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:

Use of waste gas use for electricity generation at Jindal Thermal Power Company Limited (JTPCL)

A.2. Description of the project activity:

The project in JTPCL involves putting in place systems and infrastructure for generation of electricity using corex gas and other waste gases, that were otherwise being flared off in Jindal South West Steel Limited (JSW)[1].

JTPCL has been commissioned to generate electricity using imported coal and waste gas. The electricity generated is supplied to JSW and the state grid namely Karnataka Power Transmission Corporation Limited (KPTCL). The input fuel to the JTPCL power plant is sourced from JSW, which is generating waste gas from its process and sourcing imported coal .The project helps in reducing Greenhouse Gas (GHGs) emission into the atmosphere by increasing the proportion of waste gas in the fuel configuration.

During the initial operation period, the project had experienced uncertainties in the availability and steadiness of supply of the corex gas and other waste gases from JSW. Accordingly, JTPCL had dropped the plan of utilizing waste gas, and accordingly had applied and obtained the requisite approval from Karnataka Pollution Control Board (KPCB) to combust coal exclusively. Subsequently, during March 2001, JTPCL management took the decision for the current project activity so that the use of waste gas is maximised in the fuel configuration and reduce the emission of GhG's This decision has seriously internalised potential benefits of CDM. Besides, potential CDM benefits, there is no other incentive for JTPCL to maximise the use of waste gases for power generation.

The project activity involved additional investments (to the investment in power generation using coal) to achieve a steady supply of the waste gas to the tune of INR 240 Million.

Contribution of project activity to sustainable development :

- The project activity involves generation of electricity using waste gas, thus displacing a certain amount of fossil fuel used for electricity generation. This has resulted in reduced GHG intensity per unit of electricity generation for state grid and in total the carbon intensity of Karnataka state has been reduced.
- The project demonstrates harnessing power from waste gas sources, which will encourage replication of such project in future across the region.
- The project has reduced the local air pollutants and environmental impacts due to increased share in the use of waste gas in the fuel configuration.
- The project has built up a knowledge base about the operation of the waste gas based power generation and has built up a skill set for such kind of operation.

[1] JSW Steel Limited (formerly Jindal Vijaynagar Steel Limited (JVSL))

- This project will demonstrate the use of new financial mechanism (CDM) in raising finance for power generation from waste gases.

A.3. Project participants:

Name of Party involved (*)((host) indicates a host Party)	Private and/or public entity(ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
Govt. of India	Jindal Thermal Power Company Limited (JTPCL)	No

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

>>

A.4.1.1. Host Party (ies):

India

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

Karnataka (state)

A.4.1.3. City/Town/Community etc:

Toranagallu, Bellary (District)

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

The project is located adjacent to JSW Steel Ltd at a distance of about 2 km from Toranagallu village of Bellary district in Karnataka on the state highway connecting Bellary and Sandur. The plant site is situated between Bellary and Hospet, which are 70 km apart. The nearest railway station is Toranagallu. The power plant is located on an area of 250 acres, acquired by JTPCL from KSIDC. The geographical location of the JTPCL plant is approximately 15^0 9’ latitude (N) and 76^0 51’ longitude (E).
Figure 1 below gives an overview of the plant.

Figure1: JTPCL Site Overview

Geographical location of the plant in a map of Karnataka state has been depicted in Figure 2 on the next page.

