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

CONTENTS

SECTION A. General description of project activity

A.1 Title of the project activity:

KSPCL Waste Heat to Power project, India

Version 1.6
Date: 02/08/2007

A.2. Description of the project activity:

The project activity entails utilisation of waste heat of flue gases generated in DRI kilns of sponge iron plant of Kamachi Sponge & Power Corporation Limited ("KSPCL" hereafter) in power generation. The power produced will be used actively at sponge iron plant of KSPCL. This will displace equivalent amount of power from the Tamilnadu Electricity Board (TNEB) grid, which is part of Southern Region (SR) grid in India and is primarily fossil fuel based. The project activity would result in reduced emissions by avoiding generation of this power in grid connected power stations. The grid emission factor for SR grid is 0.86 tCO2e/ MWh[1].

KSPCL has set up 04 nos. DRI kilns of 100 TPD each at its sponge iron production unit. Annual sponge iron production is ~120000 TPA. Each of the kilns generates ~25000 Nm^3/hr of high temperature flue gases. The temperature of flue gases from the kiln leaving After Burner Chamber (ABC) is at ~950-1000 deg C. This waste heat of flue gases will be utilised in generation of steam in Waste Heat Recovery Boilers (WHRB), which is further expanded in a single bleed-condensing turbine of 10MW to generate power. Steam from 04 nos. WHRB will be taken to the turbine through a common header. In the absence of the project activity, KSPCL would draw power from TNEB grid. The project activity thus displaces equivalent amount of power generation in SR grid connected power stations.

The project faces many barriers[2] to its implementation and KSPCL envisage covering the risk in the project activity with CDM backed benefit.

Sustainability aspect of the project activity:
The proposed project activity has a number of sustainability aspects as described below –

- The project activity helps reducing GHG emission in power generation in the grid, which is primarily fossil fuel based
- It helps in conservation of natural resources i.e. fossil fuels in power generation
- It generates employment during construction/ commissioning and later on operation & maintenance of the plant
- It provides the necessary impetus to other industries to come up with similar projects and become self-sustainable for their power needs

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[1] Baseline Carbon Dioxide Emissions from Power Sector – Central Electricity Authority, CEA, http://www.cea.nic.in/planning/c%20and%20e/user%20guide%20ver1.1.pdf

[2] Refer section B.5 for details

- With many projects coming up, technology suppliers/manufacturers will put in more efforts/ funds in further improvement of equipment/ machinery and help in removing existing technological barriers to implementation of such project activities.
- Reduced emissions of NOx and SOx in power generation.

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)
Government of India (Host)	Kamachi Sponge & Power Corporation Limited (KSPCL)	No

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

A.4.1.1. Host Party(ies):

Host country: India

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

District: Tiruvallur
State: Tamilnadu

A.4.1.3. City/Town/Community etc:

Village: Papan Kuppam
Town: Gummudi Pundi

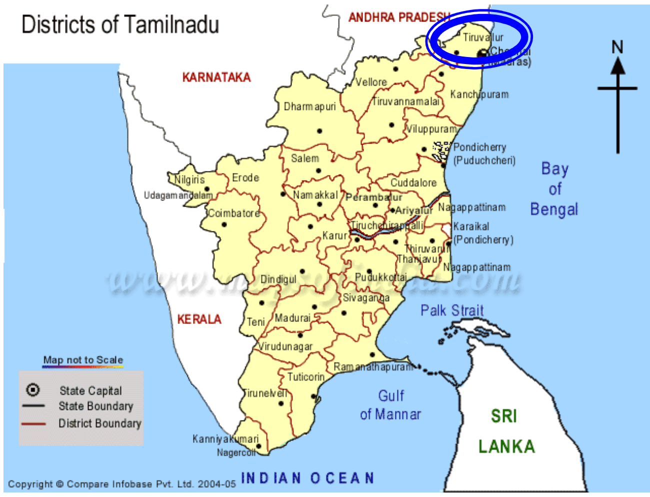
A.4.1.4. Detail of physical location, including information allowing the unique identification of this project activity (maximum one page):

