CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-PDD)
Version 02 - in effect as of: 1 July 2004)

CONTENTS

Annexes

SECTION A. General description of project activity

A.1 Title of the project activity:

Waste heat utilization for power generation at Ind Synergy Ltd, Kotmar, Raigarh in Chattisgarh, India

A.2. Description of the project activity:

M/s Ind Synergy Limited (ISL) has established an integrated complex of sponge iron and power plant at village Kotmar and Mahuapali village in the East direction from Raigarh (CG). The present steel complex comprises of 100000 tonne per annum (TPA) of Sponge Iron with 140000 TPA Semi finished Steel Capacity through DRI Induction Furnace (DRI-IF) route a alongwith 8 MW waste Heat Recovery Boiler (WHRB) based captive power plant (first phase –Unit I) and is operational since July 2004.

The purpose of the project activity is to generate electricity by utilisation of the waste gases emanating from the DR plant. The project activity includes design, engineering, procurement, finance, installation of waste heat recovery boiler integral with each kiln to recover the sensible heat contained in the waste gases for generation of power. The entire power thus generated has been utilised to meet the in-house power requirements of Ind Synergy Ltd. The project activity has substituted and will continue substituting equivalent amount of electricity generation from the grid with high carbon intensity, which is comprised of generation mix primarily composed of fossil fuels. This helps in reducing Greenhouse Gas (GHG) emission into the atmosphere per unit of electricity generation in the region.

Contribution of the project activity to sustainable development

Ministry of Environment and Forests, Govt. of India has stipulated the social well being, economic well being, environmental well being and technological well being as the four indicators for sustainable development in the interim approval guidelines for Clean Development Mechanism (CDM) projects.

Social well being

- The project has been implemented in the backward area of Chhattisgarh state. It has created direct and indirect employment opportunities, with more than 50 persons are being employed for project activity.
- It has increased income security of vulnerable sections of the rural communities in the vicinity of the project site through redistribution of benefits on account of the economic activities associated with the project.

Environmental well being

- It reduces the environmental load by avoidance of coal/lignite for power generation.
- This project activity has resulted in reduction of greenhouse gases emissions (GHGs) into the atmosphere, which would have been generated from coal fired power plant.
- This project activity reduces average emission of SO_x, NO_x, SPM and average solid waste generation.

Economic well being

- This project will demonstrate the use of new financial mechanism (CDM) in raising finance for power generation from waste gases.
- This project has developed the local economy and creates jobs and employment opportunities, particularly in rural areas, which is a priority concern of the Government of India.

Technological well being

- The project activity involves implementation of a newly built infrastructure using state of the art technology.
- Flue gas emitted from sponge iron kiln is taken in WHRB to recover sensible heat to generate steam, to drive turbine & alternator.

A.3. Project participants:

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

Name of Party involved (*)((host) indicates a host Party)	Private and/or public entity(ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
Ministry of Environment and Forests (MoEF) Govt. of India	Ind Synergy Ltd	No

A.4.1.1. Host Party(ies):

India

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

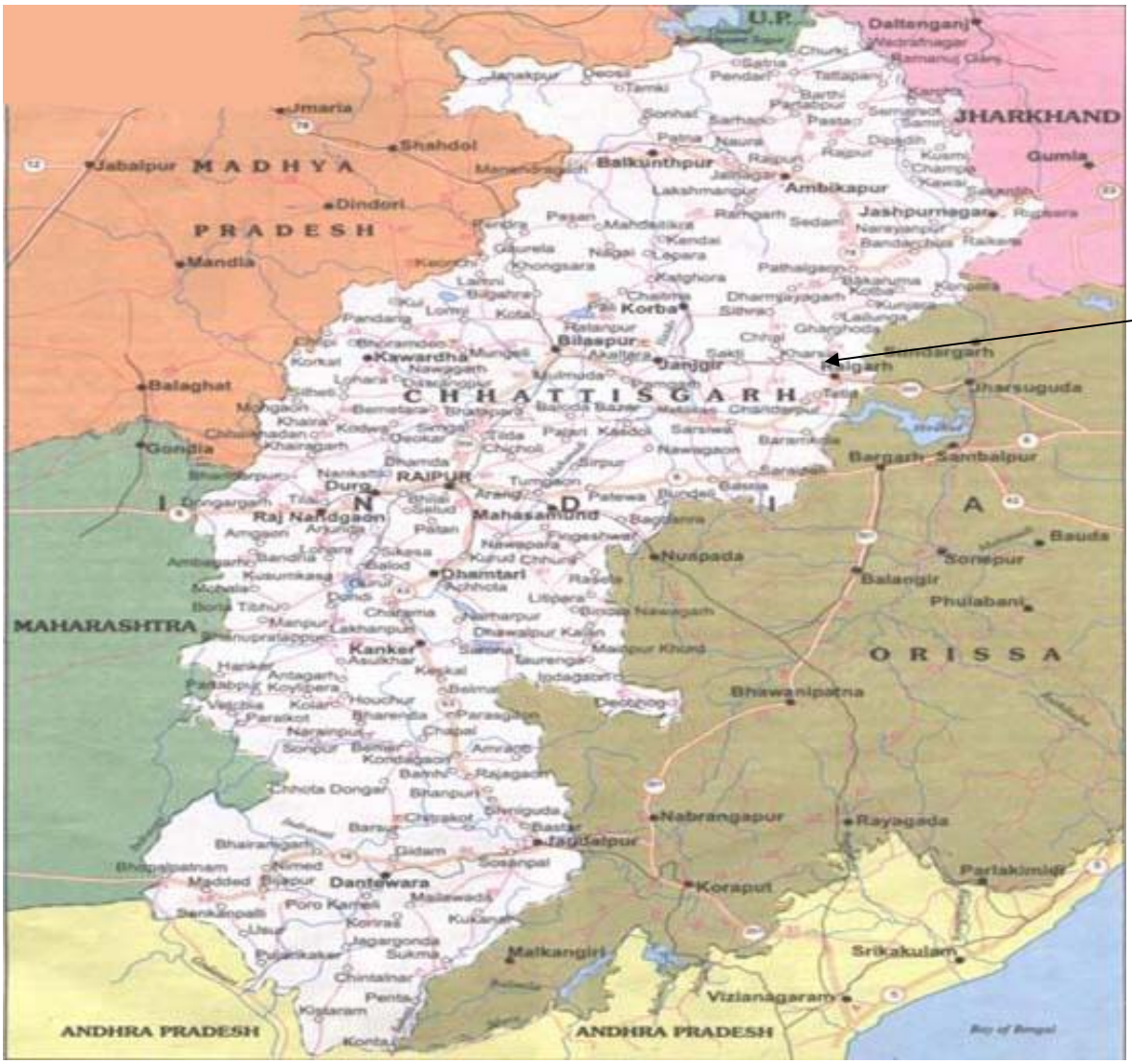
Chhattisgarh

A.4.1.3. City/Town/Community etc:

Village-Kotmar, Raigarh

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

The site is located on a flat terrain having red coloured lateritic and sandy loam soil. It is situated in the Northern Eastern part of the state of Chhattisgarh, which is about 14 km east from Raigarh. The plant site is approx 2 km from the Kotarlia railway station. All weather tar road is connected with area. The geographical location of the plant is 21^{o} 55’ 45’’ North to 21^{o} 56’ 02’’ North and 83 ^{o} 29’ 40’’ East to 83 ^{o} 30’ 01’’ East on the toposheet No. 64 O/5 and 64 O/9. The general elevation of the plain of the site in Raigarh district is about 222 M above MSL. The nearest airport is located at Mana village near Raipur at a distance of about 225 km from the project area.



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

Sector: Energy
Category 1: Energy industries (renewable - / non-renewable sources).

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

The proposed Waste Heat Boiler Scheme consists of One No. of Waste Heat Recovery Boiler and is specially designed for Waste Heat Recovery application of the Sponge Iron Plant Waste Gases. The descriptions of individual parts of the boiler are given below:

I. WASTE HEAT RECOVERY BOILER:

The Waste Heat Boiler produces steam at required pressure and temperature, as mentioned in the Technical Specifications. The boiler proposed is of Water tube type with flue gases coming from the Sponge Iron Kiln flowing over the tubes while water and steam circulate within the tubes.

