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:

BOF Gas recovery at Jindal Vijayanagar Steel Limited (JVSL) and combustion for power generation and supply to Karnataka Grid, India.

A.2. Description of the project activity:

The BOF shop at JVSL is equipped with 2 nos. * 120 t BOF converters. Presently, both the converters are operating in 2/2 mode and have already reached the total capacity of 1.57 MTPA (million ton per annum) of crude steel. During the operation of the BOF converter, waste gases[1] (called BOF gases) are generated. This gas has a combustible proportion in the form of carbon monoxide (CO), which makes this a health hazard and cannot be emitted to the atmosphere. Hence, the BOF gas is currently being flared, in a business as usual scenario.

The BOF gas also has a latent heat potential[2] due to the presence of CO, which may be extracted and utilized by combustion to generate thermal power in the form of electricity. Such efforts need collection, stabilization (to ensure continuous and steady flow at required pressure) and delivery of the BOF gas from the BOF plant to the thermal power plant. JVSL has a sister concern called the Jindal Thermal Power Company Limited (JTPCL)[3], and few other thermal power plants are also proposed in the recent future, where the BOF gases are proposed to be delivered through a gas grid to be established.

The project activity envisages to develop, design, engineer, procure, finance, construct, own, operate and maintain a BOF gas grid for delivering and distributing the BOF gases at the JTPCL and other proposed power plants.

A.3. Project participants:

The project activity is proposed by the JVSL (project sponsor) at its steel plant in Toranagallu, Bellary District of Karnataka. JVSL is part of the US$ 1.5 Billion Jindal Group. The group has synergistically diversified into 11 business units with plants at 13 locations in India and at 3 locations in the USA. The principal promoters are the Jindal Group and the KSIIDC. The remaining sharing-holding is in the form of public equity, and through participation by some banks (Indian and Overseas), Financial Institutions (Domestic and Foreign), the IMF, Trusts, Bodies Corporate, Non Resident Indians and employees.

PricewaterhouseCoopers (PwC) are assisting the project sponsor in developing the Project Design Document (PDD) and defence of the PDD in Host Government Approval (HGA) and validation procedure. PwC, formed by the global merger of Pricewaterhouse and Coopers & Lybrand in 1998, is the world's largest financial and professional services organisation with 125,000 people in 142 countries and 867 offices worldwide. The contact information on project participant and PwC are provided in Annex 1.

[1] Specific gas yield is 80 NM^3 per ton of crude steel (tcs).

[2] Gross Calorific value is about 2,000 Kcals/NM^3.

[3] Located adjacent to the JVSL facilities within a common Jindal Group complex.

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

The project is proposed in JVSL steel plant at Toranagallu, District Bellary, State of Karnataka, India.

A.4.1.1. Host Party(ies):

Government of India.

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

District Bellary, State of Karnataka.

A.4.1.3. City/Town/Community etc:

Toranagallu

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

The JVSL plant is located at 15° 11'N Latitude and 76° 41'E Longitude. The site is at a distance of 29 Km from Bellary, 33 Km from Hospet and 340 Km from Bangalore by road. The nearest railway station is at Toranagallu.

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

The project activity is applicable to 'Category 9, metal production', as per sectoral scope. In the absence of an appropriate project category definition, a new project category may be considered titled *"Process waste gas recovery and combustion for electricity generation in grid connected power plants"*.

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

The technology applied to the project activity is designed to capture, store and stabilize (i.e., ensure steady and uninterrupted supply to power generator) and deliver BOF gas to the power plant(s). All gas pipelines forming the gas grid for BOF waste gas collection and transportation, booster pumps, a floating top gas holder for storage and stabilization of the BOF waste gas, and nitrogen purging/sealing facility etc., constitute the technology for the project activity. The technology involved fully PLC controlled state of the art equipment and control systems.

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:

- In the absence of facilities to collect, stabilize and store, transport and use BOF waste gas as fuel in the power plant, the BOF gas is currently being flared.
- On recovery of the BOF waste gas, the calorific value of 2,000 Kcals/NM^3 shall be recovered through power generation and evacuation to the state grid.
- There shall be no net change in the GhG emission due to burning of BOF waste gas, but the power generated on account of the recovery of heat from BOF waste gas shall result in avoidance of need to

use GHG intensive fuels to produce the same amount of electricity to the grid as produced using the BOF waste gas.

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

Using the methodology and emission calculation procedures discussed later in this document, the total emission reduction over the 10 year fixed crediting period works out to approximately 575,967 tCO_2.

A.4.5. Public funding of the project activity:

This is a unilateral CDM Project Activity undertaken by the project proponent. The proponent proposes to identify potential participants in due course and it is as yet not known if any public funding shall be sought. In case public funding is sought, the proponent shall duly ensure that it is additional to any ODA.