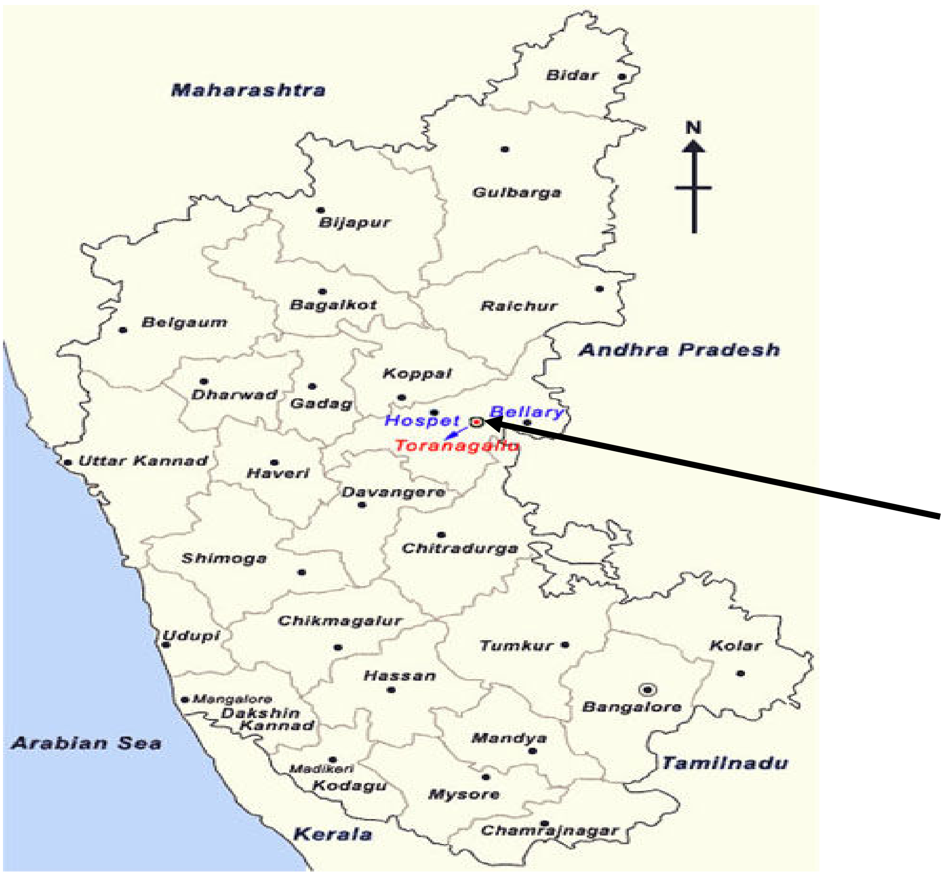

Figure 2: Geographical Position of Plant Location

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

Sector: Energy
Category 2: Energy Distribution

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

The project activity involves combustion of waste gas and coal (and HFO & LDO are start up fuels) in various proportions to generate electricity. The thermal power plant mainly consists of boiler, turbine, generator and other auxiliary system.

Waste gas/coal are burnt in the furnace of the boiler. The walls of this furnace are made of membrane wall. i.e., water tubes welded to each other. The water circulated through the water wall tubes absorbs the heat generated by combustion and this in turn generates steam. This water-steam mixture goes to the steam drum where the steam is separated. The process of passing through superheater tubes arranged within the furnace leads to superheating of this steam. This high pressure and high temperature steam is then routed to a steam turbine. The thermal energy of the steam is converted to mechanical energy by expansion of steam (through reduction in its temperature and pressure) in the turbine. This rotational energy is then used to drive the generator, which produces electricity.

Steam from the turbine is condensed in the condenser. Cooling water is circulated through the condenser to condense the steam. The condensate is pumped through low-pressure heaters to a deaerating unit. The low-pressure heaters are supplied with steam extracted from the low-pressure stages of the turbine for heating the condensate. From the deaerator that removes dissolved oxygen from the water, water is pumped through high-pressure heater to the boiler by means of boiler feed pump. The high-pressure heaters receive steam from high-pressure stages of the turbine. The heaters are provided for improving the thermal efficiency of the cycle.

A demineralizing (DM) plant meets the demineralized water requirement for the feed water make-up to the boiler. It also employs a closed circuit cooling water system in which the cooling water from the condenser outlet is cooled in an induced draft-cooling tower.

Coal after grinding to a fine powder in the mill is mixed with primary air and supplied to the coal burners. The air for combustion (secondary air) is supplied through forced draft fans. Combustion products i.e. flue gases from the boiler are cooled down in air preheaters and then passed through the chimney by induced draft fans.

The specific feature in the project activity thus required additional investment (to the baseline operation) by the proponent , to improve the reliability and availability of the waste gases for power generation. The gas holder has been installed to achieve stabilization in the gas supply. Steam generators were designed to fire 100% waste gas or 100% coal firing or the combination of both for power generation to its full capacity.

The overall technology employed is unique (stabilization of COREX gas and other waste gases and use of these for power generation) in itself and first of its kind in India. The technology adopted for power generation is environmentally safe and sound. The salient features are:

- Improved design of dust recycling system;
- Turbine: Combined HP-IP Turbine; double flow LP turbine, tandem compound, reaction, single reheat, condensing type.
- 60% HP-LP by pass station for quick start-up and house load operation of the unit.
- Turbo Generator is of hydrogen-cooled type with ratings of 162.5 MVA, 10.5 kV, 50 Mz, 0.8 power factor.
- Control System: Completely automatic control employing Distributed Control System integrated with programmed logic controllers for external systems.
- Special design of steam generator to limit emission of oxides of Nitrogen (NOx).
- Electrostatic precipitator designed for 100% coal firing to reduce particulate emission.
- Tangential fuel firing with over fire air damper control system with 12 numbers of coal burners (supported by 3 coal mills) and 12 numbers of Corex gas burners. There are three elevations of coal and three elevations of Corex burners in the boiler.
- All the burners are placed in the corner of the boiler at different elevations. These burners are tilting type and flame path can be adjusted for efficient combustion.
- The firing system is the low NOx emissions due to tangential firing with over fire air (OFA) damper control system. 30% reduction in NOx emissions have been reported due to corner tangential fired burner system with over fire air damper. Continuous Emission monitoring System is established for the online monitoring of different gas like SOx, NOx etc.

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 use of waste gas for generation of power from it. This in turn displaces a certain amount of use of coal as fuel for power generation. In the absence of the project activity the waste gas would have been flared off and the same amount of power would have been generated using coal as a fuel. The amount of coal that has been displaced due to utilisation of waste gas has resulted in savings of fossil fuel consumption. Thus the project activity is reducing GHG emission.

Legislations in India do not mandate utilization of waste gases 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 gas for power generation. Therefore JTPCL did not have any statutory compulsion to implement the project.

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 13,165,341.t CO2e.

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

Total estimated emission reduction =13,165,341 t CO2e
Total number of crediting years = 10 years

A.4.5. Public funding of the project activity:

Public funding, such as grants from official development funds, 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 01, Sectoral Scope: 01, 8 July 2005

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, electricity;
- where no fuel switch is done in the process where the waste heat or the waste gas is produced after the implementation of the project activity

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 above conditions are applicable to the project activity in the following way:

- The project activity has changed the fuel configuration in 2 units of 130 MW each and both units are generating power using waste gas displacing power generation from coal use.
- The project uses waste gas coming out of the JSW processes. In the absence of the project activity the waste gas would have been flared off by JSW. However, now the surplus waste gas is collected by JSW and sold to JTPCL for power generation.
- There is no fuel switch involved in the JSW process that is the source of the waste gases.
- The project activity applies to the existing facility.