Individual parts of the boiler are briefed below:

A) RADIATION CHAMBER: The radiation chamber is a hollow passage for flue gas flow made of water cooled walls. The Water cooled walls consist of Plain tubes welded to each other by means of plain strips. These plain tubes are then welded to top and bottom headers, which in turn are connected to the steam drum respectively. The entire chamber is fully fusion welded to provide a gas-tight chamber. Since heat transfer occurs in this section, predominantly by radiation mode, this chamber is called as Radiation Chamber. The entire first pass is of this construction only. This kind of design is best suited for Flue gas from Sponge Iron Kilns. Heavy carry-overs from the kiln freely fall into the hopper, without any hindrance. Since there is no other heat transfer surface across the flue gas path, choking problems are completely eliminated.

B) SCREEN SECTION: The Screen section consists of bare tubes arranged to form a tube bundle. The tubes are arranged in such a manner that they face the gas flow directly. The top and bottom ends of the tubes are duly welded to headers, which in turn are connected to the steam drum / water circuits respectively.

C) SUPERHEATER SECTION: The Super heater section heats the saturated steam at corresponding saturation temperature to required final temperature. The Superheater section is divided into two parts. The first part which heats saturated steam is called the Primary Superheater. The second part which further superheats this superheated steam to the final required temperature is called the Secondary Superheater. The Superheaters are of bare tube construction.

D) ATTEMPERATOR: Between both the Superheaters, an attemperator is provided. The sole purpose of the attemperator is to control the final super heated steam's temperature. The attemperator is of Spray Water type, which sprays relatively cold Boiler Feed Water (taken from the discharge line of the Feed water pump) into steam leaving the Primary Superheater. This causes the temperature of steam at outlet of Primary superheater to reduce. By varying the quantity of Attemperator Spray water, the temperature of steam entering the secondary superheater can be controlled. Since the final temperature of steam leaving Secondary Superheater depends on the inlet temperature of steam, an attemperation at intermediate level is an efficient method of Final Superheat Temperature Control.

E) EVAPORATOR SECTION: It consists of set of plain tubes, duly fitted at their ends to water drums, which in turn are connected to the separate steam drum. The drums are cylindrical vessels fitted with dished ends at their ends. The drums are drilled for various connections.

F) STEAM DRUM: The steam drum is provided with all necessary instrumentation to measure the level of water. The steam drum has two local level gauges and has two safety pressure relief valves. The continuous blow down (CBD) connection is taken from the steam drum. The CBD maintains concentration of impurities in the Boiler water within allowable limits. Feed water from the economiser and the chemical solution from the High Pressure dosing system enters the steam drum. The CBD, Feed water and Dosing connections are provided with internal piping with evenly distributed nozzles to take care of even distribution / collection along the drum length.

The Main steam line tapping on the steam drum is provided with a demister pad internally. The demister pad is of SS 304 construction and is of wire mesh type arrangement. This construction entraps the water particles in the steam leaving the steam drum and supplies dry steam.
All drums are provided with man-holes for facilitating inspection / maintenance. The Material of construction of drum shall be Carbon steel.

F) ECONOMISER:
The economiser section is provided to cool down the flue gas to the required outlet temperature and use this heat to increase the temperature of Boiler Feed water entering the Steam drum. The economiser is of bare tube construction. The tubes are horizontally orientated and are hung from the top by means of hangers and supports.

G) OUTLET BOX:

The outlet box will lead the flue gases to the Electrostatic Precipitator, The outlet box is provided with necessary hopper for ash collection. The entire waste heat boiler is provided with such kind of hoppers for ash collection.

II. HIGH PRESSURE DOSING SYSTEM:

The High Pressure dosing system doses the boiler water with required quantity of Chemical solution to control the contaminants in the boiler water. The dosing chemical normally used is Tri-Sodium Phosphate. The dosing system consists of a storage tank, which is filled with water and chemicals are added to it and stirred. A motorised stirrer is provided for this purpose. The mixed chemical solution is pumped to the steam drum by means of Reciprocating type pumps. The pumps are of metering type, that is, the quantity of Dosing solution can be varied depending upon the quality of Boiler water. The dosing tank shall be internally rubber-lined.

III. BOILER FEED WATER PUMPING STATION:

The Feed water required for the Boiler is supplied by the Feed water pumping station. Boiler feed water pumps (2 X 100 % capacity, 1 working + 1 stand by) shall be provided. The pumping station includes Auto-recirculation valves and conical strainers. The pumps are centrifugal multistage type. The pumps are provided with Mechanical Seal. . The feed water pumps draw water from the deaerator.

IV.SOOT BLOWERS:

The Waste Heat Boiler is provided with necessary quantity of soot blowers at appropriate locations. The sole purpose of soot blowers is to keep the heat transfer area clean of fouling. The Soot blowers are spaced in such a manner that all heat transfer areas are sufficiently covered. Retractable soot blowers are provided in High temperature zones (such as superheaters) and rotary soot blowers are provided in other zones.

V INDUCED DRAFT FANS:

The induced draft fan draws flue gas from the boiler and exhausts it through the stack. One induced draft fan per boiler shall be provided each with one number of multi-louver type control damper on suction side of the fan. This damper can be used as an isolation damper also. The control damper can be manipulated to control the draft in the flue gas circuit and thus will have an effect on the Kiln.

On discharge side a manually operated butterfly type damper shall be provided to isolate. The induced draft fans are sized to provide necessary draft to overcome the pressure drop across the boiler, ducting & ESP.

VI BLOW DOWN TANK:

The Blowdown and drain water discharging out of the boiler are at high temperatures and pressures. When such a liquid is discharged to open atmosphere, there shall be sudden splashing due to reduction in pressure. Hence the blow down tank is provided.

The Blow Down tank is normal cylindrical vessels with dished ends. The top dished end is provided with a vent line while the bottom is provided with drain points and the tank is provided with over-flow line.

VII) ELECTROSTATIC PRECIPITATOR:
The operations produce exhaust gases that contain dust. This is passed through electrostatic precipitator that caught particles from the flue gas.

VIII) DEAERATOR:

The Dearator is basically an Oxygen scavenging equipment. It uses the principle, that as the temperature of water rises the oxygen holding capacity drops. It is proven that if the temperature of water is above 100 ^{o}C, its oxygen holding capacity drops down below 0.02 ppm. The Deaerator, which is proposed, operates at a pressure of 1.36 kg/cm^{2}g. The corresponding saturation temperature is 125 ^{o}C.

The Deaerator is fed with the condensate return from the Condenser of the Power Plant. The heating medium is the extraction steam from the steam turbine. In order to make up the loss of water due to blow down etc. a make-up water line is also connected to the Deaerator. The steam line is provided with a pressure control valve and the Make-up water line is provided with a Level control valve. The Deaerator is provided with a Pressure transmitter and Level transmitter.

IX) ELECTRIC MOTORS:

The electrical motors shall be of Class F insulation & temperature rise shall be as per Class B. All motors shall be suitable for Safe Zone. We have considered only LT motors. All electric motors shall be provided with Canopy made of GI.

BASIS OF DESIGN

GENERAL DATA:		
1	Type of Boiler proposed	Natural Circulation Water tube type

2	Orientation of Boiler	Vertical	
FLUE GAS SIDE DATA:			
1	Gas flow rate (nm3/hr)	84,000 to 86,000	
2	Gas inlet temperature (^oC)	950	
3	Gas outlet temperature (^oC)	180	
4	Gas composition (*) (% v/v)	CO_2	15 – 17
		H_20	12 – 14
		N_2	64.7 – 69.7
		O_2	3 – 4
		CO	0.3
		SO_2	200 ppm
5	Gas Dust loading (gm/nm^3)	40	
6	Total Gas side pressure drop (mm WC) across boiler, ducting & ESP	200	
7	Radiation loss	2 % of heat duty	
WATER/STEAM SIDE DATA:			
1	Steam Generation rate (kg/hr)	36,000 *	
2	Steam Pressure at final superheater outlet (kg/cm^2 g)	65	
3	Steam Temperature at final superheater outlet (^oC)	490$\pm$ 5	
4	Water inlet temperature at economiser inlet (^oC)	125	
5	Superheated steam outlet temperature control range, %	60 to 100	
6	Blow down	2 %	

* For the gas flow rate, gas inlet temperature and composition as mentioned above.