SECTION B. Application of a baseline methodology

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

In the absence of an approved baseline methodology for the project activity, a new methodology has been developed, in line with the approved Meth Panel recommended methodology "Approved consolidated baseline methodology ACM0002[4].

The title of this new methodology is *"Avoiding flaring of waste gases from steel manufacturing operations and its utilization for generating thermal power thereby substituting fuel and supplying to grid"*.

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

- ✓ Part of the BOF waste gases will be used for meeting the internal heating requirements at JVSL and the rest would be supplied to power generator(s) instead of flaring.
- ✓ There will be no integrated process change in the BOF plant due to the project activity, except for providing for additional facilities to collect and store the waste gases ensuring steady supply to power generator(s).
- ✓ There is no regulation in India at central or Karnataka state levels encouraging or prohibiting the use of BOF waste gases for power generation.
- ✓ The project activity will result in power generation that will be supplied to the Karnataka grid (local) and southern grid (regional).

There are several larger issues that favour justification of choice of the selected new methodology:

- ✓ The project activity is unique in the sense that it is the only such plant in India and is the only project where BOF waste gas will be directly fed to a power plant serving the state grid.

[4] Consolidated baseline methodology for grid-connected electricity generation from renewable sources.

- ✓ The economy of India as a whole is in transition to a market economy. There are still several structural imperfections that distort the market e.g. potentially attractive fuels like oil and natural gas have only been recently taken out of the ambit of administered price mechanism and the pricing continues to be distorted.

- ✓ Due to several risk factors prevalent in the power sector in Karnataka, there is considerable uncertainty in the number and nature of power projects that may or may not come up.

- ✓ Amongst several other risk factors, despite the runaway demand–supply deficit, there is a nearly 45% shortfall in planned new capacity addition in the power sector, primarily because of the poor financial health of state owned state electricity boards and the consequent payment security to the generators serving the system. Various entities in the power sector have failed to evolve appropriate payment security mechanisms. The pitfall is amply demonstrated by the closure of the Dabhol Power Corporation in Maharashtra state on account of a power purchase and payment imbroglio. In Karnataka also, the sole purchaser of power is the KPTCL, which is also a state-owned entity and its financial health is suspect.

- ✓ The resource endowment pattern of Karnataka has not undergone any significant alteration. There is though a general decline in interest in Hydro-Power projects on account of several socio-economic and environmental issues associated with them, inter-state water sharing disputes and the uncertainties on account of climatological factors. This is expected to result in increased reliance on fossil fuel based capacity additions, which shall result in increased GHG emission intensity of the grid. There have been significantly large natural gas finds in Krishna – Godavari (K-G) basin in the neighbouring state of Andhra Pradesh. This may in time result in Andhra Pradesh becoming a power surplus state with new capacity addition in the state. But the development of the K-G gas fields and the consequent impact on power sector of the region is not expected in the time horizon of relevance to the project.

- ✓ No significant change in the access or availability of technology is expected for the power sector in the state.

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

As mentioned earlier in this document, the project activity will have two significant components, viz., replacement of coal with BOF waste gas in existing JPTCL power plant (including use of new fuel in proposed greenfield power plant, and supply of generated electricity at these power plants to the state/ regional grids. The project activity is thus in line with the proposed new methodology which applies to the following types of project activities:

- ✓ steel manufacturing operations (one or multiple) using BOF/ LD processes, where waste gases with latent heat content are produced and reused as fuel supplement in reheating process; any excess gases are flared;

- ✓ potential for utilizing waste gases for generation of electricity thereby substituting commonly available GHG intensive fuels and supply the generated electricity to the grid; and

- ✓ waste gas collection, stabilisation *(due to fluctuations in waste gas heat content and flow over time)* and supply to power generators connected to the gas grid.

With the above background the additionality for the project activity can be demonstrated through the following steps:

Step 0 Start date of the project activity.

The project activity will be initiated after 1 January 2000 and before 31 December 2005. The CDM benefits for the project activity were seriously considered while conceptualising the project to cross several barriers so that the project activity could be attractive for implementation. There is official evidence in the form of confidential internal documentation that may be verified to confirm to this. For example, in a board resolution, JVSL referred to availing the benefits of CDM to overcome the disadvantages of generation cost of electricity using BOF gases, which is marginally higher than cost at which power is available from the grid. The resolution is supported by an internal assessment of all power availability and uncertainties in power availability likely to come up in future.

Step 1 Demonstrating that the project activity is not mandated under current laws and regulations.