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 activity the available waste gas would have been flared off and the electricity would have been generated through use of coal.
The methodology ACM0004 is applied in the following steps:

1. Identification of alternative baseline scenarios consistent with current laws and regulations;
2. Additionality assessment of the project applying "*Tool for the demonstration and assessment of additionality*";
3. Determination of project emission;
4. Determination of baseline emission;
5. Estimation of emission reduction;

The project participant is the power producer so the baseline scenario alternatives include all possible options that provide or produce electricity for sale to grid and/or other consumers.
The baseline options considered do not include those options that:

- do not comply with legal and regulatory requirements; or
- depend on key resources such as fuels, materials or technology that are not available at the project site.

Identification of alternative baseline scenarios

A possible set of alternative is drawn up which will be there in the absence of the CDM activity.
Alternative (a): The project activity without the CDM revenue
Alternative (b): Continue with existing power generation using coal
Alternative (c): Other uses of the waste gas

Alternative (a): The proposed project activity without the CDM revenue

1. The project has many uncertainty factors associated with the corex process of JSW. The fluctuations in gas production at JSW can/will cause disturbance in the production of the electricity. This will result in temporary loss of power production. In the worst case, a unit trip causes a complete loss of electric output.
2. To create a steady gas supply requires investment in a buffer tank costing INR 240 million.
3. JTPCL has no incentive to invest into the gas hoder, as the cost of gas and coal are same per GCal.
4. Accordingly, this alternative is not financially attractive to the investor.

Alternative (b): Continue with existing power generation using coal

1. JTPCL had consent for operation of the plant by using COREX gas at 20% and coal at 80% or firing of corex gas or coal in any combination of 0 to 100% from Karnataka Pollution Control Board. This had given JTPCL an option to operate the plant using coal as fuel. This option minimizes the uncertainty of the availability of power due to disturbance in the supply of waste gases.
2. In this alternative scenario there was no need for the installation of the gas holder. This results in saving of INR 240.00 million.
3. The fuel purchase agreement also provides no incentive to prefer waste gases over the coal as fuel. The price of the waste gas has been decided on the basis of coal price at 6500Kcal/kg (calorific value of the imported coal is 6500 kcal/kg) for equivalent Gcal.
4. In the existing power generation using coal the surplus waste gas would have been flared off. The coal is imported and is available to JSW.
5. All the above arguments demonstrate that this alternative has crossed all the prohibitive barrier and is an economically attractive option. In the absence of the CDM project activity and potential revenue thereof it is likely that JTPCL could have opted for this alternative.

This alternative option is the most conservative case.

Alternative (c): Other uses of the waste gas

1. The amount of waste gas can be used for heat generation. However, there is no demand for such kind of process requirements in the JTPCL.
2. Given the existing situation at the location and prevailing conditions the realization of alternative (c) is ruled out.

This reduces the list of plausible alternative to Alternative (b): Continue with existing power generation using coal**.**
The alternative (b) is possible under the current regulatory conditions.

Step 2: **Additionality assessment of the project applying "*Tool for the demonstration and assessment of additionality*":**
Refer to the next section B.3 of this project design document.

Step 3: Determination of project emission:
Coal and HFO/LDO are used as fuel and start up fuel respectively in project activity. The total project emission for a given year is equal to the quantity of fuel used in a year multiplied by NCV which is again multiplied by Emission factor, oxidation factor and 44/12.
Project emissions are given as: $PE_y = \sum Q_i \times NCV_i \times EF_i \times 44/12 \times OXID_i$…………1
Where:
PEy =Project emissions in year y (tCO_2)
Qi =Mass or volume unit of fuel i consumed (t or m^3)
NCVi =Net calorific value per mass or volume unit of fuel i (TJ/t or m^3)
EFi =Carbon emissions factor per unit of energy of the fuel i
OXIDi =Oxidation factor of the fuel i (%); (99%, IPCC default values)
i=1,2,3
1 for Coal

2 for LDO
3 for HFO

Step 4: Determining the baseline emissions: (EFy)

As per the baseline alternative review the alternative Alternative (b): Continue with existing power generation using coal as fuel**.** The electricity generated is sold to JSW and then to KTPCL. So considering the same kind of situation the existing power generation emission is calculated as similar to the option 1 of ACM 0004. For determination of baseline emissions, project participant has included the following emission sources: CO_2 emissions from coal consumption.

Baseline emissions are given as :
BE y = EGy.EFy
EGy : net quantity of electricity supplied to the manufacturing facility by the project during the year y in MWH, and
EFy: CO_2 baseline emission factor for the electricity displaced due to project activity during the year y

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

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

Leakage
No leakage is considered

Step 5: Estimation of **Emission Reduction:**
The emission reduction ERy by the CDM project activity during a given year y has been calculated as the difference between the baseline emissions though substitution of electricity generation with percentage of fossil fuels (BEy) and project emissions (PEy).