FLUE GASES

Flue gases leaving the combustor transfer the heat by radiation to the water walls by non luminous radiation and convection to the super heater and economizer. The flue gas leaving the super heater passes through the economizer that acts as heat recovery units. The cooled exhaust flue gases then flows to ESP. the ash get collected in to the hoppers provided below the **Electrostatic Precipitator** (**ESP**). field, with rotary air lock. One number ID fan is provided in the flue gas stream to produce necessary draft to maintain the furnace under low positive pressure and provide required draft pressure to the gas outlet through Chimney. ID fan inlet dampers can be adjusted to maintain the furnace draft at desired levels from operating platform.

A.4.4. Brief explanation of how the anthropogenic emissions of anthropogenic greenhouse gas (GHGs) by sources are to be reduced by the proposed CDM project activity, including why the emission reductions would not occur in the absence of the proposed project activity, taking into account national and/or sectoral policies and circumstances:

This project involves recovery and use of sensible heat contained in the waste gases for generation of power. This in turn displaces a certain amount of coal use as the fuel for power generation. In the absence of the project activity an equivalent amount of power would have generated from a thermal power station to meet the electricity demand of the project proponent. The amount of coal consumption that has been displaced due to utilisation of waste heat has resulted in savings of fossil fuel consumption. Thus the project activity is reducing GHG emission into the atmosphere.

Legislations in India do not mandate utilization of waste heat for power generation. There is also no immediate plan of the Ministry of Environment and Forests, India to introduce any legislation related to use of waste heat for power generation. Therefore ISL did not have any statutory compulsion to implement the project activity.

The project activity substitutes the use of coal for power generation, additional to the existing practise in compliance with national /sectoral regulations/policies/circumstances, thus reducing GHG emissions to the atmosphere. The total project emission for the 10-year crediting period works out to be 4,35,622 tCO_2e.

A.4.4.1. Estimated amount of emission reductions over the chosen crediting period:

Year	Annual estimation of emission reductions in tonnes of CO_2e
July2006 – Dec 2006	14,521
Jan 2007 – Dec 2007	43,562
Jan 2008 – Dec 2008	43,562
Jan 2009 – Dec 2009	43,562
Jan 2010 – Dec 2010	43,562
Jan 2011 – Dec 2011	43,562
Jan 2012 – Dec 2012	43,562
Jan 2013 – Dec 2013	43,562
Jan 2014 – Dec 2014	43,562
Jan 2015 – Dec 2015	43,562
Jan 2016 – June 2016	29,041
Total estimated reductions (tonnes of CO_2e)	4,35,622
Total Number of Crediting Years	10 years
Annual average over the crediting period of estimated reductions (tonnes of CO_2e)	43,562

A.4.5. Public funding of the project activity:

This is a unilateral CDM Project Activity undertaken by the project proponent. Hence public funding, such as grants from official development funds (ODA), is not involved in this project.

SECTION B. Application of a baseline methodology

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

Title: "Consolidated baseline methodology for waste gas and/or heat for power generation"
Reference: Approved consolidated baseline methodology ACM0004 / Version 02, Sectoral Scope: 01, 03 March 2006.

B.1.1. Justification of the choice of the methodology and why it is applicable to the project activity:

This methodology applies to project activities that generate electricity from waste heat or the combustion of waste gases in industrial facilities.

The methodology applies to electricity generation project activities:

- that displace electricity generation with fossil fuels in the electricity grid or displace captive electricity generation from fossil fuels;

The project activity is generating power using recover sensible heat contained in the waste gases that displaces equivalent power generation from coal fired captive power plant. In the absence of the project activity the waste heat would have been vented out.

- 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 the project activity

No fuel switch is involved or planned in the Ind Synergy sponge Iron process that is the source of the waste heat.

The methodology covers both new and existing facilities. For existing facilities, the methodology applies to existing capacity, as well as to planned increases in capacity during the crediting period. If capacity expansion is planned, the added capacity must be treated as a new facility.

The project activity applies to the existing capacity which is operational since July 2004.

The above arguments justify that the project meets all applicability criteria of the selected approved consolidated methodology ACM0004 and hence is applicable to the project.

B.2. Description of how the methodology is applied in the context of the project activity:

The basic assumption of the baseline methodology is that in the absence of the project activities the waste gases would have been released into the atmosphere and equivalent electricity would have otherwise been generated by operation of existing or new power plants in the eastern regional grid, which is the base case in the present project activity.

The approved methodology ACM0004 is used to determine the baseline scenario. ACM0004 states that the alternatives to the base line scenario should include all possible options that provide or produce electricity for in-house consumption and /or sale to grid and or other consumptions.

As per ACM0004, those baseline scenarios have been excluded that:

- Do not Comply with legal and regulatory requirement ; or
- Depend on key resources such as fuels, material or technology that are not available at the project site

As per ACM0004 alternative scenarios in the absence of the CDM project activity would be as follows;

The proposed project activity not undertaken as CDM project activity;
Alternative (a) the proposed project activity not undertaken as CDM project activity,
Alternative (b) Import of electricity from the grid
Alternative (c) captive power generation on-site, using coal.
Alternative (d) captive power generation on-site, using natural gas.
Alternative (e) captive power generation on-site, using diesel.
Considering point (f) other uses of waste heat or waste gas,

Alternative (a) the proposed project activity not undertaken as CDM project activity,

This alternative would not have been sustainable if it did not envisage assistance from CDM revenues, since it requires high initial investment. Apart from the Investment barrier this alternative also faces other prohibitive barriers (operational barriers) (Please refer to section B.3 below for details). Though, this alternative is in compliance with all applicable legal and regulatory requirements, it faces investment and operational barrier. Hence this option is not a part of the baseline scenario.

Alternative (b) Import of electricity from the grid

The uncertainty/ fluctuation in the power production due to fluctuation in waste gas supply have major impact on total generation of power from the power plant. In the absence of the project activity, the project proponent may import its total electricity demand from the grid. The state of Chhattisgarh is also a power surplus state, thus there is no risk related to the availability of power from the grid. Considering these facts the import of electricity from the grid may be a likely baseline scenario.

Alternative (c) captive power generation on-site, using coal.

Captive power generation using coal may be considered as an alternative baseline scenario as ISL has access to use this as a fuel for electricity generation. Coal is the Chhattisgarh's most plentiful and readily available domestic fossil fuel. The plant is located near a coal mine and we will be able to derive the advantage of lower fuel cost. The above information indicates that captive thermal power generation using coal was one of the baseline scenarios available with the project proponent before the start of the CDM project.

This alternative is in compliance with all applicable legal and regulatory requirements and can be part of the baseline scenario.

Alternative (d) Captive power generation on-site, using natural gas.
This alternative is in compliance with all applicable legal and regulatory requirements. However, this alternative is not a realistic option due to the non-availability of natural gas and its distribution network in the region.

Alternative (e) captive power generation on-site, using diesel.

In the absence of the CDM project activity ISL may generate electricity by diesel based power plant for meeting electricity requirements of the sponge iron power plant. This alternative is in compliance with all applicable legal and regulatory requirements. Hence this is a part of the baseline scenario.

Considering point (f) other uses of waste heat or waste gas,
This alternative is in compliance with all applicable legal and regulatory requirements.

There is no requirement for the waste heat from flue gases for other use at the plant site. Given the existing situation at the location and prevailing conditions the realization of alternative g is ruled out.

From the discussion above it is found that alternative (b), alternative (c) and alternative (f) are plausible alternatives. Further as per the methodology ACM 0004, the most economically attractive alternative should be considered as the baseline scenario. A sensitivity analysis was undertaken to analyse economically attractive option among the two options.
Sensitivity analysis

Alternative	**Capital Cost of Power Plant (Rs. Crore/MW)**	**Cost of delivered energy Rs/ kWh (At 80 % PLF and 200 Km between the source and load centre)**	**Comments**	**conclusion**
Alternative (b) Import of electricity from the grid	Nil		• No initial capital investment • Easy government approval • Less financial burden	Economically attractive option
Alternative (c) captive power generation on-site, using coal.	4.0[1]	1.56**(At 80 % PLF and 200 km between the source and load centre)**[1]	• Marginally higher capital cost in comparison to Diesel based power plant. • Lower variable cost due to lower fuel price	This option is not an economically attractive option
Alternative (f) Existing or new captive power generation on-site, using diesel.	3.5[1]	5.96 (Diesel at Load Centre)[1]	• Marginally lower capital cost in comparison to coal based power plant. • High variable cost due to higher diesel price	This option is not economically attractive option.