In India, laws and regulations do not mandate the utilization of waste gases from steel manufacturing processes. However, there are instances in national power policies favouring utilization of preference on using GHG intensive fuels such as coal for power generation due to low cost and other logistical considerations. The Electricity Act 2003 does not restrict or empower any other authority to restrict the fuel choice for power generation. The draft National Electricity Policy (revised in August 2004) asserts 'coal would necessarily continue to remain the major fuel' and 'use of gas as a fuel for generation would depend upon its availability at reasonable prices'. The applicable environmental regulations do not restrict the choice of fuel for generation units located anywhere any other part of India. The decision to transport selection of BOF waste gas as fuel for power generation is an internal decision by the board members of JVSL.

Step 2 Identification of alternatives to project activity consistent with current laws and regulations.

In case the project activity was mandated under existing legal requirements, the plausible alternatives to project activity could have been one or more of the following:

- ✓ flaring excess waste gases (after meeting internal heating requirements in the steel industry);
- ✓ existing power generator would continue using GHG intensive fuel for generating electricity under legal mandate; and
- ✓ any new Greenfield power plant may choose and obtain regulatory permission to use any GHG intensive fuel to generate power.

Step 3 Investment Analysis.

- ✓ The chosen alternative to the project is flaring the waste gases, and purchasing power from the grid after paying the wheeling charges are allocated. The cost of power in the alternative scenario in comparison to the project activity has been worked out to be Rs. 1.94/kWh.

Step 4 Barrier Analysis

- ✓ ***Investment***- The project has adopted some elements of new technology for collection, storage, stabilization and supply of BOF waste gases to thermal power generator(s). Due to this, additional investments were to be made that makes this financially less attractive compared to purchase of power from the grid. The investors to this project activity (JVSL management) had perceived risks to their investment due to unfamiliarity with the new technology.

- ✓ ***Technological***- The technology for waste gas utilization to generate power is not widely used, and there is unfamiliarity and uncertainties to the processes and procedures involved. The new technology takes into account the cyclic nature of LD Converter operation requiring periodic maintenance shutdowns, while power generation is a continuous operation, causing an input – output mismatch. Though this mismatch is smoothened to some extent by a Gas holder, the risk of disruption in supply of primary fuel remains. The technologically inferior alternative is to shift to 100% coal, which would result in higher net emissions. JVSL has carried out certain level of R&D or pilot plant studies (transporting waste gases to a power generator from COREX I plant) to establish certain degree of reliability in the new technology.

- ✓ ***Prevalence***- The project activity would be amongst the first few integrated steel plants in the country. More importantly, JVSL is the first Indian steel industry whose waste gases will be used for generating power and supplying to the grid.

The barriers discussed above could prevent the project activity if there is no sufficient incentive for overcoming these barriers and making the project happen.

Step 5 Common Practice Analysis

- ✓ As mentioned under step 4 earlier, JVSL is the first steel industry in India that will supply waste gases for generation of power.

- ✓ JVSL has established through R&D work and/ or pilot-scale studies utilizing COREX I plant waste gases that this technology is a viable alternative to use of coal.

Step 6 Impact of CDM Registration

- ✓ The success of the project activity through assistance of CDM benefits may encourage other steel industries to go for such CO_2 avoiding projects.

- ✓ The success may also encourage development of policies at national level encouraging the use of waste gases as potential alternatives to GHG intensive fuels.

- ✓ The success may also encourage equity participation by private parties on such projects, and bring in investors.

- ✓ This could bring credibility to the project activity and the new technology.

Based on the above analysis, it is satisfactorily concluded that the project activity is additional to a baseline scenario.

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:

In the absence of the project activity, the BOF waste gases will not be dispatched to power plant(s) for generation of electricity and supply to the grid, resulting in the following incidences/ occurences:

1. BOF waste gases would have continued to be flared leading to CO_2 emissions;

2. The existing power plant which has permission to use 100% coal, would have continued with use of coal leading to emission of CO_2 emissions; and