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 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 during July 2001. The CDM was seriously considered in the decision to proceed with the project activity. Such an evidence is available in the form of background notes provided to the Board of Directors; and exchange of information with a third party. 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 project activity without the CDM revenue • Alternative (b): Existing power generation using coal as fuel • Alternative (c): Other uses of the waste gas	
Sub- Step 1b: Enforcement of applicable laws and regulations.	There is no legal requirement or framework to obligate the use of corex gas and waste gas as fuel for power generation or other use. • It may be noted that the Indian Electricity Act of 2003 does not restrict or empower any authority to restrict the fuel choice for power generation. • In addition, the draft National Electricity Policy (revised in August 2004) asserts 'coal would necessarily continue to remain the major fuel'. • The applicable environmental regulations do not restrict the choice of fuel for generation units located anywhere in India. • Also there is no legal requirement on the choice of a particular technology for power generation. • Currently India's legislations also do not mandate that waste gas has to be used.	The project activity has crossed sub-step 1 of additionality demonstration, and hence this assessment has moved to the next step 2 investment analysis.

Step 2: Investment analysis
Determination of whether proposed activity is economically and financially less attractive than the other alternatives without the revenue from the sale of certified emission reductions.

Sub- Step 2a. Investment analysis: Determine appropriate analysis method

<table>
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- The price of the waste gas(as per the Fuel Supply Agreement) is decided on the basis of coal price at 6500Kcal/kg (calorific value of the imported coal is 6500 kcal/kg) for equivalent Gcal. The price formula accounts for the change in calorific value of coal . So JTPCL does not have incentive for change in the fuel configuration or maximisation of the use of waste gas in the fuel configuration. Such a pricing of waste gas is based on guidance provided by Central Electricity Authority.
- The proposed project' exports electricity to KPTCL. KPTCL assured purchase level (APL) from the project is 657 Million KWHs per tariff period. JTPCL exports the surplus electricity to the KPTCL after meeting the demand of JSW and auxiliary consumption.
- The price of the electricity purchased by KPTCL is totally independent of the fuel type. The PPA was signed with Rs 2.60/kwh as the baseline price for 2000-2001 with an escalation @ 5% every year. So there is no incentive to maximise use of waste gas in the fuel configuration.

The procurement price of the power by KTPCL at various supply quanta is provided below for further illustration.

Year	Upto 657 MU	Beyond 657 MU
01-02	Rs 2.73/Kwh	Rs 2.31/Kwh
02-03	Rs 2.8665/Kwh	Rs 2.4255/Kwh
03-04	Rs 3.0098/Kwh	Rs 2.5468/Kwh
04-05	Rs 3.1603	Rs 2.6714/Kwh

This demonstrates that the project activity generates no additional revenues by the sale of power in the case of additional use of waste gas in comparison to that of use of coal as main fuel as the price of waste gas is same as that of coal per Gcal.

- As the additional investment in CDM project activity generates no other benefit than GHG emission reductions and hence the CDM revenues(sale of potential CERs), application of simple cost analysis is applicable

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<tr><td colspan="3">Sub-Step 2b- Option I Apply Simple Cost Analysis</td></tr>
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The Costs Associated with the **Project activity**

- The project has many uncertainty factors associated with corex process of JSW. The fluctuations in gas production at JSW can/will cause disturbance in the

</td><td>This indicates that CDM project activity generates no financial or economic benefits</td></tr>
</table>

	production of the electricity there by resulting in temporary loss of power production. In the worst case , a unit trip causes major loss of electric output. • Realising the necessity of steady supply of the waste gases JTPCL proceeded for the project activity and a gas holder (buffer tank) was installed. The investment required was to the tune of INR 240 Million. JTPCL had discussed this matter with the fuel supplier (JSW) and reached an understanding with JSW, that JSW would make the requisite investment in the gas holder initially. JTPCL would then reimburse the amount to JSW at a future date after assessing the satisfactory performance of the gas holder with regards to uninterrupted and steady supply of gas to JTPCL. JTPCL had taken the investment decision keeping in view the potential CDM revenue flows due to the project activity. **Without the project activity: Coal as main fuel** • JTPCL has been operating the power plant with coal as the main fuel and obtained necessary permission for the same. • Operation with coal minimises the risk of unavailability of the waste gases and helps in generating assured level of power and this does not require any additional investment . The cost of fuel (as the cost of waste gas to JTPCL is same as coal per GCal) to JTPCL is same in both the cases **1**. when waste gas is the main fuel **2**.when coal is the main fuel and revenues receipts from sale of power to the JSW and KPTCL, are also same but the project activity involves additional investment of INR 240 Million.	other than CDM related income. So the simple cost analysis is applied for the investment analysis. Application of simple cost analysis demonstrates that the project involves additional costs and does not provide any additional financial or economic benefits. The project activity has crossed step 2 of additionality demonstration, and hence this assessment has moved to the next step 3 investment analysis.
Step 3. Barrier analysis-we are also using this step in addition to step 2 to further strengthen our case for additionality of the project.		
Sub-step 3a. Identify barriers that would prevent the implementation of type of the proposed project activity:	**Barriers due to prevailing practice,** The project activity (use of COREX gas for power generation at this size of operation) is the first of its kind in the world (only anecdotal evidence is available). In any case, no project activity of this type is currently operational in India. **Technology Barrier-** Skilled and/or properly trained workmen to operate and maintain the gas holder and maintaining the steady supply of the waste gas and operation of waste gas (COREX) based power plant was not available because of unfamiliarity with the processes	Non existing prevailing practice and requirement additional personnel training, personnel protective and other safety measures are prohibitive barriers which the project

	involved in the project activity. **Also additional safety measures (in the form of personnel training and Personnel Protective Equipments) were required in the project activity in addition to that of the scenario of using coal.**	had to overcome(in addition to being investment additional)
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):	Alternative (b): Existing power generation using coal (the power produced is imported to KPTCL and JSW) and the waste gas would be flared off . There are no prevailing practice or technology barriers that exist for this alternative.	Both Sub-steps 3a – 3b are satisfied, proceed to Step 4