[1] "Report of Expert Committee on Fuels for Power Generation", Planning Wing, Central Electricity Authority, Government of India, February 2004

Based on the above information it is evident that "Import of electricity from the grid" requires the minimum investment and hence was the most economically attractive baseline alternative available to ISL for obtaining power requirement in its industrial complex. Hence, **"Import of electricity from the grid"** is considered as the baseline scenario in this project activity.

B.3. 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:

As required by the approved methodology, the additionality of the project activity shall be demonstrated and assessed using the latest version of the "Tool for the demonstration and assessment of additionality" agreed by the CDM Executive Board, available at the United Nations Framework Convention on Climate Change (UNFCCC) CDM web site.

Steps followed under the "Tool for the demonstration and assessment of additionality" are as follows:

Steps for Additionality Check	**Demonstration of crossing Barriers**	**Remarks**
Step 0: Preliminary screening based on the starting date of the project activity.		
Has the project started after 1st January 2000? If yes, is there verifiable evidence to justify that CDM was seriously considered in the decision to proceed with the project activity?	*Yes.* The project activity has started (construction activity) during May 2003. TG-1, commissioning date: 21/10/2004 The CDM was seriously considered in the decision to proceed with the project activity. This evidence will be made available to the DOE.	The project activity has crossed step 0 of additionality demonstration, and hence this assessment can move to step 1.
Step 1. Identification of alternatives to the project activity consistent with current laws and regulations		
Sub-Step 1a: Define alternatives to the project activity.	A possible set of alternative is drawn up which will be there in the absence of the CDM activity. **Alternative (a) the proposed project activity not undertaken as CDM project activity,** **Alternative (b) Import of electricity from the grid** **Alternative (c) captive power generation on-site, using coal.** **Alternative (d) captive power generation on-site, using natural gas.** **Alternative (e) captive power generation on-site, using diesel.** **Considering point (f) other uses of waste heat or waste gas**.	
Sub- Step 1b: Enforcement of applicable laws	• In India and state of Chhattisgarh it is not mandatory for sponge iron units to implement waste heat recovery based power generation project.	The project activity has crossed sub-step 1

and regulations.	• Also there is no legal requirement on the choice of a particular technology for power generation.	of additionality demonstration, and hence this assessment has moved to the next step 2 investment analysis or step 3 barrier analysis.

Step 3. Barrier analysis		
Sub-step 3a. Identify barriers that would prevent the implementation of type of the proposed project activity:	**Investment barrier** The project activity had a high initial capital cost which is a hindrance for the waste heat recovery based power plant compared to the baseline scenario. Ind Synergy Ltd was conceived during 2001-2002 to manufacture sponge iron using DRI kilns and also steel using the Induction furnaces. This period was a recessionary period where state run steel plants were registered heavy losses and a number of steel units loans were being turned into non performing assets (NPAs). It is in this backdrop the project proponent has approached the State Bank of Travancore for the term loan. The Bank has carried out a detailed appraisal and agreed to finance the project partly on the condition that promoters had to furnish a number of collateral securities and personal guarantees and borrow money at higher effective interest rate. The average cost of fund during project inception stage was about 9 to 10%. In general, the average cost of fund is based on the macroeconomic outlook for sector, the promoters' credentials and experience in the sector, penetration and risk associated with the technology and regulatory risks. During the inception stage of the project activity the overall economic scenario for the steel sector was negative, technological penetration of waste heat recovery based CPP was low. As a result of the above risks that the project activity envisaged, the bank has partly funded the project activity at a higher lending rate of 11%. However, ISL management has taken on board the recommendation for the project activity after consideration of CDM benefits. Ind Synergy Ltd is shouldering the additional fund cost by showing confidence in the Kyoto Protocol/CDM system. **Operational Barrier-** The WHRB entirely depends on waste gases generated by the kiln & the efficiency of the WHRB relies on the efficiency of kiln operation. The efficiency of kiln operation gets badly affected by :	

	(a) Non availability of coal of suitable quality: For the kiln to operate on optimum efficiency, the fixed carbon content of the coal should be 42% min. & should have a calorific value of 5000 Kcal / Kg. If coal of such quality is not available, the coal consumption of the kiln increases, thereby increasing coal volume inside the kiln occupied. This reduces the production capacity of the kiln. As a result the power generation by WHRB gets reduced & the power plant operates on low efficiency. (b) Apart from this the supply of inadequate quantity of coal also affects the efficiency of the kiln & consequently of the WHRB. (c) The Kiln waste gases are first burnt in ABC (After Burning Chamber) & the burnt gases go to the WHRB via ABC. The improper burning of waste gases causes fluctuations in the temperature of the flue gases at WHRB inlet & this affects the power generation by WHRB. (d) Apart from this any mechanical or electrical break down / shut down of the kiln also affects the efficiency of WHRB Power generation. (e) In case of inadequate power generation by WHRB the power has to be taken from the state power grid. In this the unit being non regular consumer of power, extra charges are required to be paid. Demand charges for such type of supply drawl are very high & this affects the profitability of the unit. (f) Skilled and/or properly trained workmen to operate and maintain the power plant is not available because of unfamiliarity with the processes involved in the project activity. **Other barrier** Ind Synergy was promoted by Shri Satish Goel and the group has various business activities including solvent extraction, edible oil, Soya Bean meal processed. Hence the management lacked proper knowledge and exposures of the complications involved in sponge iron plant and WHRB based power plant operation.	
Sub-step 3 b. Show that the identified barriers would not prevent the implementation of at least one of the alternatives	The barriers identified above, do not exist for any other three project alternatives, and hence will not prevent implementation of any of such project alternatives.	Both Sub-steps 3a – 3b are satisfied, proceed to Step 4

(except the proposed project activity):		

Step 4: Common Practice analysis		
Sub-step 4a. Analyze other activities similar to the proposed project activity: Sub-step 4b. Discuss any similar options that are occurring:	<table><tr><th>Sponge Iron Plant power source</th><th>Number of Units</th></tr><tr><td>Import of power from Grid</td><td>12 units</td></tr><tr><td>Waste heat recovery CPP for in-house consumption</td><td>2 units</td></tr><tr><td>Waste heat recovery based CPP for export to grid</td><td>3 units</td></tr></table> Source: Sponge Iron Manufacturers Association and ISL The above table presents a way to illustrate the power demand source of sponge iron plant in Chhattisgarh. Therefore, the Project activity (Waste heat recovery CPP for in-house consumption) is not a common practice.	Steps 4 satisfied, proceed to Step 5.

Step 5: Impact of CDM Registration		
	▪ The primary impact of CDM registration will be the sale of CERs, providing compensation towards the investment in the project activity. ▪ The CDM returns from the project activity would decrease the uncertainty involved. ▪ It would also make the project more attractive for the project proponent ▪ The added incentive of CDM would reduce financial uncertainty and increase investments in waste heat recovery based power generation.	Step 5 is satisfied

Based on the above analysis, it is concluded that in the absence of the project activity, the equivalent amount of electricity would otherwise have been generated from the grid, which is comprised of generation mix primarily composed of fossil fuels. This would result in increasing emission of GHGs into the atmosphere. Without the CDM revenue the proponent had no direct economic incentive to proceed for the project activity.

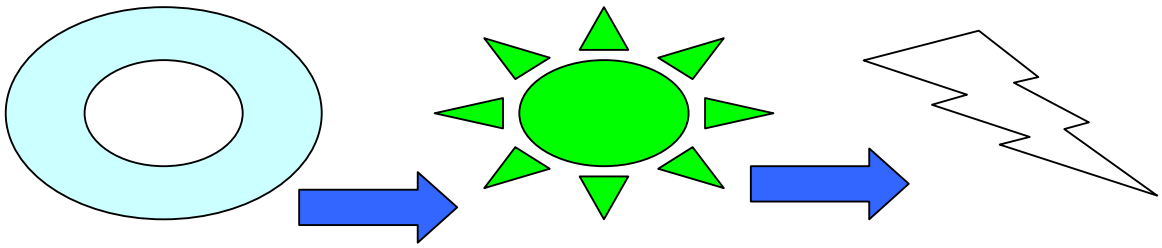
The project is expected to reduce about 4,35,622 tCO_2equ over the entire crediting period of 10 years.