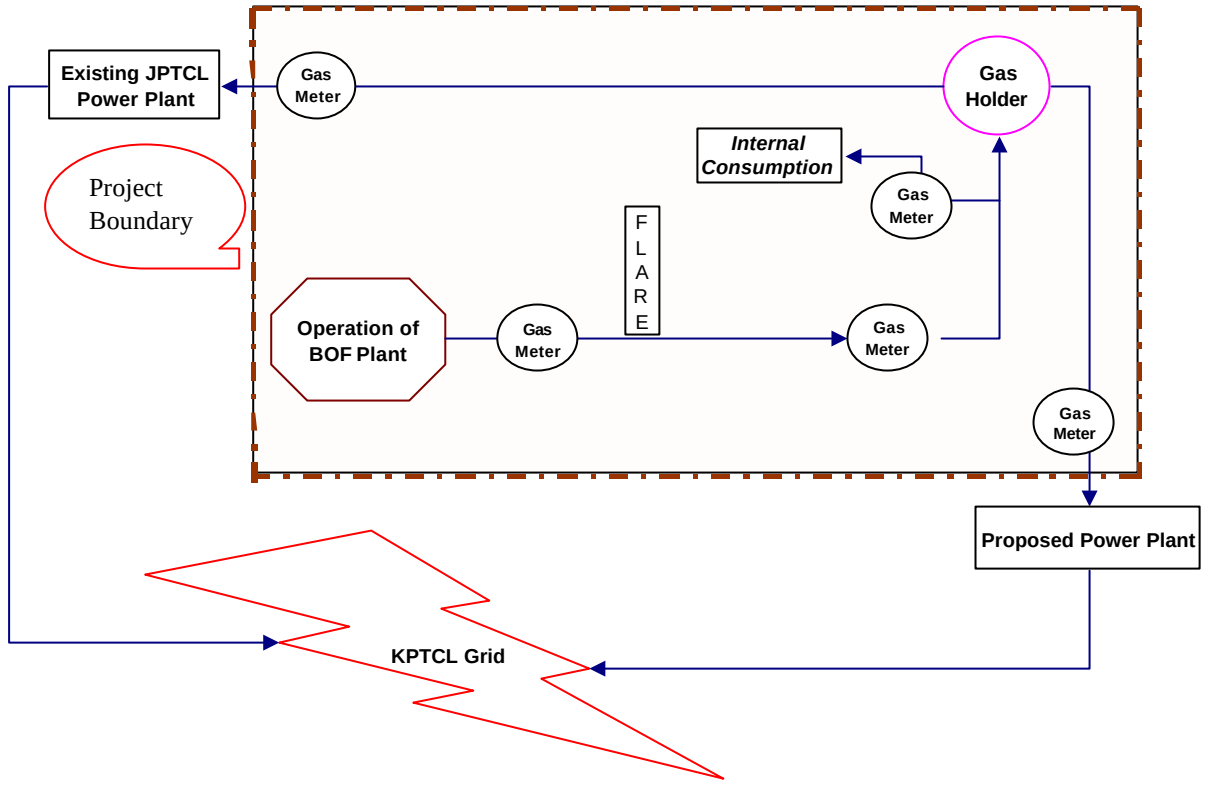
3. New Greenfield power projects utilizing more GHG intensive fuels would have come up faster to meet the demand-supply gap in the Karnataka state grid, leading to further GHG emission.

All or some of the above would be avoided, reduced or delayed because of the project activity. There is no net change in CO_2 emission due to combustion of BOF waste gases (i.e. pre and post project activity) but the electrical energy generated is evacuated to Karnataka Grid. The emission reduction is on account of the avoided emission to the extent of the electrical energy generated and evacuated to the grid.

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

The proposed CDM project activity comprises effecting any modifications in the existing BOF waste gas handling system, and including all equipment and accessories necessary for collection, stabilization (for ensuring desired flow and pressure of BOF waste gas at power plants) and transportation of waste gases to the existing (JTPCL) and proposed power plant(s). This is in line with the project boundary suggested in the baseline methodology.

Project Boundary for the BOF Gas Utilization Project



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 draft will be completed by 31 May 2005, subject to approval of the proposed new baseline methodology. The baseline may require updating prior to validation.

Dr. P Ram Babu of PricewaterhouseCoopers (P) Limited, has assisted the project 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 commercial operation is expected to commence from end of January 2005, which is taken to be the starting date of the Project Activity. As it is not prior to the adoption of Decision 17/CP.7 (10 November 2001), no documentation is required.

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

The Project is expected to be operational for a period of 30 years from the date of commencement of operations.

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

C.2.1. Renewable crediting period

Not opted for.

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

>>

C.2.1.2. Length of the first crediting period:

>>

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

January 2005.

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:

A new monitoring methodology called *"Monitoring generation, storage and stabilization, and supply of waste gases from steel manufacturing operations to generate thermal power plant(s)"* has been used which is based on a similar approved methodology (ACM0002) by the Meth Panel.

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

>>"Monitoring methodology for generation, storage and stabilization, and supply of waste gases from steel manufacturing operations to generate thermal power plant(s)"is applicable to the project as

- ✓ the project uses waste gases which would have been flared in the absence of the project activity;
- ✓ the waste gas consumption and heat containing characteristics are measurable;
- ✓ the project uses part of the waste gas generated during the steel manufacturing operation for meeting internal heating requirements within the steel manufacturing industry;
- ✓ the project activity does not obtain enhanced credits by diversion of waste gases required for internal usage for generation of power and replacing the shortfall with other energy sources.