Step 4: Common Practice		
	In India JTPCL is the first of its kind which is generating electricity from Corex gas . Therefore, the Project case is an exceptional case and not a common practice.	*Steps 4 satisfied, proceed to Step 5*

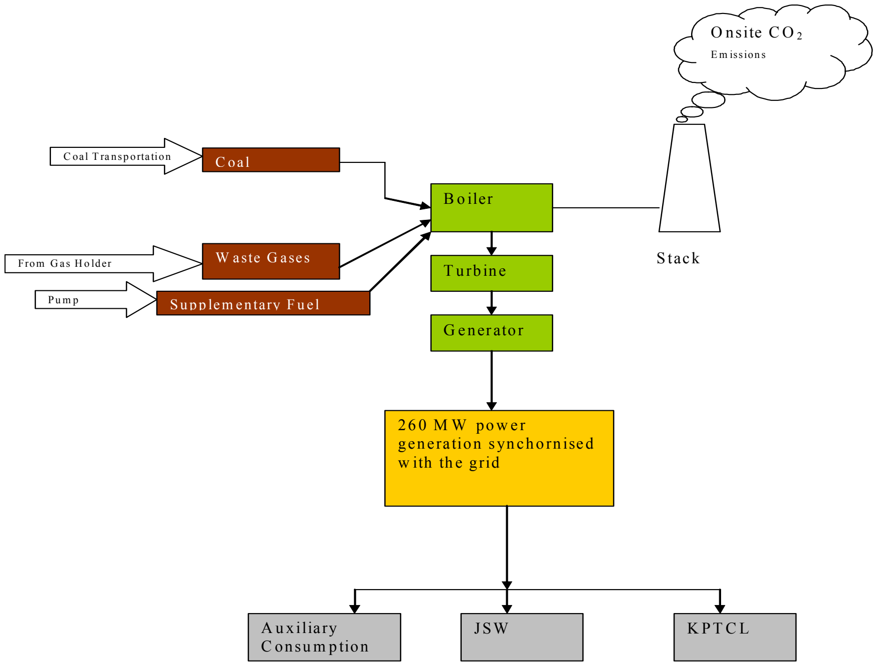
Step 5: Impact of CDM Registration		
	• the primary impact of CDM registration will be the sale of CERs, providing compensation towards the investment in the gas holder	Step 5 is satisfied

Based on the above analysis, it is concluded that in the absence of regulations requiring utilization of corex gas and other waste gas for power generation in India, the same amount of electricity could be generated using coal as fuel. This would result in increasing emission of GHGs into the atmosphere. Without the CDM revenue the proponent had no direct economic incentive to incur the costs towards the gas holder.

The project is expected to reduce about 13,165,341 t CO2equ 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:

The **spatial extent** of the project boundary comprises the waste gases source of delivery, power generating equipment, DG set as a standby for emergency purpose and the power plants connected physically to the electricity grid KPTCL and JSW. Hence, project boundary is considered within these terminal points where the project proponent has full control. For the purpose of calculation of project emissions, imported coal consumption has been included in the system boundary. Usage of any supplementary fuel by project has been included in the project boundary.
A schematic of the project boundary is reproduced below:



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 16 September 2005.
Dr Ram Babu, PricewaterhouseCoopers (P) Limited, whose contact information is set out at Annex 1, has assisted the Sponsor in determining the baseline methodology.

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:

>> **The starting date of a CDM project activity is the date on which the implementation or construction or real action of a project activity begins.**

24th July 2001 is the starting date of the Project Activity.

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

>> **Please state the expected operational lifetime of the project activity in years and months.**
The Project is expected to be operational for a period of 25 years from the date of commencement of operations.

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

Please state whether the project activity will use a renewable or a fixed crediting period and complete C.2.1 or C.2.2 accordingly.
Fixed crediting period

C.2.1. Renewable 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:

C.2.2.1. Starting date:

>>01 August 2001

C.2.2.2. Length:

>>10 years

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 01, Sectoral Scope: 01, 8 July 2005

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

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.
Project activity includes electricity generation by utilizing imported coal and waste gas. The electricity generated is supplied to KPTCL and JSW. The project activity emission is calculated by considering the consumption of coal, LDO and HFO. The project activity's baseline emissions and the emission reduction units are based on the net units generated by the project activity for supply to KPTCL and JSW as measured by power meters at plant.
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

All the data (of plant and operational parameters) monitoring, recording, checking, reviewing and archiving is as per ISO 9000/14000 practices unless otherwise specifically mentioned.