B.4. Description of how the definition of the project boundary related to the baseline methodology selected is applied to the project activity:

For the purpose of determining GHG emissions of the **project activity**, project participants shall include:
• CO_2 emissions from combustion from auxiliary fossil fuels

For the purpose of determining **baseline emissions**, project participants shall include the following emission sources:
• CO_2 emissions from fossil fuel fired power plants connected to the electricity system;
• CO_2 emissions from fossil fuel fired captive power plants supplying the project site facility;

Thus, the **spatial extent** of the project boundary comprises the waste heat sources, captive power generating equipment, any equipment used to provide auxiliary heat to the waste heat recovery process, and the power plants connected physically to the electricity grid that the proposed project activity will affect.



PROJECT BOUNDARY

B.5. Details of baseline information, including the date of completion of the baseline study and the name of person (s)/entity (ies) determining the baseline:

The current final PDD with baseline study was completed on: 12/04/2006.

Dr Ram Babu, PricewaterhouseCoopers (P) Limited, whose contact information is set out at the below table has assisted the Sponsor in determining the baseline methodology.

Organization:	PricewaterhouseCoopers (P) Ltd.
Street/P.O.Box:	Veer Savarkar Marg,
Building:	252
City:	Mumbai
State/Region:	Maharastra
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URL:	www.pwc.com
Represented by:	
Title:	Associate Director

Salutation:	Dr
Last Name:	Ram Babu
Middle Name:	
First Name:	P
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Mobile:	+91-9820135929
Direct FAX:	-
Direct tel:	+91-22-56691302
Personal E-Mail:	ram.babu@in.pwc.com

PWC is not a project participant as meant in Annex I.

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:

TG-1 , commissioning date :21/01/2004

.....

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

20 years 0 months

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

C.2.1. Renewable crediting period

Fixed Crediting Period

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

NA

C.2.1.2. Length of the first crediting period:

NA

C.2.2. Fixed crediting period:

10 years

C.2.2.1. Starting date:

1st July 2006

C.2.2.2. Length:

10 years and 0 months

SECTION D. Application of a monitoring methodology and plan

D.1. Name and reference of approved monitoring methodology applied to the project activity:

Title: "Consolidated monitoring methodology for waste gas and/or heat for power generation"

Reference: Approved consolidated monitoring methodology ACM0004 / Version 02, Sectoral Scope: 01, 03 March 2006.

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

The approved consolidated monitoring methodology is designed to be used in conjunction with the approved consolidated baseline methodology. The applicability conditions for the monitoring methodology are identical to that of the baseline methodology. Please refer to section B.1.1 for a detailed discussion. Hence it is justified to adopt the approved consolidated monitoring methodology for the project activity.

The waste gases released from the plant is having a considerable waste heat, which is used for power generation. The proposed power project is a Waste heat recovery based power project. Thus, the project displaces the use of any other fossil fuel at the regional grid for the equivalent amount of electricity generation at thermal power station, which can liberate pollutant to the environment.

According to the ACM0004 the applicability criteria are the same as for the Baseline Methodology.

D.2. 1. Option 1: Monitoring of the emissions in the project scenario and the baseline scenario

D.2.1.1. Data to be collected in order to monitor emissions from the project activity, and how this data will be archived:

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 archived data to be kept?	Comment

There are no projet emissions from the project activity.

D.2.1.2. Description of formulae used to estimate project emissions (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.)

NA

D.2.1.3. Relevant data necessary for determining the baseline of anthropogenic emissions by sources of GHGs within the project boundary and how such data will be collected and archived :

ID number *(Please use numbers to ease cross-referencing to table D.3)*	Data type	Data variable	Data unit	Measured (m), calculated (c), estimated (e),	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	For how long archived data to be kept?	Comment
1. EG_{GEN}	Quantitative	Electricity Export to 220 kV switchyard through Generator Transformers	MWh/yr	Online measurement	Daily	100%	Electronic	Credit period +2 years	Meters at switch yard measure the data. Manager in-charge is responsible for regular calibration of meter.
2. EG_{AUX}	Quantitative	Electricity import from 220kV switchyard, for plant auxiliaries	MWh/yr	Online measurement	Daily	100%	Electronic	Credit period +2 years	Same as above.
3. EG_y	Quantitative	Net Electricity Export	tCO_2/MWh	c	Yearly	100%	Electronic	Credit period +2 years	Calculated from the above measured parameters (1– 2).
4. $EF_{OM,y}$	Quantitative	OM emission factor for relevant grid	tCO_2/MWh	c	Yearly	100%	Electronic	Credit period +2 years	Calculated as per ACM0002.
5. $EF_{BM,y}$	Quantitative	BM emission factor for relevant grid	t	e	Yearly	100%	Electronic	Credit period +2 years	Same as above.

6. $F_{i,j,y}$	Quantitative	Amount of fossil fuel consumed by each fossil fuel based power plant in relevant grid	tCO_2/t	e	Yearly	100%	Electronic	Credit period +2 years	Used for calculating emission coefficients in OM and BM.
7. $COEF_{i,k}$	Quantitative	CO_2 emission coefficient for each fossil fuel based power plant in relevant grid	MWh/yr	e	Yearly	100%	Electronic	Credit period +2 years	Same as above.
8. $GEN_{i,y}$	Quantitative	Electricity generation by each fossil fuel based power plant in relevant grid	tCO_2/MWh	c	Yearly	100%	Electronic	Credit period +2 years	Same as above.
9. EF_y	Quantitative	CM CO_2 emission factor for relevant grid	tCO_2/MWh	c	Yearly	100%	Electronic	Credit period +2 years	Calculated as weighted average of OM and BM.

D.2.1.4. Description of formulae used to estimate baseline emissions (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.)

A combined margin approach has been used to calculate the baseline emissions for the various electricity grids considered. The emission factor is calculated as follows:

$BE_y = EG_y * EF_y$……...…….(1)

$EF_y = (EF_{OM,y} + EF_{BM,y}) / 2$……..……(2)

$EF_{OM,Y} = [\sum (F_{i,j,y} * COEF_{i,,j}) / \sum GEN_{j,y}]$……(3)

$COEF_{i,,j} = NCV_i * EF_{CO2,i} * OXID_i$……..……(4)

A 3-year average, based on the most recent statistics available at the time of PDD submission has been used in the operating margin calculations.

For build margin calculations, power generation by project types based on fuel used from recent capacity additions to the system for which capacity additions defined as the greater of most recent 20% of existing plants or the 5 most recent plants, have been used.

D. 2.2. Option 2: Direct monitoring of emission reductions from the project activity (values should be consistent with those in section E).

Not Applicable

D.2.2.1. Data to be collected in order to monitor emissions from the project activity, and how this data will be archived:

ID number *(Please use numbers to ease cross-referencing to table D.3)*	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e),	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment

NA

D.2.2.2. Description of formulae used to calculate project emissions (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.):

NA

D.2.3. Treatment of leakage in the monitoring plan

D.2.3.1. If applicable, please describe the data and information that will be collected in order to monitor leakage effects of the project activity

ID number *(Please use numbers to ease cross-referencing to table D.3)*	Data variable	Source of data	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)	Comment

Not Applicable

D.2.3.2. Description of formulae used to estimate leakage (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.)

NA

D.2.4. Description of formulae used to estimate emission reductions for the project activity (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.)

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

$$\mathbf{ER_y = BE_y - PE_y} \quad \textbf{(5)}$$

D.3. Quality control (QC) and quality assurance (QA) procedures are being undertaken for data monitored

Data *(Indicate table and ID number e.g. 3.-1.; 3.2.)*	Uncertainty level of data (High/Medium/Low)		Explain QA/QC procedures planned for these data, or why such procedures are not necessary.