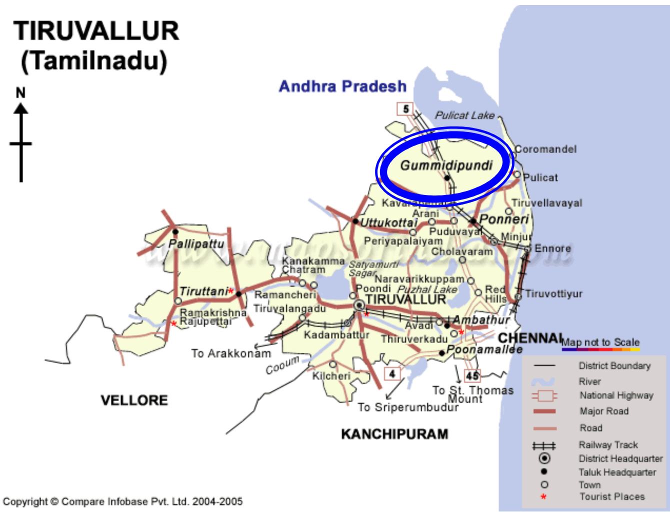
The project activity is located in Tiruvallur District in the state of Tamilnadu. The project site is nearly ~50 km. from the city of Chennai and nearest highway is NH 5. Tiruvallur is located at 79.57 E Longitude and 13.09 N Latitude.

Physical address of project site:

Kamachi Sponge & Power Corporation Limited
Plot No. 86, 116-119 & 123-125
Pappankuppam Village
Gummudipundi Taluk, Tiruvallur
Tamilnadu, India

The physical location is depicted in the maps below –





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

Approved consolidated baseline methodology **ACM0004 "Consolidated baseline methodology for waste gas and/or heat and/or pressure for power generation"**

Reference: Version 02, Sectoral Scope 01, dated 03rd March 2006

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

KSPCL has installed 4X10 TPH WHRB for utilising high temperature heat of flue gases from 4X100 TPD DRI kilns. The temperature of flue gases after 'After Burning Chamber' (ABC) is at 950-1000 deg

C. Steam is generated at 67 kg/cm2 and 485 deg C and expanded in one single bleed-condensing turbine of 10MW to generate power.

Each of the 04 kilns generates ~25000 Nm^3/hr of high temperature flue gases. The temperature of flue gases from the kiln leaving After Burner Chamber (ABC) is at ~950-1000 deg C. This waste heat of flue gases will be utilised in generation of steam in Waste Heat Recovery Boilers (WHRB), which is further expanded in a single bleed-condensing turbine of 10MW to generate power. Steam from 04 nos. WHRB will be taken to the turbine through a common header

Waste Heat Recovery Boiler

Capacity	10 TPH
Steam Pressure	67 kg/cm2
Steam Temperature	485 +- 5 deg C
Nos.	04 Nos.
Flue gas inlet temp.	950 deg C
Flue gas inlet to ESP	175 deg C

Turbine

Rated Capacity	10 MW
Steam Inlet Pressure	64 ata
Steam Inlet Temperature	480 deg C
Nos.	1 Nos.
Bleed pressure for deaerator	4 ATA

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

Years	Annual estimation of emission reductions in tones of CO2 e
2007-08	39010
2008-09	39010
2009-10	41796
2010-11	41796
2011-12	44582
2012-13	44582
2013-14	44582
2014-15	44582
2015-16	44582
2016-17	44582
Total estimated reductions (tonnes of CO2 e**)**	429106
Total number of crediting years	10 years fixed
Annual average over the crediting period of estimated reductions (tonnes of CO2e**)**	42910

A.4.5. Public funding of the project activity:

No public funding (ODA and/ or Annex 1 countries) for the project activity.

SECTION B. Application of a baseline and monitoring methodology

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

- Approved consolidated baseline methodology **ACM0004 "Consolidated baseline methodology for waste gas and/or heat and/or pressure for power generation"**
  - Reference: Version 02, Sectoral Scope 01, dated 03rd March 2006

- Approved consolidated monitoring methodology **ACM0004 "Consolidated monitoring methodology for waste gas and/or heat and/or pressure for power generation"**
  - Reference: Version 02, Sectoral Scope 01, dated 03rd March 2006

- Approved consolidated baseline methodology **ACM0002 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources"**
  - Reference: Version 06, Sectoral Scope 01, dated 19 May 2006

- **Tool for the demonstration and assessment of additionality (version 03)**
  - Reference: Version 03, EB29

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

Methodology	Applicability Criteria	Project Status
Approved Consolidated methodology ACM0004; "Consolidated baseline methodology for waste gas and/or heat and/or pressure for power generation"	This methodology applies to project activities that generate electricity from waste heat or the combustion of waste gases in industrial facilities.	The proposed project activity is a power generation project from waste heat from DRI kilns in a sponge iron plant
	The methodology applies to electricity generation project activities: That displace electricity generation with fossil fuels in the electricity grid or displace captive electricity generation from fossil fuels;	The project activity displaces Tamilnadu Electricity Board (TNEB) power, part of SR grid, which is predominantly fossil fuel based.