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 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
A	Actual quantity of BOF waste gas available for use in power generation	Records from power plant generator and waste gas generator	SCM	m	Annual	Daily	Electronic	-
B	Minimum quantity of BOF waste gases that were generated in the steel manufacturing industry	To be estimated as per monitored project data	SCM	e	Annual	Last 3 years or any other smaller duration in case of recently stabilized manufacturing operations	Electronic	-
C	Minimum quantity of BOF waste gas that were flared in the steel industry	To be estimated as per monitored project data	SCM	e	Annual	Last 3 years or any other smaller duration in case of recently stabilized	Electronic	-

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)	Comment
						manufacturing operations		
D	Average amount of BOF waste gases that were used for meeting the internal requirements of all waste gas generators in similar steel manufacturing sector)in the region or country	To be estimated as per monitored project data	SCM	e	Annual	Last 3 years or any other smaller duration in case of recently stabilized manufacturing operations	Electronic	-

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

>> The project activity of gas generation by BOF gas does not generate any GhG gases. Hence, the annual emission form project activity $\mathbf{PE_Y=0}$.

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)	Comment
$Q_{i,y}$	Monthly BOF waste gas consumption ' during year 'y' by the power plant	Existing project records at power generator using waste gases	SCM	m	Annual	3 yearsdata	Paper	
GCV_i	Monthly gross calorific value for BOF waste gas based on average daily values	Existing project records at power generator using waste gases	KCal/SCM	e	Monthly	3 years data (36 months data)	Paper	
HR_i	Monthly 'heat rate' for BOF waste gas, based on average daily values	Existing project records at power generator using waste gases	KCal/kWH	e	Monthly	3 years data (36 months data)	Paper	

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)	Comment
$GEN_{j,y}$	Electricity delivered to the grid by source j	Published data from electricity boards or control authorities	GW/h	c	Annual	Annual	Paper	
$GEN_{m,y}$	Monitored installed capacity of power plants connected to the grid to which power generator will be contributing	Published data from electricity boards or control authorities	GWh	c	Annual	Annual	Paper	

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

>> Baseline emissions could be calculated as per the following procedure, considering that the power generated would avoid or delay equivalent quantity of electricity to the grid. The fuel replacement component of the baseline as detailed in the baseline methodology has not been included in preliminary baseline emission calculations since the project activity has not yet started operation. Such effect will be considered after start of project activity, and may result in a change of CERs than those indicated based on the preliminary baseline calculations.

'Average Operation Margin' calculations

The average OM emission factor ($EF_{OM,Average,y}$) is to be calculated as the average emission rate of all power plants, including low-operating cost and must-run power plants, using equation (2.1) below. A 3- year average data vintage, based on the most recent statistics available at the time of PDD submission, is to be considered.

$$EF_{OM,Average,y} = S\ (GEN_{j,y} * EF\_IPCC_{i,j}) / S\ GEN_{j,y} \quad \ldots\ldots(1)$$

where,

$EF_{OM,Average,y}$ Average OM CO_2 emission factor per unit of energy (tCO_2/GWh) of all generating sources serving the southern grid

$GEN_{j,y}$ Electricity (GWh) delivered to the southern grid by source j

$EF\_IPCC_{i,j}$ Emission Factor as per IPCC for CO_2 from fuel i (tCO_2 / GWh) at power sources j

Build Margin Calculations

This is calculated as the generation-weighted average emission factor (tCO_2/GWH) of a sample of power plants, as per the following algorithm:

$$EF_{BM,,y} = S\ (GEN_{m,y} * EF\_IPCC_m) / S\ GEN_{m,y} \quad \ldots\ldots(2)$$

where, EF_IPCC_m and $GEN_{m,y}$ are analogous to the variables described for the average OM method earlier for plants *m.* The sample group *m* consists of power plants capacity additions in the electricity system that comprise 20% of the system generation (in *GWH*) and that have been built most recently [including plants under construction].

Considering equal weightage for both OB and BM, the baseline emission factor by average CM in any year y, is calculated as,

$$EF\_BL_{CM,y} = EF_{OM,Average,y} + EF_{BM,,y} \quad \ldots\ldots(3)$$

Baseline II (in tCO_{2equ})
*= $EF\_BL_{CM,y}$ * Average annual power generated (GWh) that can be supplied to the grid each year from BOF waste gas ……(4)*

After start of the project activity, a fresh baseline due to fuel replacement (coal with BOF waste gases) will be considered as per the following formulae. The baseline emission will depend on quantities of waste gases combusted at the existing power plant.

$MPO_{i,y} = Q_{i,y} * GCV_i / HR_i$ ……(5)

$TPO_y = S\ MPO_{i,y}$ ……(6)

Baseline I (in tCO_{2equ}) = $EF\_IPCC * TPO_y$ ……(7)

where:

$Q_{i,y}$	Monthly 'Waste Gas Consumption' of during year 'y' (in SCM)
GCV_i	Monthly 'Gross Calorific Value' for waste gas (in kCal/ SCM), based on average daily values
HR_i	Monthly 'Heat Rate' for waste gas (in kCal/kWH), based on average daily values
$MPO_{i,y}$	Monthly 'Power generated by waste gases' (in GWh, after converting MWh to GWh) during year 'y'
$TPO_{i,y}$	Total annual 'Power generated by waste gases' (in GWh) during year 'y', supplied to the grid
EF_IPCC	Emission Factor of GHG intensive fuel as per IPCC (in tCO_2 / GWh)
Baseline I	CO_2 emission due to replacement of GHG intensive fuel with waste gases (in tCO_{2equ}) during any year 'y'.