1,2,3	Low	Yes	This data is used for the calculation of project electricity generation. This data is monitored using meters and standard testing equipment, which is regularly, calibrated following standard industry practices.
4,5,6,7,8,9	Low	Yes	The data is directly used to calculate baseline emissions. This data is determined, so does not need QA procedure.

D.4 Please describe the operational and management structure that the project operator will implement in order to monitor emission reductions and any leakage effects, generated by the project activity

The project is operated and managed by ISL who is the project proponent. ISL has ensured safety in operation of the plant as per environmental management plan prepared for the site. The site also has an ISO 14001 based Environmental Management System (EMS) in place and the power plant will also be included ISO 14001 based Environmental Management System (EMS). Accordingly, the monitoring plan used herein has become an integral part of the Environmental Management Programmes and would be constituent of operational and management structure of this Environmental Management System (EMS).

Managing Director (MD) has constituted the CDM project team, which is responsible for the project activity. The monitoring and verification of the project activity is assigned to the four member team which is responsible for monitoring, verification and recording of the data. On a daily basis the monitoring reports is checked by the operation head. In case of any irregularity in the project activity it is reported to the operation head. On a monthly basis this report is forwarded to the President and MD.

D.5 Name of person/entity determining the monitoring methodology:

Dr. P. Ram Babu of PricewaterhouseCoopers (P) Limited, whose contact information is set out at section B.5, has assisted the project proponent in determining the monitoring methodology.

SECTION E. Estimation of GHG emissions by sources

E.1. Estimate of GHG emissions by sources:

The project activity uses waste heat recovered from the fuel gases for power generation. Therefore, it does not use any other fossil fuel for power generation. Hence the project emission is zero.

E.2. Estimated leakage:

No Leakage

E.3. The sum of E.1 and E.2 representing the project activity emissions:

Since the **project emissions** and the leakage are **zero**, the sum of both will zero.

E.4. Estimated anthropogenic emissions by sources of greenhouse gases of the baseline:

The total anthropogenic emissions in the baseline during 2006 – 2016 will be 4,35,622 tCO_{2e}.

E.5. Difference between E.4 and E.3 representing the emission reductions of the project activity:

Since the project emissions and the leakage are zero, the emissions reductions are equal to the baseline emissions. The total emission reductions during 2006 – 2016 will be 4,35,622 tCO_{2e}.

E.6. Table providing values obtained when applying formulae above:

Year	Estimation of Project activity Emission Reductions (tones of CO_2e)	Estimation of Baseline Emissions(tones of CO_2e)	Estimation of leakage (tones of CO_2e)	Estimation of emission reduction (tones of CO_2e)
Sep 2006 - Dec 2006	0	14,521	0	14,521
Jan 2007 - Dec 2007	0	43,562	0	43,562
Jan 2008 – Dec 2008	0	43,562	0	43,562
Jan 2009 – Dec 2009	0	43,562	0	43,562
Jan 2010 – Dec 2010	0	43,562	0	43,562
Jan 2011- Dec 2011	0	43,562	0	43,562
Jan 2012- Dec 2012	0	43,562	0	43,562
Jan 2013 – Dec 2013	0	43,562	0	43,562
Jan 2014 – Dec 2014	0	43,562	0	43,562
Jan 2015 –Dec 2015	0	43,562	0	43,562
Aug 2016- June 2016	0	29,041	0	29,041
Total (tonnes of CO_2 e)	0	4,35,622	0	4,35,622

SECTION F. Environmental impacts

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

M/s Ind Agro Synergy Limited (ISL) has setup a 8MW waste heat recovery based CPP at village Kotmar and Mahuapali village in the East direction from Raigarh (CG).

The EIA for the project activity is carried out as mandated by the Environmental Protection Act 1986. In case of Thermal Power Plants, by a notification of 10 April 1997, Ministry of Environment and Forest (MoEF), Government of India (GoI) has delegated power to the State Governments for environmental clearances for some specific categories of plants. The environmental clearance for this project is guided by the above-mentioned notification and accordingly an Environmental Impact assessment has been conducted. This project activity has received environmental clearance and the environmental impacts are not significant.

The environmental impacts are summarized below. Also, it may be noted that there are no trans-boundary impacts due to this project activity.

Impact on Air Environment:
The ambient air quality monitoring with respect to SPM, RPM, SO_2, NOx and CO concentrations has been carried out in and around the steel plant and power plant, and it was found that the levels are in compliances with limit prescribed by CECB and MOEF.

Air pollution control measures:

- At all the transfer points, Dust Collector along with bag filters with chimney will be installed.
- Water spraying on coal hip, coal yard and raw material will control the fugitive emissions.
- The waste Gases will be fed in the Waste Heat Recovery Boiler wherein Electro Static Precipitator will be installed, to arrest the SPM in flue gases.
- Most of the process raw material/coal/finished products will be stored in cover.
- All internal roads will be made pucca, after all construction activity is completed.
- Good house keeping practices will be followed to improve the work environment. All the roads and floors will be cleaned regularly. Maintenance program of the air pollution control equipment will be regularly followed.
- The flue gas generated from FBB will be treated with DSC then passed through ESP.
- Emission from steel melting shop will be controlled by fume collection hood.

Impact on Water Environment and Management

With respect to water environment, two aspects are generally considered in EIA. The availability of raw water and effluent that will be disposed. The first priority in the water quality assessment is to maintain and restore the desirable level of water quality in general. Thereafter, the requirement of 'best designated uses' is considered. For major organized community uses of water, three important uses are commonly recognized i.e. 1) raw water used for Domestic community water supply, 2) outdoor bathing at mass bathing reaches and 3) irrigation.

All units of the proposed project are considered as dry process because they do not consumed or use water in manufacturing process. The water requirement is mostly for indirect cooling purposes and hence the pollution load in the wastewater is relatively less. The project is designed on total water re-circulation system. During the operation stage, the entire waste water will be re-circulated and not discharged out side the premises. The re-circulation will be through a number of settling tanks and storage sumps. The treated water will be used for irrigation on Green Belt and for sponge iron cooler spray.

The storm water drains of the project will be separate from the waste water drains. During the rainy season, the storm water will be use for rain water harvesting and also recycling the collected water in the project to the best extent possible. The surplus rain water will be drained out into near by Sapnai River, which ultimate joins the Chhote Kelo River. Due to huge dilution available in the stream during rainy water season, discharge of storm water into the rivers will not affect the quality in any significant manner.

Keeping in view the fact that the project will not discharge any waste water outside the premises directly or indirectly into nearby streams or nallas, there will be insignificant impact on the surface water and ground water.

Impact on Noise Environment and Abatement

The impact of noise generated by existing and proposed expansion activities of ISL project on the general population in the surrounding villages is found to be well within the permissible limits. The background noise levels at twelve locations during the day time in the study area vary between 48 to 57 dB(A) and in night time are 39 to 48.5 dB(A).

Captive Power Plants, Compressors, Turbines, Cooling Towers, are the main sources of noise in the project activity. The turbines and air compressors will be installed in closed room. The highest noise level will be from turbo generator, which will be order of 95-105dB(A) at 1 meter away from the source. The noise levels will decrease with increase in distance from the source mainly due to wave divergent. By using noise prediction model, the significant noise levels at certain distain can be predicted. The predicted noise levels at a distance of 500 m, 1000m and 1500m distances from the source would be 51, 45, and 42 dB(A) respectively.

The workers maintaining, supervising and operating machines can get exposure to high noise levels but for a short duration, as continuous attendance of workers is not required at these places. Furthermore, personnel with noise protection device (ear plug/ muffs etc.) and sitting inside acoustically insulated cabins (noise prone unit) will get reduced exposure. Hence, the noise level may not be of much concern from occupational health point of view. Thick green belt in around the plant and along internal road will be planted to attenuated noise.

Therefore it could be concluded that the impact on ambient noise due to the project will be marginal at plant boundary and remain within the stipulated parameter of Ambient Noise Standards prescribed for industrial area category.

Impact on Land Environment and Management

The construction activity will be done on the acquired site and no additional land will be used for the purpose. Hence localized and reversible impact is expected on the quality of land during the construction stage.

Impact on Biological Environment:

The impact due to construction activities of the proposed expansion on the ecology of the area will be confined to the construction site itself. There will be negligible impact on the ecology (flora and fauna) during the construction phase.