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 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)	For how long archived data to be kept?	Comment
1. Q_1	Quantity of coal used by project activity	Power Plant records	tonnes	m	Measured continuously and recorded monthly	100 %	Paper	Credit periods +2 years	To be measured and used for estimation of project emissions.
2. NCV_1	Net calorific Value of coal	Power Plant records	TJ/tonne	c	Monthly	Random	Paper	Credit periods +2 years	From measurements of Gross Ca;orifice value and ultimate analysis the Net calorific value is calculated each month
3. EF_1	Carbon emission factor for coal	IPCC	tC/TJ	IPCC defaults	Monthly	Random	Paper	Credit periods +2 years	In the absence of India specific values, IPCC recommended values has been used.
4. Q_2	Quantity of LDO used by project activity	Power Plant records	tonnes	m	Monthly	100 %	Paper	Credit periods +2 years	From the difference of levels (beginning and end of the meonth) in the storage tank. This parameter is not very significant in project

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 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)	For how long archived data to be kept?	Comment
									emission calculations
5. NCV_2	Net calorific Value of LDO	Power Plant records	TJ/tonne	m	Monthly	Random	Paper	Credit periods +2 years	To be measured and used for estimation of project emissions.
6. EF_2	Carbon emission factor for LDO	IPCC	tC/TJ	IPCC defaults	Monthly	Random	Electronic/ paper	Credit periods +2 years	In the absence of India specific values, IPCC recommended values has been used.
7. Q_3	Quantity of HFO used by project activity	Power Plant records	tonnes	m	Continuously	100 %	Electronic/ paper	Credit periods +2 years	To be measured and used for estimation of project emissions. This parameter is not very significant in project emission calculations.
8. NCV_3	Net calorific Value of HFO	Power Plant records	TJ/tonne	m	Monthly	Random	Electronic/ paper	Credit periods +2 years	To be measured and used for estimation of project emissions.
9. EF_3	Carbon emission factor for HFO	IPCC	tC/TJ	IPCC defaults	Monthly	Random	Electronic/ paper	Credit periods +2 years	In the absence of India specific values, IPCC recommended values has been used.

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

Coal, LDO & HFO is used in the project activity. The total project emission for a given year is equal to the quantity of fuel used in a year multiplied by NCV which is again multiplied by Emission factor, oxidation factor and 44/12.

Project emissions are given as: $PE_y = \sum Q_i \times NCV_i \times EF_i \times 44/12 \times OXID_i$ ………………….1

Where:

PEy =Project emissions in year y (tCO2)
Qi =Mass or volume unit of fuel i consumed (t or m^3)(Source:Plant record)
NCVi =Net calorific value per mass or volume unit of fuel i (TJ/t or m^3) (Source:Plant record and Central Electricity Authority (CEA))
EFi =Carbon emissions factor per unit of energy of the fuel i (tC/TJ);(Source:Default values from 1996 revised IPCC Guidelines)
OXIDi =Oxidation factor of the fuel i (%); (Source:IPCC default value)
I=1.2.3
1 for coal
2 for LDO
3 for HFO

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 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)	For how long archived data to be kept?	Comment
10. EG_{GEN}	Total Electricity Generated	Power Plant records	MWh/yr	Online measurement	Continuously	100%	Electronic	Credit period +2 years	Meters at plant and DCS will measure the data. Manager in-charge will be responsible for regular calibration of meter.
11. EG_{AUX}	Auxiliary Electricity	Power Plant records	MWh/yr	Online measurement	Continuously	100%	Electronic	Credit period +2 years	Same as above.
12. $EG_{yKPTCL,,JSW}$	Net Electricity supplied to JSW and KPTCL	Power Plant records	MWh/yr	Online measurement	Continuously	100%	Electronic	Credit period +2 years	Calculated from the above measured parameters.

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 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)	For how long archived data to be kept?	Comment
13. $EG_{y,KPTCL}$	Net Electricity supplied to KPTCL	Power Plant records	MWh/yr	Online measurement	Continuously	100%	Electronic	Credit period +2 years	Meters at plant and DCS will measure the data. Manager in-charge will be responsible for regular calibration of meter.
14. $EG_{y,JSW}$	Net Electricity supplied to JSW	Power Plant records	MWh/yr	Online measurement	Continuously	100%	Electronic	Credit period +2 years	Meters at plant and DCS will measure the data. Manager in-charge will be responsible for regular calibration of meter.
15. $EF_{CO2,i}$,	Emission factor	IPCC	tC/TJ	IPCC defaults	Yearly	100%	Electronic/paper	Credit period +2 years	

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 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)	For how long archived data to be kept?	Comment
16. $Eff_{captive}$	Efficiency of the captive power plant	JTPCL	%	Measured	Yearly	100%	Electronic	Credit period +2 years	

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

>> ***Step 4: Determining the baseline emissions: (EFy)***

As per the **Alternative (b):** Existing power generation using coal (the power produced is exported to KPTCL and JSW) and the waste gas would be flared off is the baseline scenario. The electricity generated is sold to JSW and then to KPTCL. So considering the same kind of situation the existing power generation emission is calculated as similar to the option 1 of ACM 0004. For determination of **baseline emissions**, project participants have included the following emission sources: CO_2 emissions from coal consumption.

Baseline emissions are given as :

$BE_{,y} = EGy.E_{,y}$

EGy : net quantity of electricity supplied to the manufacturing facility by the project during the year y in MWH, and
EFy: CO_2 baseline emission factor for the electricity displaced due to project activity during the year y

EFy =

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

EF_y Emission factor for the power generation unit

$EF_{CO2,i}$ CO_2 emissions factor of fuel used in power generation (tC/TJ) (Sources:IPCC Default facto, 1996 Revised IPCC Guidelines for default values)

$Eff_{captive}$ Efficiency of the power generation (%) (Source:Plant)

44/12 Carbon to Carbon Dioxide conversion factor

3.6/1000 TJ to MWh conversion factor

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

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

Not applicable.