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

Not opted for.

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.):

>>

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

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

>> Built in the baseline and emission reduction calculations.

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 preliminary (annual) emission reductions are calculated as per the following formula:

$ER_y = Baseline\ II * CF - PE_y$ ……..*(8)*

The actual (annual) emission reductions will be calculated after start of project activity as per the following formula:

$ER_y = Baseline\ I * CF - PE_y$ ……..*(9)*

The correction factor (CF) will be calculated as per the following formula (refer to Table D.2.1.1):

CF = Ratio between 'Minimum of [(B-D), C and A] and A…….*(10)*

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.
A	*Low*	*The monitoring will regularly be checked as part of ISO 9001:2000. Measurements and checks will be done by third party annually.*
B	*Low*	*Same as above*
C	*Low*	*Same as above*
D	*Low*	*Same as above*
$Q_{i,y}$	*Low*	*Same as above*
GCV_i	*Low*	*Same as above*
HR_i	*Low*	*Same as above*
$GEN_{i,y}$	*Low*	*To be taken from available public reports obtained from regulatory authorities*
$GEN_{m,y}$	*Low*	*Same as above*

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 will be operated and managed by JVSL who is also the project proponent. JVSL will ensure safety in operation of the plant; a project manager will be allocated with the responsibility for ensuring that the safety issues are addressed. JVSL will supply BOF waste gases to the power plant(s) as per the design and the quantum of fuel will be logged in and archived electronically.

Although it is being anticipated that there won't be any leakage of the CDM power project, however, if any such condition arises, and leakage effect is found due to any of the CDM project activity, such leakage will be accounted accordingly as mentioned in the chosen applied baseline methodology.

The GHG emission reductions estimated herein will be a target in the ISO 14000 standards based Environmental Management System (EMS) that will be put in place at JVSL. Accordingly, the monitoring plan proposed herein will become an integral part of the Environmental Management Programmes and would be constituent of operational and management structure of EMS.

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 Annex 1 has assisted the Sponsor in determining the baseline methodology.

SECTION E. Estimation of GHG emissions by sources

E.1. Estimate of GHG emissions by sources:

>> There will be no project activity related emissions since in the absence of the project the BOF waste gases would have been flared emitting CO_2.

E.2. Estimated leakage:

>> Built in the emission reduction calculations.

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

>> Zero.

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

>> As in D.2.1.4.

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

>> The preliminary emission reductions work out to 575,967 tCO2 for the 10 year crediting period.

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

		Years =>									
Particulars	**Units**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
Project Emission	**tCO2/GWh**	0	0	0	0	0	0	0	0	0	0
Baseline Emission	**tCO2/GWh**	621	621	621	621	621	621	621	621	621	621
Projected Generation	**GWh**	49	98	98	98	98	98	98	98	98	98
Annual Emission Reduction	**tCO2**	30,314	60,628	60,628	60,628	60,628	60,628	60,628	60,628	60,628	60,628
Total Emission Reduction	**tCO2**										**575,967**

The detailed calculations are provided under Appendix 1.

SECTION F. Environmental impacts

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

Thirty-two categories of activities with a certain investment criteria, are required to undertake an Environmental Impact Assessment (EIA) under the Environmental Impact Notification of Government of India. This project activity is not covered under any of the categories as per the said notification. Nevertheless, the project sponsors have undertaken an EIA for the proposed project activity. The detailed EIA report shall be made available for validation.

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:

The environmental impacts (negative/positive) due to the proposed activity are summarized below:

1. There would not be any impact on the water environment, nor any significant amount of liquid waste generation, or its impact on land environment.

2. Emission of CO_2 due to combustion of fuel such as coal will be avoided.

3. The avoidance of noise pollution which otherwise would have been generated due to handling/ transportation of solid fuel such as coal is a positive impact on maintaining the quality of acoustic environment. The booster pumps, which are a major source of noise in this particular activity will be provided with acoustic enclosures, hoods and claddings so as to bring the noise level below 85-dB (A).

4. The utility would deal only with gases and does not utilise any other raw material which other wise can be evaluated as a hazardous/ non-hazardous waste.

5. In a power generation activity with coal as a base fuel, emissions of primary pollutants are not ruled out. Even in such a case impact on the health of flora and fauna is envisaged to a certain extent. The ecological impacts are potentially due to the release of such emissions to the atmosphere and their impacts on vegetation, terrestrial flora and fauna. However, in a case like this where BOF waste gas will be used, the impact on the ecological systems is avoided, as no air emissions would be generated in this activity.

