary consumption • Net quantity of steam available from the waste heat recovery boiler (WHRB-1 & 2) for electricity generation in CPP. • Total Steam availability to TG sets. • Temperature and pressure of steam from WHRB boiler. • Net electricity generation from waste heat recovery.
2.0	**Metering System**
2.1	The metering system for the CPP consist of • Internal metering system sealed by SE(P) cum Electrical Inspector Generation for metering total generation from each TG Set. • In house metering system of AIPL (for metering the generation of power, auxiliary consumption,) • Steam Flow meters for monitoring net steam flow from WHRB-1&2 after the vent before the common header at entry port. • Flow meter for steam inlet to turbine TG1 and TG2. • Temperature gauge for WHRB-1&2, boiler. • Pressure gauge for WHRB-1&2 boiler. The two numbers TG meters are located in the TG room itself. They are used to monitor AIPL's net electricity and total generation from the CPP. These meters are maintained and calibrated by AIPL. All these meters are cross calibrated from standard testing laboratory Govt of Orissa, Bhubaneshwar and sealed by DEI(G).
2.2	**In house Metering System of AIPL** AIPL has an in-house metering system, which monitors the overall performance of the waste heat based CPP. The metering system mainly comprises of four meters. • 2 in-house generation meters- One for each TG set. • In-house Auxiliary consumption meter. (two) The in-house generation meters (or the Energy Meter) and consumption meters are micro-processor based metering device which monitor the net unit of Energy generated and auxiliary electricity consumed by AIPL's CPP. In-house captive auxiliary power consumption meters (or the Kilowatt Hour meter) are mainly micro-processor based metering device. In case of requirement the AIPL may also install the normal energy meters at various locations. The number and place of metering can be changed to suit the actual field requirement. Installation of all such meters will be well documented. All the meters will be calibrated from the reputed agencies.

3.0	**Calibration of the Metering System**
3.1	All the metering devices are calibrated at regular intervals so that the accuracy of measurement is ensured all the time. The meters recording total generation is calibrated by standard testing laboratory Govt of Orissa, Bhubaneshwar and sealed by DEI(G). The other meters are calibrated internally as per suppliers calibration schedule following the standard procedures for calibration.
4.0	**Reporting of the Monitored Parameters/ Authority and Responsibility of monitoring and reporting**
4.1	**Metering System** The AIPL personnel read the power generation metering system for recording the net electricity and the total generation from the CPP on the last day of every month or First day of the subsequent month and keep the complete and accurate records for proper administration. In case of requirement the accuracy of the main meter reading may be substantiated by the check meter reading. In the event that the main meter is not at service, then the check meter shall be used. A monthly report is prepared based on these meter reading, which is sent to the Electrical Inspector as monthly statuary return.. The Shift Engineer (Electrical) takes daily reading (at 6.00 AM) of the Main meters of the metering system and keeps the complete and accurate records in the reading book (maintained at the plant) for proper administration. The reading are verified by the Manager (Electrical and Instrumentation) on a daily basis and sent to the General Manager (Plant) at the Administrative Building in the plant for his review and for preparing the daily report.
4.2	**In-house Metering System of AIPL** The Shift Engineer (Electrical) monitors shift wise or eight hourly data on total generation, auxiliary consumption, net electricity available. The shift data or eight hourly data are recorded in the log book. The complete and accurate records in the log book are signed by the Shift Engineer (Electrical). Both of these reports are sent to the Manager (Electrical & Instrumentation) for his review on a daily basis. On the basis of the reported parameters, a complete and accurate executive daily summary report is prepared and signed by the General Manager (Electrical & Instrumentation) and sent to the unit head for proper administration. The flow meter reading, temperature and pressure gauge and DCS will measure the respective parameters and reporting is done shift wise by shift in-charge (operations) based on the online measurements.
5.	**Uncertainties and Adjustments:**