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

No leakage as per the methodology

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 (**ER_y**) by the project activity during a given year ***y*** is the difference between the baseline emissions for electricity generation with coal (**BE_y**) and project emissions (**PE_y**), as follows:

$ER_y = BE_y – PE_y$……………………………………………………………(6)

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)	Are QA/QC procedures planned for these data?	Explain QA/QC procedures planned for these data, or why such procedures are not necessary.
1, 2, 3,4,5,6,7,8,9	Low	Yes	This data will be required for the calculation of project emissions.
10,11,12,13,14	Low	Yes	This data will be used for the calculation of project electricity generation.
15,16	Low	Yes	The data will be directly used to calculate baseline emissions.

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 JTPCL who is the project proponent. JTPCL 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. 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 EMS.

CEO 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 CEO.

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

>> PricewaterhouseCoopers (P) Limited, whose contact information is set out at Annex 1, has assisted the Sponsor in determining the monitoring methodology.

SECTION E. Estimation of GHG emissions by sources

E.1. Estimate of GHG emissions by sources:

Coal as main fuel, HFO & LDO is used as supplementary fuels as a start up fuel or for flame stabilization. The total project emission for a given year is equal to the quantity of auxiliary fuel used in a year for startup or additional heat gain multiplied by NCV which is again multiplied by Emission factor, oxidation factor and 44/12.

Project emissions are given as: $PE_y = \sum Q_i \times NCV_i \times EF_i \times 44/12 \times OXID_i$

Where:

PEy =Project emissions in year y (tCO2)

Qi =Mass or volume unit of fuel i consumed (t or m^3)

NCVi =Net calorific value per mass or volume unit of fuel i (TJ/t or m^3)

EFi =Carbon emissions factor per unit of energy of the fuel i (tC/TJ); (IPCC default values)

OXIDi =Oxidation factor of the fuel i (%); (IPCC default values)

	Coal tCO2	LDO t CO2	HFO t CO2	Total emissions PEy T CO2
2001	292195.11	191.41	1887.19	294273.71
2002	645392.73	93.33	2411.87	647897.94
2003	578554.37	158.30	533.87	579246.55
2004	678086.21	134.26	843.33	679063.79
2005	626922.41	164.94	1621.79	628709.14
2006	626922.41	164.94	1621.79	628709.14
2007	626922.41	164.94	1621.79	628709.14
2008	626922.41	164.94	1621.79	628709.14
2009	626922.41	164.94	1621.79	628709.14
2010	626922.41	164.94	1621.79	628709.14
2011	313461.20	82.47	810.89	314354.57

E.2. Estimated leakage:

>>No Leakage

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

>> It is same as E1.

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

Therefore, the total anthropogenic emissions in the baseline during 2001 – 2011 will be 19452432.7 tCO_2.

	Baseline emission calculation			
	MU	MWH	EFPG	BEelectricity, y

	E_{NET}	E_{NET}	tCO2/Mwh	tCO2
2001	1030.78	1030775.00	0.97	1002973.53
2002	2039.54	2039537.50	0.97	1984528.26
2003	2044.96	2044957.50	0.97	1989802.07
2004	1881.80	1881802.50	0.97	1831047.60
2005	1999.16	1999163.57	0.97	1945243.27
2006	1999.16	1999163.57	0.97	1945243.27
2007	1999.16	1999163.57	0.97	1945243.27
2008	1999.16	1999163.57	0.97	1945243.27
2009	1999.16	1999163.57	0.97	1945243.27
2010	1999.16	1999163.57	0.97	1945243.27
2011	999.58	999581.79	0.97	972621.64

where:
$E_{NET} = E_{GEN} – E_{AUX}$
E_{NET} = Net Electricity generated by the project (MWh/yr)
E_{GEN} = Total electricity generated of the project (MWh /yr)
E_{AUX} = Auxiliary power consumption within the boundary (MWh /yr)
EF_y = Baseline emissions factor ((tCO2eq/ MWh)

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

>>**Emission Reduction (ERy)(kg CO_2 eq/yr) = Baseline Emissions (BEy) – Project Emission (PEy)………..(5)**

Please refer to the Table below

Year	Baseline Emissions $BE_{electricity,y}$ tCO₂	Project Emissions PEy tCO_2	Emission Reduction ER_y tCO_2
2001	1002973.53	294273.71	708699.82
2002	1984528.26	647897.94	1336630.32
2003	1989802.07	579246.55	1410555.53
2004	1831047.60	679063.79	1151983.81
2005	1945243.27	628709.14	1316534.13
2006	1945243.27	628709.14	1316534.13
2007	1945243.27	628709.14	1316534.13
2008	1945243.27	628709.14	1316534.13
2009	1945243.27	628709.14	1316534.13
2010	1945243.27	628709.14	1316534.13
2011	972621.64	314354.57	658267.07
Total Emission Reductions =13165341.35 t CO2			

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

>>

	Baseline Emissions	Project Emissions	Emission Reduction
Year	$BE_{electricity,y}$	PEy	ER_y
	tCO_2	tCO_2	tCO_2
2001	1002973.53	294273.71	708699.82
2002	1984528.26	647897.94	1336630.32
2003	1989802.07	579246.55	1410555.53
2004	1831047.60	679063.79	1151983.81
2005	1945243.27	628709.14	1316534.13
2006	1945243.27	628709.14	1316534.13
2007	1945243.27	628709.14	1316534.13
2008	1945243.27	628709.14	1316534.13
2009	1945243.27	628709.14	1316534.13
2010	1945243.27	628709.14	1316534.13
2011	972621.64	314354.57	658267.07
Total Emission Reductions =13165341.35 t CO2			

SECTION F. Environmental impacts

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

>> In case of Thermal Power Plants, by a notification of 10 April 1997, Ministry of Environment and Forest, Government of India has delegated power to the State Governments for environmental clearances for some specific categories of plants. One of the categories is Co-generation plant and the proposed power plant falls under that category. The environmental clearance for this project will be guided by the above-mentioned notification and accordingly an Environmental Impact assessment has been conducted. This project activity has received environmental clearance has been received and the environmental impacts are not significant.