6. The operation of the JVSL plant has seen several changes in the socio-economic and cultural environment. The contribution of JVSL towards provisions of employment and livelihood opportunities has improved the quality of life of the people in the surrounding habitations. The proposed power generation activity would add to this, through its contribution of providing social and economic benefits in terms of employment opportunities during operations and maintenance of the plant, and secondly, by providing cleaner environment and better environment health conditions to the people in the neighbouring villages.

7. The generation of electricity from such a clean process would contribute towards meeting the states deficit in electricity requirements.

The proposed Clean Development Mechanism (CDM) initiative would contribute towards:

- Maintenance of regional air quality, and subsequently ecosystem and human health.
- Conservation of natural resources such as coal and water.
- Contribute towards regional developmental goals.

- Contribute to Karnataka State's power deficit facilitating industrial growth.
- Socio-economic development through provision of employment opportunities for local population.

In view of above positive impacts and contribution towards the nation's goal of sustainable development and improvement in quality of life of local population, the proposed development and implementation of systems for waste heat recovery of BOF Gas and utilisation in power generation is recommended. The clearance of this CDM initiative by JVSL would facilitate the process of sustainable energy production.

SECTION G. Stakeholders' comments

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

To create awareness on the environmental issues, JVSL organizes mass awareness programme each year wherein all local stakeholders, mainly neighbouring community participates. During 2003, the programme was on the theme of ''Sustainable development of Northern Sandur Taluka '' on 10th June, where members of village Panchayats (local body), local NGO's and senior citizens were invited to share any concerns, knowledge and information. In this programme, the CDM initiatives of JVSL were explained and it was also announced that the individual villages will be approached by a local stakeholder consultation team consisting of Dr. P. Ram Babu of PricewaterhouseCoopers, Mr. P.K. Sarkar (Head, Environment Management), and Mr. R. T. Srinivasa Rao (AGM, Environment management) and their concerns related to the CDM initiative of JVSL will be sought. The participants in the meeting were also encouraged to articulate the concerns, but the general response was that the concerns will be communicated to and discussed with the team during their consultation visits. Subsequently the consultation schedule was decided and the participants requested that the consultations be held near the Village Panchayat office on the 23rd of June. It was announced that the project brief and the summary of EIA are available at Mr. Sarkar's office and can be made available to any stakeholder in the nearest Village Panchayat office on request by telephone. Similarly, it was announced that any concern regarding the project can also be communicated to Mr. Sarkar by telephone or in writing. Accordingly the team visited the villages on 23rd June 2003 from 10:00 to 19:00 hrs and conducted meetings next to the village panchayat office in full public gaze and without any access/ participation restrictions.

FOLLOWING ARE THE PEOPLE CONSULTED AT VARIOUS VILLAGES

Sl. No	Name of Village	People contacted
1	Sandur	Sri V.R.Ghorpade, Ex-President, Zilla Panchayat , Bellary.
Vaddu Panchayat		
2	Vaddu	Smt. Santamma, Vice President
3	Vaddu	Sri Marudra Gouda
4	Basapur	Sri Hanumantappa, Member
5	Basapur	Sri P.H. Ranganath, Member
6	Basapur	Sri G. Thippe swamy, Member
7	Jog	Sri C.M.Durganna,
8	**VADDU**	Sri D.H.Anjanappa

9	**TALUR**	Sri M. Thippeswami
Kurekuppa Panchayat		
10	Kurekuppa	Sri Malla Reddy, Member
11	Kurekuppa	Sri Devanna, Member
12	Kurekuppa	Sri Hema Reddy
13	Toranagallu Stn.	Sri G. Revanna
14	Toranagallu Stn.	Sri K. RajaShekar
Toranagallu Panchayat		
15	Toranagallu	Smt Chennamma, President
16	Sultanpura	Smt Huligamma, Vice President
17	Sultanpura	Sri Hurkundappa
18	Toranagallu	Sri N.Shankar, Member
19	Toranagallu	Smt V.T.Sridevi , Member
20	Toranagallu	Sri Hemappa

Contents of the Project brief that was communicated to the local Stakeholders in local language

Presently, Jindal Vijayanagar Steel Limited is flaring the excess COREX gas and total BOF Gas. This excess gas, if utilized for power generation, will provide additional power to the grid. Coal based power plants emit many gases that harm the human health and ecology, and also Green House Gasses (GHG) namely CO_2 which has become a global concern. The excess Corex gas and BOF gas if utilized for power generation, instead of flaring as is practiced now, will produce power without the additional gaseous pollutants. To utilize the COREX and BOF gases in the power plant the additional facilities for storage that need to undertaken, were explained.