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

For the purpose of determining GHG emissions of the **project activity**, project participants shall include:

1. CO_2 emissions from combustion from auxiliary fossil fuels

For the purpose of determining **baseline emissions**, following emission sources have been included:

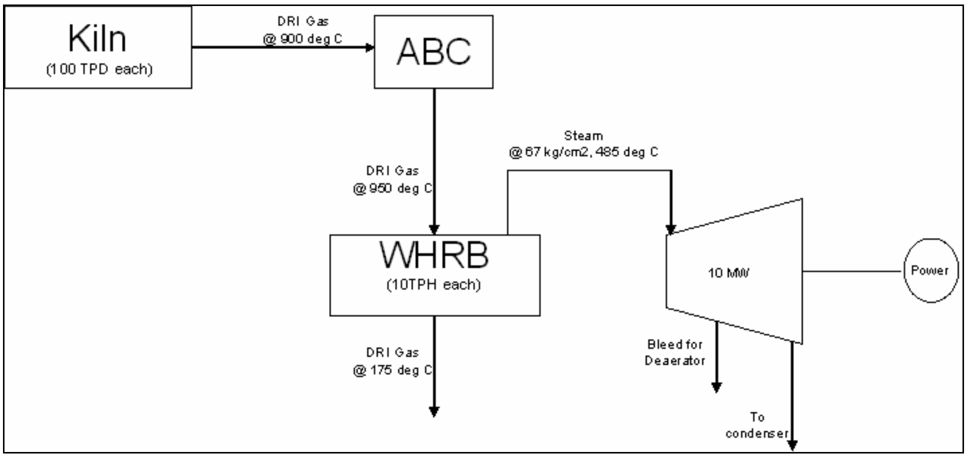
2. CO_2 emissions from fossil fuel fired power plants connected to the electricity system;
3. CO_2 emissions from fossil fuel fired captive power plants supplying the project site facility;

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

The combined margin is calculated as described in ACM0002 (latest version), both in terms of the relevant grid definitions and the emissions factors.

Following emissions sources are included in the project boundary for determination of both baseline and project emissions.

Emissions	Source	Gas		Justification/ explanation
Baseline Emissions	Grid electricity generation	CO2	Included	Main emission source
		CH4	Excluded	Excluded for simplification. This is conservative.
		N2O	Excluded	Excluded for simplification. This is conservative.
	Captive electricity generation	CO2	Excluded	This is not applicable to project activity
		CH4	Excluded	Excluded for simplification. This is conservative.
		N2O	Excluded	Excluded for simplification. This is conservative.
Project Emissions	On-site fossil fuel consumption due to project activity	CO2	Excluded	Project activity does not entail use of fossil fuels in the project activity.
		CH4	Excluded	Excluded for simplification
		N2O	Excluded	Excluded for simplification
	Combustion of waste gas for electricity generation	CO2	Excluded	Project activity entails use of waste heat of the flue gases from DRI kilns for power generation.
		CH4	Excluded	Excluded for simplification
		N2O	Excluded	Excluded for simplification



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

The baseline scenario alternatives include all possible options that provide or produce electricity for in-house consumption excluding baseline options that either 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.

The identified possible alternative scenarios in absence of the CDM project activity are as follows:

1. The proposed project activity not undertaken as a CDM project activity
2. Import of electricity from the grid as continuation of current scenario
3. Captive power generation based on coal
4. Captive power generation based on diesel
5. Captive power generation based on gas
6. Captive power generation based on hydro/ wind

All above options have been analyzed on whether these comply with the legal and regulatory requirements and/or depend on key resources such as fuels, materials or technology that are not available at the project site.