The above study showed that overall environmental impacts are not significant. Economic and related benefits, if considered, will make the overall impact positive.A summary of impacts is presented below:

Land use

There has been no change in land use. The project activity is carried out inside the existing plant.

Water quality

There will be no impact on water quality of local water source including the rivers.

Air quality

The dispersion computation shows that the increase in air pollutants will be negligible. No significant impact is envisaged.

Employment

Around 5 people are additionally employed after the project activity in the plant and 20 people were temporarily employed during construction.

The new plant will enhance the industrialization of Bellary district and also of the state. This will be helpful socio-economically for the local population as well as for the state.

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:

>> This project activity has received environmental clearance and the environmental impacts are considered not significant both by the host party.

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 at the outset by a team of JTPCL staff and the stakeholders were duly informed of the consultation meeting. In addition public notices were also issued for the local stakeholder consultation meeting. Local stakeholder consultation meeting to discuss stakeholder concerns on the proposed Clean Development Mechanism (CDM) project – waste gas use for electricity generation at JTPCL, was held at 11:00 a.m. on 7th April 2005 at the Business centre, JVSL township, Vidyanagar, Dist. Bellery, Karnataka, India.

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

G.2. Summary of the comments received:

>>

Stakeholder concerns / question / comment	Answer / clarifications
Environment	
Are you storing Corex gases? Is there danger of explosion or any other incident?	Yes we are storing the corex gases. There is no danger of explosion of the Corex gases.
What is the present ambient air quality and what would be the result of the project activity on ambient air quality?	The background ambient air quality of the area is as below. SPM – 132 µg/m3 SO2 - 7.03 µg/m3 NOx - 10.96 µg/m3 Since the project will generate power using more proportion of waste gases beyond the consent limit, there is no increase in the level of SPM & SO2.
What are the effects of increase	The national ambient air quality standard for industrial areas is 60

Stakeholder concerns / question / comment	Answer / clarifications
in ambient concentration of NOx?	μg/m3. The NOx ambient concentrations below this level do not cause any health or ecological impacts.
Why should you reduce GHG emissions while it is the commitment of developed nations?	All the nations ratifying Kyoto Protocol have recognized the need to reduce emissions of GHG's. Since Government of India has ratified the protocol, we have taken these initiatives which would also improve the local environment
Which division of the ministry in environment and forest handles climate change?	There is a climate change division in MoEF and Mr. R.K.Sethi, Director, heads this Division. You can know more details by logging on to www.envfor.nic.in
Does the project activity require additional water?	Water Requirement is same as before the project activity. Installation of the gas holder does not need any substantial increase in the water requirement.
Would you generate any more solid waste due to the project activity?	No solid waste will be generated because of the [project activity.
What care workers have to take for handling slag?	Workers would have to wear personal protective equipment and follow strictly the safety and occupational health instructions
Economic	
How much money have you invested in your gas holder?	INR 240.00 million
Social	
Would workers require any retraining to work on this activity?	A training session was conducted for the employee.

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 JTPCL during the project operation and at any other stage .

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Jindal Thermal Power Company Ltd.
Street/P.O.Box:	5-A , G.Deshmukh Marg
Building:	Jindal Mansion
City:	Mumbai
State/Region:	Maharashtra
Postfix/ZIP:	
Country:	India
Telephone:	0091-22-23513000
FAX:	
E-Mail:	raaj.kumar@jtpcl.com
URL:	
Represented by:	
Title:	Joint Managing Director & CEO
Salutation:	Mr.
Last Name:	Kumar
Middle Name:	
First Name:	Raaj
Department:	
Mobile:	09821910516
Direct FAX:	
Direct tel:	00-91-2223512671
Personal E-Mail:	

Annex 2

INFORMATION REGARDING PUBLIC FUNDING
No official Development assignment is used in this project activity

Annex 3

	Baseline emission calculation			
	MU	MWH	EFPG	BEelectricity,y
			tCO2/Mwh	tCO2
2001	1030.78	1030775.00	0.97	1002973.53
2002	2039.54	2039537.50	0.97	1984528.26
2003	2044.96	2044957.50	0.97	1989802.07
2004	1881.80	1881802.50	0.97	1831047.60
2005	1999.16	1999163.57	0.97	1945243.27
2006	1999.16	1999163.57	0.97	1945243.27
2007	1999.16	1999163.57	0.97	1945243.27
2008	1999.16	1999163.57	0.97	1945243.27
2009	1999.16	1999163.57	0.97	1945243.27
2010	1999.16	1999163.57	0.97	1945243.27
2011	999.58	999581.79	0.97	972621.64
		19991635.7		19452432.7

Annex 4

MONITORING PLAN
As in section D
- - - - -