5.1	The shift wise or eight hourly, daily and monthly data are recorded at various points as stated above. Any observations (like inconsistencies of reported parameters) and/or discrepancies in the operation of the power plant will be documented as "History" in the daily report prepared by the General Manager (Plant) along with its time of occurrence, duration and possible reasons behind such operational disruptions. Necessary corrective actions will be undertaken at the earliest. Any discrepancies in the Main reading (for example, difference between main meter and check meter reading or extreme deviation in the net generation figure, if identified, will immediately be brought to the notice of General Manager as well as to Electrical Inspector. Corrective actions to be undertaken at the earliest after identification of reason of such discrepancy. Furthermore, as a safety measure, the total power generating system is equipped with an Automatic Alarming System which gives a prior indication of any fluctuations in the operating parameters of the power plant thereby enabling the operators to take necessary preventive measures. These measures will be undertaken in order to detect and minimize the uncertainty levels in data monitoring.
6.0	**Experience and Training**
6.1	All the Shift Engineers (Electrical and Instrumentation, Operations) are qualified engineers/ technologists. All the operators of the boiler power plant are IBR certified and NPTI certified engineers, and they also undergo an exhaustive on-the-job training program including plant operations, data monitoring and report preparation.
6.2	**Emergency Preparedness Plan** The total power generating system of the waste heat based CPP is equipped with an "Automatic Alarming System" which helps the operators to take necessary preventive actions before any kind of non-functioning of the power plant results in. AIPL. CPP has a fire fighting system in place. In addition AIPL has standard procedures for tackling emergencies arising from • Blackout • Low boiler drum level/ low feed water level • High flue gas temperature from sponge iron kiln. • Load throw off • Boiler Tube leakage. Boiler tripping at alarm systems.
(f)	**Reference** Project Design Document, maintenance manuals and standard OEM procedures.

	Records 1. Log Book, maintained by electrical & instrumentation department at site, containing 8 hourly data or shift wise data for all the in-house metering system. 2. Daily Executive Summary submitted to the Vice president/General Manger (Plant), prepared by electrical & instrumentation department at site containing daily data for all the in-house metering system and record of any history with details. 3. Daily report containing the performance parameters of the power plant and record of any history with details, maintained at site with a copy being sent to the unit head of the AIPL . 4. Monthly Report on net quantity of electricity generated at AIPL's Captive Power Plant and Electricity Duty returns submitted by AIPL on generation archived at site with a copy being sent to the unit head of AIPL. 5. Calibration certificate of the meters maintained at site.

(A) Purpose

To define the procedures and responsibilities for GHG Performance, Project Management , Registration, Monitoring, Measurement and Reporting of data and dealing with uncertainties.

(B) Scope

This procedure is applicable to 16 MW waste heat based i.e. WHRB power project of AIPL, India.

(C) Authorities and Responsibilities of Project Management, Registration, Monitoring, Measurement and Reporting:

Shift Engineer (Operations): Responsible for reporting Shift wise or and eight hourly data of the steam generated from boilers, steam fed to turbines, parameters of steam and flow meter reading of the Captive Power Plant. The report is then sent to the Manager (O & M) for his review.

Manager/General Manager (O&M) : Responsible for reviewing the monitored parameters on Eight hourly or Shift based and presenting a daily executive summary report, duly signed by himself, to the General Manager (Plant).

Shift Engineer (Electrical): Responsible for taking meter reading for electricity generation and wheeling shift-wise. The report is then sent to the Manager (E&I) for his review on a daily basis.

Manager/General Manager (E&I): Responsible for reviewing the monitored parameters shift-wise and presenting a daily executive summary report, duly signed by himself, to the General Manager (Plant).

President (Operation): Responsible for summarizing data of Electrical, Mechanical, Process (operation) Departments and report the same to the Director and CMD (AIPL) on a daily basis.

Appendix I : Abbreviation

^0C	Degree Centigrade
ABC	After Burning Chamber
AFBC	Atmospheric Fluidized Bed Combustion
AIPL	Action Ispat & Power Pvt Limited
Annex	Annexure
BOD	Biochemical Oxygen Demand
CDM	Clean Development Mechanism
CER	Certified Emission Reduction
COD	Chemical Oxygen Demand
CPP	Captive Power Plant
dB	Decibel
DEI(G)	Deputy Electrical Inspector (Generation)
DM	De-Mineralized
DRI	Direct Reduced Iron
E&I	Electrical and Instrumentation
EB	Executive Board
EHT	Extra High Tension
EIA	Environmental Impact Assessment
ESP	Electro Static Precipitator
GHG	Green House Gas
AIPL	Action Ispat & Power (P) Ltd.
HSD	High Speed Diesel
HT	High Tension
IBR	Indian Boiler Regulation
Kcal	Kilo calorie
kg/cm^2	Kilogram per centimeter square.
kWh	Kilo Watt hour
$M^3/hr.$	Meter cube per hour
MU	Million Units
MW	MW
MWh	Mega Watt hour
Nm^3/h	Normal Meter Cube per Hour
NPTI	National Power Training Institute
WESCO	Western Electricity Supply Company Of Orissa Ltd.
OSERC	Orissa State Electricity Regulatory Commission
OSPCB	Orissa State Pollution Control Board
O&M	Operation and Maintenance
PDD	Project Design Document
PLF	Plant Load Factor
Qty	Quantity
SE(P)	Superintending Engineer (Project)
WESCO	Western Electric Supply Company (Grid)

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