The impact on the flora of the area due to the operation of the project will mainly occur due to dispersion or from the deposition of pollutants through air medium. Dust affects the biotic and abiotic components of the ecosystem individually and synergistically with other pollutants. Chronic and acute effects on plants and animals may be induced when the concentration of pollutants exceeds threshold limits. The dust particle depending upon the size and weight settles down at varying distances on vegetation and soil surfaces in the prevailing wind direction.

The emission of suspended particulate matter from the stacks will be limited to 100 mg/Nm^3. The incremental GLC values are not likely to induce any significant changes on the flora of the study area.
The wild animal generally found in sheltered valley in larger forest block. Project will not create any barrier between movements of wild animal nor pollute natural water sources and will not disturb the habitat due to noise generated by project.

Hence, there will not be any considerable impact on the biological environment

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

As per impact statement for different environmental components it can be concluded that the environmental impacts for the first stage of the project activities (Unit I) would be marginal. However, strategies have been formulated under Environmental Management Plan for mitigation of expected impacts and enhance the positive impact. The positive economic output will improve the overall quality of life of people living in the region.

SECTION G. Stakeholders' comments

>>

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

The stakeholders for the project activity were identified by the ISL CDM team and the stakeholders were duly informed of the consultation meeting. In addition public notices were also displayed and distributed at key public places for the local stakeholder consultation meeting. Local stakeholder consultation meeting to discuss stakeholder concerns on the proposed Clean Development Mechanism (CDM) project – "Waste heat utilization for power generation at Ind Synergy Ltd", was held at 2:00 pm on 3rd November 2005 at **ISL KOTMAR** Chhattisgarh.

The local stakeholders appreciated the CDM initiative and applauded the fact that it would be without additional resource use and also without emissions of harmful gases.

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

G.2. Summary of the comments received:

Stakeholder concern / question / comment	Answer / outcome
Public Concern	
Does this project lead to increase in discharge of gaseous, liquid and/or solid wastes? If yes, what are the impacts?	No. Instead the project is avoiding use of conventional fuel that is coal for power generation, reduces emission of CO_2, and avoids emission of SO_2 and SPM which would have been happened in coal based power generation in the absence of the project activity. It also avoids generation of fly ash and other problems associated with handling coal such as excess land requirement for storage and usage of coal, land degradation and effluents. The project also avoids emission of NOx unlike many other power projects in India by using an advanced technology. No industrial effluents with pollution potential will be discharged from the project.
What technology to be employed?	The project utilizes a environmentally sound technology that aims at use of waste hot flue gas to generate electricity by WHRB and reducing emission of NOx, CO_2, SO_2 and saving the certain amount of fossil fuel .
What will be the impact of the project activity on health of the villagers and domestic animals? Will this create any kind of new diseases?	This project will not affect the health of the local people and domestic animals. It will reduce the noxious & GHG emissions, which will be more beneficial for the health of the people. It will not create any kind of new diseases. It will create a better environment.
What are the socio-economic and welfare development programs be initiated for the area?	Community development plan will be introduced, which will encourage local entrepreneurship, provide employment to locals. Training programs for developing self-sufficiency among the local youth will be organized. Programs like tree planting, free health check-ups and medicines, donation of building materials and furniture, local school, College & Temple building renovation, are also included in the socio-economic development plan. Locally available service of farmers, plumbers, electricians, vehicle repair shops, shopkeepers and traders will be utilized to be maximum.
Does the project increase employment opportunities in the area?	The project requires labour during construction phase and operation phase (at designated areas of operation and utilities, such as green-belt maintenance, housekeeping, etc).
What are the contributions of the project activity to the sustainable development of around the project area?	The project will lead to sustainable development around the project area by contributing to the development of local economy and create jobs and employment in and around the project site. The project will use waste Hot flue gas emitted from Kiln and better technology that helps in minimizing pollution potential that is usually associated with other power generators in India.

NGO's Concerns	
Will the emissions from the project affect the life of flora in the region?	No. no impacts are expected from the project activity.
How do CO_2 emissions contribute to global warming?	CO_2 emissions when present in the atmosphere prevent escape of solar heat energy from the earth's surface, resulting in heat build-up which results in global warming.
What are the safety practices to be adopted for this project?	Fire fighting facilities with water reservoir reservoirs, pumps and hydrant networks, detailed and documented on-site and off-site emergency plant, active and passive accident control equipment and risk mitigation measures will be implemented. Continuous preventive measures, training will be implemented as per disaster management plan for the project.
What other socio-economic development can be availed from the project?	The project will bring many other indirect employment opportunities in the region due to development of infrastructure (roads), ISL housing colony, and other banking and cooperative societies around the project site.
Have you done any analysis on project impact on environment?	Yes, EIA has been done for the project activities. It demonstrates the project positive benefits.
Employee's Concerns	
Does this project require new skills and how are you going to provide them?	The engineers and technicians to be employed for the project will undergo enhancement of skill through appropriate training as required for the type of activity to be performed.
Are there any occupational health impacts from this project?	No. Every employee will be regularly covered under mandatory health check-up as per requirements of Factories Act. Additionally the low noise turbine will be installed and personal protective equipments will be provided to the employment working in noise prone zone.
Does this project lead to cost savings in energy production as compared to conventional fossil fuel projects?	Marginally higher operational costs are expected due to higher environmental benefits from the project due to use of a better technology and skill manpower. CDM benefits are expected to offset partially this disadvantage
Other Concerns	
What is the cost of the project?	Rs. 97.5 Crore
What is the projected timeline?	Above 15 years

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

The stakeholders were provided clarifications on the issues raised as above to their satisfaction. None of the concerns expressed by the stakeholders required an action to be taken by the ISL during the project operation and at any other stage.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Ind Synergy Ltd
Street/P.O.Box:	North Ambazari Road
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URL:	www.indsynergy.com
Represented by:	Mr.J.H.Kulkarni
Title:	G.M.(Works)
Salutation:	Mr
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Personal E-Mail:	

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

Public funding, such as grants from official development funds, is not involved in this project.

Annex 3

BASELINE INFORMATION

2001-2002									
Fuel	Units	Consumption	Density (kg/Lt)	10^3 MT	Emission factor ($tCO_2/10^3$ tonnes)* NG =TCO_2/M Cu.m)	Gross Emissions (tCO2)	Gross Electricty generation (GWh)	Auxiliary consumption (%)	Net ele Gen (GWh)
Steam Stations		*		*			*	**	
Coal	000 MT	42909	1	42909	1909.651191	81941222.9	56296	10.31	50491.88
Furnace Oil	KL	105626	0.93	98.23218	3366.012672	330650.763		10.31	0
Light Oil	KL	121976	0.827	100.8742	3178.375452	320615.928		10.31	0
LSHS/HHS/HSD	KL	0	0.827	0	3210.159207	0		10.31	0
Gas	MT	0	1	0	3193.262123	0		10.31	0
Lignite	000 MT	0	1	0	1089.926884	0		10.31	0
Gas stations									0
Natural Gas	M Cu M	0	1	0	1931.3547	0	18.35	5.776	17.2901
HSD	KL	7382	0.827	6.104914	3159.813399	19290.3891		5.776	0
Naphtha	KL	252	0.76	0.19152	3267.726	625.834884		5.776	0
Diesel Stations						0			0
LSHS	KL	0	0.827	0	3210.312561	0	115.54	2.045	113.1772
Diesel	KL	25300	0.827	20.9231	3159.964348	66116.25	0	2.045	0
Total						**82678522.1**			**50622.35**
*	Source ;table 6.1, CEA general Review						Simple OM		1633.241
**	Table 5.5, CEA general review								