G.2. Summary of the comments received:

The local stakeholders appreciated the two initiatives without additional resource use and emissions of harmful gases. Local stakeholders articulated the following concerns:

a) The project results in more power availability in Karnataka Grid but at the same time the benefit of extra power would not accrue to them directly and solve the problems of irregular supply. Some participants enquired "Can JVSL or JTPCL supply the power to local villagers?"

b) Additional power could boost the economic activity in the region and that finally will improve the quality of life in the region. Some participants enquired, "Could JVSL ensure that the local economy benefits through such an initiative?"

c) Many expressed concern if the project would draw any additional water and also desired water should be made available to them.

d) Some stakeholders expressed that the vegetative cover in and around be improved.

e) Some stakeholders enquired if storage of COREX and BOF gas would be safe.

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

a) In response to the first query [(a) above] Mr. Rao explained to the participants in Kannada Language (the local language) that as per the law, the power can only be fed into the grid and JVSL or JTPCL cannot supply any power to the local communities directly.

b) Mr. Rao in response to the second query [(b) above] assured to the participants in Kannada Language that the local suppliers, contractors and workmen will have preference in undertaking these initiatives. However, ensuring that the power generated through these two initiatives would catalyze local economic development is beyond the scope and mandate of JVSL .

c) Mr. Rao in response to the third concern [(c) above] explained to the participants in Kannada Language that the initiatives would require less water than the present situation or alternate situation, where coal is being utilized for power generation.

It was brought to their notice that Supply of drinking water to 9 villages namely, Old Daroji, New Daroji, Madapur, Basapur, Kurekuppa, Toranagallu station, Toranagallu village Talur and Vaddu under Rajiv Gandhi Drinking water mission with proposed contribution of 41.5 lakhs from JVSL are already under implementation. Also the other rural development programmes taken up by JVSL were explained including water supply to the areas that fall en-route to JVSL incoming water line.

d) Mr. Rao explained to the participants, in response to their articulated desire [(d) above], in Kannada Language that JVSL would continue the vegetation cover improvement through its ongoing plantation programme.

e) Mr. Rao in response to the expressed concern [(e) above] explained to the participants in Kannada Language the safety features of the devices, equipment that will be used and also outlined the safety precautions that will be taken during the operation. He said that this would also become a part of onsite and off site emergency preparedness plan.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Jindal Vijayanagar Steel Limited
Street/P.O.Box:	PO Vidya Nagar
Building:	Toranagallu
City:	Bellary
State/Region:	Karnataka
Postfix/ZIP:	583 275
Country:	India
Telephone:	+91-8395 -250134 / 283120
FAX:	+91- 8395 - 250140 / 283120
E-Mail:	brahmanand.singh@jvsl.com, pranabkumar.sarkar@jvsl.com
URL:	www.jvsl.com
Represented by:	
Title:	Jt. Managing Director & CEO or (Alternately) Head Coke, Environment and Energy
Salutation:	Dr. (Alternately) Mr.
Last Name:	Singh (Alternately) Sarkar
Middle Name:	-
First Name:	Brahmanand (alternately) Pranab Kumar
Department:	CEO (alternately) Coke, Environment and Energy
Mobile:	-
Direct FAX:	+91- 8395 - 250140
Direct tel:	+91- 8395 - 250134
Personal E-Mail:	Brahmanand.singh@jvsl.com (alternately) pranabkumar.sarkar@jvsl.com

Organization:	PricewaterhouseCoopers (P) Ltd.
Street/P.O.Box:	Senapati Bapat Marg,
Building:	Kamala Mills Compound, Trade World, 'C' Wing
City:	Mumbai
State/Region:	Maharastra
Postfix/ZIP:	400 013
Country:	India
Telephone:	+91-22-56619400
FAX:	+91-22-24913417
E-Mail:	ram.babu@in.pwc.com
URL:	www.pwc.com
Represented by:	
Title:	Associate Director
Salutation:	Mr.
Last Name:	Ram Babu
Middle Name:	
First Name:	P
Department:	Sustainable Business Solutions
Mobile:	+91-9820135929
Direct FAX:	+91-22-24913417
Direct tel:	+91-22-56619341
Personal E-Mail:	ram.babu@in.pwc.com

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

This is a unilateral CDM Project Activity undertaken by the project proponent. The proponent proposes to identify potential participants in due course and it is as yet not known if any public funding shall be sought. In case public funding is sought, the proponent shall duly ensure that it is additional to any ODA.

Annex 3

BASELINE INFORMATION

Combined Margin

Particulars	Specific emission (tCO2/GWh)
Operating Margin	834.92
Build Margin	407.22
Combined Margin	**621.07**

The detailed calculations are provided under Appendix 1.

- - - - -

Annex 4

MONITORING PLAN

As in D.2.1.

- - - - -