Power Source	Explanation
Proposed project activity from GRSPL not undertaken as CDM project activity	Energy source required in power generation in the project activity is available as waste heat in high temperature flue gases from DRI kilns of KSPCL's sponge iron plant. This alternative is in compliance with all applicable legal and regulatory requirements but faces many barriers and would not have come up in the absence of CDM benefits (as detailed in section B.5) hence this option is not a baseline option.
Coal based CPP	The KSPCL project site is close to Singreni Colliery in Andhra Pradesh and coal is procured for sponge iron plant from this colliery. Coal can also be imported as Chennai port is only 60 km from project site. Coal could also be procured for power generation. Char, a byproduct from sponge iron kilns having good fuel properties can also be used in power generation. The advantages for this option are manifold such as high PLF, well established technology, easily available char and coal fines within the company and from neighbouring sponge iron industries. This alternative is in compliance with all applicable legal and regulatory requirements and can become a baseline option.
Diesel based CPP	Availability of diesel for DG set is not a problem in Tamilnadu state and is a likely proposition for KSPCL. This alternative is in compliance with all applicable legal and regulatory requirements and can become a baseline option.
Gas based CPP	In India there are total 147 sponge iron plants based on coal and only 3 of these are based on natural gas. All the 3 units are based in the western part of India where plants have proximity to natural gas. None of the units is based in Tamilnadu because natural gas is not available in Tamilnadu. Hence, this option is ruled out as an alternative baseline scenario.
Renewable power	This option is in line with legal and regulatory requirements of centre and state as applicable. But the sources of hydro and/ or wind are not available to the project proponent at the site; hence ruled out as plausible alternative scenario.
Import from Grid	This alternative is in compliance with all applicable legal and regulatory requirements and thus can become a baseline option. KSPCL has been drawing power from the grid prior project activity and it would be only natural for KSPCL to continue with the same practice.

Hence, identified alternatives available to KSPCL for power are following:

1. Import of electricity from the grid as continuation of current scenario
2. Captive power generation based on coal
3. Captive power generation based on diesel

These alternatives are analysed based on cost of the plant and cost of power drawn/ generation from each of the alternatives and following conclusion can be drawn-

Parameter	Grid based power	Coal based CPP	Diesel based CPP
Cost of Power	Rs 2.55 basic cost + demand charges	Rs. 1.56/kWh estimated by CEA is for coal based power plants. The cost of power plant assumed by CEA is Rs. 40 million per MW capacity. This is on the higher side and thermal power plants can be installed at a lesser cost. This would reduce the cost of power generation from thermal power plant based on coal. Also, KSPCL would use char from the kiln along with coal and this would further reduce the cost of generation further. Char is a residual waste from DRI kilns. *Source: Central Electricity Authority*	~ Rs 5.96/kWh *Source:* *Central Electricity Authority*

Based on the above information it is evident that "Import of electricity from the grid" requires the minimum investment. Coal based power plant is also a feasible option due to low cost of power generation compared to that based on Diesel and this makes it the best option available for meeting power requirement in its plant. The DRI kilns also generate a lot of char that has fuel properties and can be used along with coal in a coal based power plant. This would help in further reduction in cost of power generation. This makes the coal based power generation the most sought after choice for power generation at the KSPCL site too. Hence a coal based power generation is the baseline option in the absence of project activity.

However as grid based power has lower emission factor as compared to coal based power generation, adopting conservative approach to estimation of emission reduction "Import of electricity from the grid" has been considered as the baseline scenario in this project activity, which is Option 2 as per the methodology ACM0004.

B.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered CDM project activity (assessment and demonstration of additionality): >>

Additionality of the project activity is determined based on **Tool for the demonstration and assessment of additionality** (version 03/ EB29).

This document provides for a step-wise approach to demonstrate and assess additionality. These steps include:

1. Identification of alternatives to the project activity;
2. Investment analysis to determine that the proposed project activity is not the most economically or financially attractive;
3. Barriers analysis;
4. Common practice analysis; and
5. Impact of registration of the proposed project activity as a CDM project activity.

Step 1. Identification of alternatives to the project activity consistent with current laws and regulations

Sub-step 1a. Define alternatives to the project activity:
As explained in section B.4 following are considered plausible alternatives to proposed project activity:

1. The proposed project activity not undertaken as a CDM project activity
2. Import of electricity from the grid as continuation of current scenario
3. Captive power generation based on coal
4. Captive power generation based on diesel

Sub-step 1b. Enforcement of applicable laws and regulations:
All the alternatives listed as above are well in line with the regulatory requirements of the state and central authority in India and neither of these is prohibited from prevailing rules and regulations. Thus, all the alternatives qualify for the next step of the tool.

However, in section B.4 these alternatives have been analysed and as a conservative approach to estimation of emission reduction in the project activity, import of grid power has been selected as the baseline scenario.

Step 2: Investment Analysis
At this step it has been determined whether the project activity is economically or financially viable and attractive without the sale of Certified Emissions Reduction (CER). Project developer has done comparison of levelized cost of electricity generation in Rs./kWh for WHRB (project activity) with that in a coal/char based AFBC system.