2002-2003									
Fuel	**Units**	**Consumption**	**Density (kg/Lt)**	**10^3 MT**	**Emission factor ($tCO_2/10^3$ tonnes)* NG =TCO_2/M Cu.m)**	**Gross Emissions (tCO2)**	**Gross Electricty generation**	**Auxiliary consumption%**	**Net ele Gen**
Steam Stations		*		*			*	**	GWh
Coal	000 MT	45146	1	45146	1643.994864	74219792.1	59743.1	9.64	53983.87
Furnace Oil	KL	52510	0.93	48.8343	3439.444786	167962.879		9.64	0
Light Oil	KL	98608	0.827	81.54882	3198.739912	260853.453		9.64	0
LSHS/HHS/HSD	KL	0	0.827	0	3230.727311	0		9.64	0
Gas	MT	0	1	0	3193.262123	0		9.64	0
Lignite	000 MT	0	1	0	1115.254709	0		9.64	0
Gas Stations									0
Natural Gas	M Cu M	0	1	0	1931.3547	0	8.5	11.74	7.5021
HSD	KL	3423	0.827	2.830821	2996.189524	8481.67623		11.74	0
Naphtha	KL	0	0.76	0	3267.726	0		11.74	0
Diesel Stations						0			0
LSHS	KL	0	0.827	0	3230.881648	0	139.7	2.76	135.8443
Diesel	KL	14847	0.827	12.27847	2996.332657	36790.3776		2.76	0
Total						**74693880.5**			**54127.21**
*	Source ;table 6.1, CEA general Review					Simple OM	t CO2/GWh		**1379.969**
**	Table 5.5, CEA general review								

2003-2004									
Fuel	**Units**	**Consumpt**	**Density (kg/Lt)**	**10^3 MT**	**Emission factor ($tCO_2/10^3$ tonnes)* NG =TCO_2/M Cu.m)**	**Gross Emissions (tCO2)**	**Gross Electricty generation**	**Auxiliary consumption %**	**Net ele Gen (GWh)**
Steam stations		*		*			*	**	GWh
Coal	000 MT	53212	1	53212	1505.648617	80118574.2	69554	10	62598.6
Furnace Oil	KL	78230	0.93	72.7539	3323.684991	241811.045		10	0
Light Oil	KL	170917	0.827	141.3484	3131.263642	442598.977		10	0
LSHS/HHS/HSD	KL	0	0.827	0	3162.576279	0		10	0
GAS	KL	0	0.827	0	3193.262123	0		10	0
Lignite	000 MT	0	1	0	1136.430431	0		10	0
Gas Stations									0
Natural Gas	M Cu M	0	1	0	1931.3547	0	6.61	14.22	5.670058
HSD	KL	2596	0.827	2.146892	3126.965829	6713.25792		14.22	0
Naphtha	KL	0	0.76	0	3267.726	0		14.22	0
Diesel Stations									0
LSHS	KL	0	0.827	0	3162.72736	0	150.75	2.89	146.3933
Diesel	KL	38881	0.827	32.15459	3127.115209	100551.098		2.89	0
Total						**80910248.6**			**62750.66**
*	Source ;table 6.1, CEA general Review					**Simple OM**	t CO2/GWh		**1289.393**
**	Table 5.5, CEA general review								

BM										
Type of Unit		State	Date of addition	Installed capacity	PLF	Gross Gen	Auxiliary Consm %	Net Gen	Emission Coefficient tCO_2/GWh	Total t CO_2
Hydro			*	* MW	**	GWh	***	GWh		
Kalpong (Unit-1,2,3)		A&N island	01.07.01,24.07.01,15.8.01	5.25	0.5	22.995	0.47	22.8869235		0
Potheru Small HE project(Unit 1 and		Orissa	30.6.2002	6	0.5	26.28	0.47	26.156484		0
Rangit-III(unit 1,2&3)		Sikkim	05.02.00,05.02.00,03.02.00	60	0.5	262.8	0.47	261.56484		0
Upper Indravati (Unit 1&2)		Orissa	05.09.99	300	0.5	1314	0.47	1307.8242		0
Teesta Canal Falls-II(Unit 7,8&9)		West Bengal	23.07.99,07.09.99	22.5	0.5	98.55	0.47	98.086815		0
Teesta Canal Falls-II(Unit 2&3)		West Bengal	22.10.98,24.06.98	15	0.5	65.7	0.47	65.39121		0
Teesta Canal Falls-I (unit 1,2 &3)		West Bengal	15.09.97,25.01.98,27.03.98	22.5	0.5	98.55	0.47	98.086815		0
Teesta Canal Falls-II (unit I)		West Bengal	18.03.98	7.5	0.5	32.85	0.47	32.695605		0
Eastern Gandak (unit 3)		Bihar	12.11.97	5	0.5	21.9	0.47	21.79707		0
Steam										
Talchar STPP-II(Unit 3)	State	Orissa	4.1.03	500	0.68	2974.02	10	2676.618	1290.811	3838898.81
Talchar STPS-II(Unit 4)		Orissa	25.10.03	500	0.68	2974.02	10	2676.618	1290.811	3838898.81
Jojobera TPS (Unit 2)	State	Jharkhand	27.08.01	120	0.7	735.84	10	662.256	1290.811	949830.634
Bakreshwar TPP(Unit-1)		West Bengal	18.07.99	210	0.7	1287.72	10	1158.948	1290.811	1662203.61
Budge-Budge TPS(Unit 2)		West Bengal	06.03.99	250	0.56	1215.45	10	1093.905	1290.811	1568916.67
Budge-Budge TPS(Unit 1)		West Bengal	16.09.97	250	0.56	1215.45	10	1093.905	1290.811	1568916.67
Mejia(unit 3)		West Bengal	25.03.98	210	0.56	1020.98	10	918.8802	1290.811	1317890
Talchar (Unit 2)		Orissa	27.03.96	500	0.68	2974.02	10	2676.618	1290.811	3838898.81
Wind										
State		Orissa	31/3/04	1.49	0.01	0.13052	2.89	0.12675186		0
State		West Bengal	3/31/2004	1.1	0.01	0.09636	2.89	0.0935752		0
different wind power stations		West Bengal	01.06.01	1.1	0.01	0.09636	2.89	0.0935752		0
Diesel						0		0		0
Bamboo Flat DG (Unit 2&4)		A&N island	1.6.02	10	0.6	52.56	10	47.304	686.8558	36101.1386
Bamboo Flat DG (Unit 1&3)		A&N island	1.2.03	10	0.6	52.56	10	47.304	0	0
					0.65	0	14.2	0	0	0
					Total	16446.6	GWh	14987.1601		18620555.2
	Total Gross Electrical Ene Gen for ER grid (2003-2004) =					77249	GWh			
	Total Gross Ele Gen from the power plant which is added to the ele					16446.6	GWh			
	The above power plant in the system comprises =				21.3	% of the electricity system				
						BM=			1242.434	
*	Source:table2.7, CEA, General Review 2003-2004,2002-2003,2001-2002,2000-2001,1999-2000,1998-1999,1997-1998									
**	Source:table 6.6, CEA General Review 2003-2004									
***	Source:table 5.5, CEA General Review 2003-2004									
**	Source:table2.4,3.4,6.6, CEA, General Review 2003-2004									

Simple OM		tCO_2/GWh
2001-2002		1633.24 tCO_2/GWh
2002-2003		1379.97 tCO_2/GWh
2003-2004		1289.39 tCO_2/GWh
Simple OM	EFOM,y	1434.20 tCO_2/GWh
BM	EFBM,y	1242.43 tCO_2/GWh
CM	EFy	1338.3175 tCO_2/GWh

Month-Year	Electricty Generation GWh	Aux power Consumption GWh	Net Electricity Generation GWh	Combined Margin tCO_2/GWh	Baseline Emissions tCO_2
Sept 2006 - Dec 2006	13.65	8.4	5.25	1338.3175	7026.1668
Jan 2007 - Dec 2007	40.95	8.4	32.55	1338.3175	43562.234
Jan 2008 – Dec 2008	40.95	8.4	32.55	1338.3175	43562.234
Jan 2009 – Dec 2009	40.95	8.4	32.55	1338.3175	43562.234
Jan 2010 – Dec 2010	40.95	8.4	32.55	1338.3175	43562.234
Jan 2011- Dec 2011	40.95	8.4	32.55	1338.3175	43562.234
Jan 2012- Dec 2012	40.95	8.4	32.55	1338.3175	43562.234
Jan 2013 – Dec 2013	40.95	8.4	32.55	1338.3175	43562.234
Jan 2014 – Dec 2014	40.95	8.4	32.55	1338.3175	43562.234
Jan 2015 –Dec 2015	40.95	8.4	32.55	1338.3175	43562.234
Jan 2016- Aug 2016	27.3	8.4	18.9	1338.3175	25294.201

Annex 4

MONITORING PLAN
As described in the section D

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