<u>Information & assumptions for WHRB:</u>
Capital Cost: Rs 4800 Lacs (Including Plant & machinery and Building & civil works, however Contingency and Margin money for working capital are not included)
Debt/Equity Ratio: 3:1
Power Generation: 80% Plant load factor
Expected return on equity: 16% (this is return which Govt of India guarantees for Independent Power producers (IPPs) in India.
O&M: 3.5% of capital cost
Debt details: 11.50%

SN	Parameters	Waste heat recovery based power generation	Coal based power generation	Remarks
1	Levelized cost of power generation	Rs 1.97 (including variable cost, depreciation, interest payments, minimum demand charges paid for grid connection)	Rs 1.56/ unit[3] The cost of power generation will still go down due to utilization of char (a by-product from DRI kilns having fuel properties).	Power generation using waste heat is not the most economical option available to KSPCL.
2	Sensitivity of power generation cost based on 5% increase in PLF	Rs 1.85		Cost of power generation is still much higher than coal based power.
3	Sensitivity of power generation cost based on 10% decrease in PLF	Rs 1.75		Cost of power generation is still much higher than coal/char based power.

Above analysis shows that power generation using waste heat from DRI kiln is not the most economical option. Cost of per unit power generation from WHRB is higher compared to coal/char because of following reasons

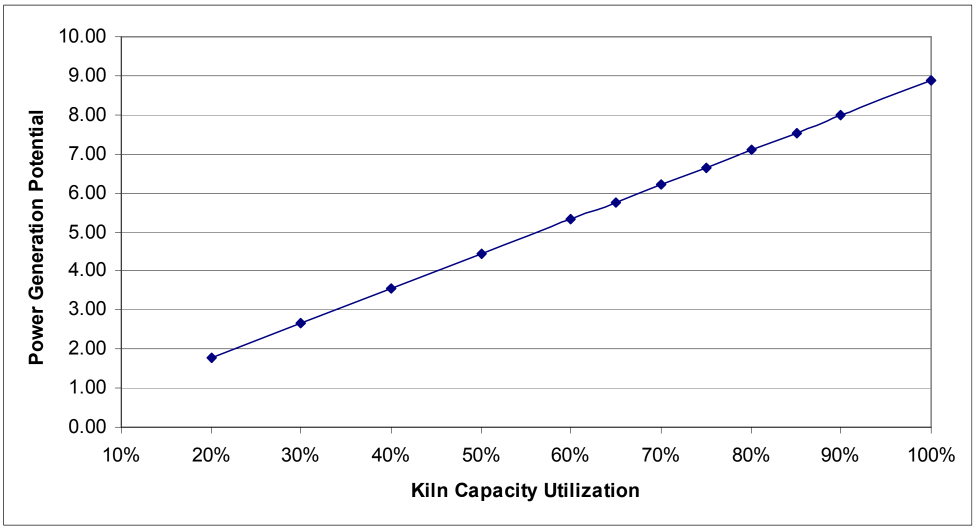
- High capital cost compared to AFBC (4 boilers are required for 4 kilns which further escalates the project cost which is not required for coal based power project because one large size boiler could be utilised for the same, different material/equipments to tackle technical problems associated with waste gas)
- Low plant load factor (due to various factors related to availability of waste gas which in turn depend upon operating performance of DRI kiln, availability related problems described in following sections).

Above analysis demonstrates that project activity is not a financially attractive option even if key assumptions on the basis of which cost/unit has been calculated are changed and is thus additional.

Step 3: Barrier Analysis
The proposed project activity faces a number of barriers to its implementation in current scenario, which have been discussed in the sections below –

Technological barriers
Fluctuating production from kiln
Success of the proposed project activity depends on uninterrupted supply of energy input from waste gases of kilns at consistently high temperatures to waste heat recovery boilers. The graph below shows that how power generation through waste heat recovery changes with change in the flow of waste gases.

[3] Source : Central Electricity Authority expert committee report on cost of power generation



Variation in Power Generation with change in flue gas availability

However, supply of high temperature flue gases depends on continuous operation of kilns. The variation in production from the kiln has direct impact on quantity of coal burned in kiln and hence on the quantum of waste gas generation. Low capacity utilisation of kilns would have direct impact on project's viability. Low capacity utilization of kilns may be linked to operational problems, technological issues and unavailability and quality of raw material for kiln operation. These have been discussed in following sections.

As shown above power generation potential directly depends on kiln capacity utilization. Any direct or indirect aspect which impacts kiln production, impacts negatively power generation from the project activity too.

Raw material un-availability

As per the survey from Joint Plant Committee (JPC) set up by Government of India, major constraints toady faced by sponge iron industry are related to raw material (availability & prices), power and to some extent labour & investments. Management of iron ore for kiln is a major hurdle in successful and continuous operation of kiln. With growing numbers of sponge iron plants, this situation will only become worse affecting small & medium industries more. A feature in Jan 2006 edition of Steel World[4] reports that 70 of 115 units in Chattisgarh went on strike in December 2006 and stopped production due to recurring shortage of iron ore. The scarcity of raw material has a direct impact on price and/ or quality of raw materials and that also makes the entire project risky.

Raw material quality

Availability constraint for raw material has forced industries to opt for iron ore of lesser quality. Quality of iron ore is judged on the basis of Fe content, moisture level and presence of fines in it. Fines in iron ore is not desired as most of the fines escape during reduction process from the kiln and result in more losses & low production. The presence of fines in flue gases also causes problems in WHRB operation. Similarly presence of iron ore with size larger than normal requires more coal. This leads to more load in

[4] http://www.steelworld.com/analysis0106.pdf ; "*Ban on ore exports gaining momentum*"

form of particulate matter in flue gases. Also particulate matter carries some heat of coal and quantum of actual usable energy is reduced at WHRB inlet.

Problems in operation & maintenance[5]

- Handling of high particulate matter laden waste gas from kiln is tricky. High PM level causes erosion and abrasion of mechanical parts which is speeded up at high temperature of these gases. Higher rate of erosion than normal may lead to more frequent changes in mechanical parts/ machinery resulting in more shutdown and/ or breakdown of system.

- Other than erosion of parts, fusion of ash and formation of clinker build up at high temperatures is another area of concern. This phenomenon is called "Accretion". Accretion leads to clinker build up inside the kiln, restricting its opening, which requires frequent cleaning and hence more kiln stoppages or shorter campaign life. Shorter campaign life directly impacts availability of waste gases for power generation in project activity. This is further affected if inferior quality of raw material is used in kiln. The problem is particularly severe to small capacity (100 TPD) kilns with smaller sizes as in the project activity.

- Presence of sulphur aggravates the situation as it restricts the temperature gradient available for utilization. For, if temperature of waste gas is brought below 170 deg C, then possibility of sulphuric acid formation in the system is increased leading to corrosion of vital machinery/ parts in down stream. This keeps a tab on extent of utilization of waste heat in the system in power generation. The presence of moisture at times complicates the situation as it speed up the formation of acid in economiser area. In case of WHRB the economiser life may be affected because of formation of sulphurous and sulphuric acid in economiser.

The above problems associated with kiln operation result in fluctuating production i.e. fluctuating quantum of waste heat availability for steam generation in WHRB. This is specific to WHRB operation only and not the case with coal/ char based FBC boilers or with power drawl from the grid.

Barriers due to prevailing practice

KSPCL would potentially generate ~10MW power in the project activity. Other than auxiliary power consumption (approx. 10% of gross power generation), 2MW would be the power requirement at the sponge iron plant. KSPCL thus would have additional power that can be utilized elsewhere. This power could also be sold to other companies in the neighbourhood but the policies of Tamilnadu Electricity Regulatory Commission (TNERC) prevents third party sale. In case of surplus, power can only be sold to TNEB grid but the power price is less. So, KSPCL had to look for other options and decided to wheel this power to another group unit far off from the project site using state grid. In this case too, wheeling charges are at a staggering 12% of the net power supplied to the grid resulting in reduced return for the surplus power. KSPCL is not allowed to wheel it directly through its own transmission line to the group unit as well.

All these barriers as described above pose many obstacles for such project activity to happen and hence it is not a business-as-usual scenario.

Step 4: Common Practice

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[5] http://www.steelworld.com/technology7.pdf ; "*Sponge Iron Industry – An overview of problems & solutions*"

As per one report[6] conducted by Joint Plant Committee (JPC) constituted by Government of India, the total no of coal based sponge iron plants in India is 147 and gas based sponge iron plants is 3 with a cumulative capacity of 17 million tonnes. Only 16 units out of 147 have existing facilities for captive power generation plant. In Tamilnadu there are 2 sponge iron units[6] and none of these existing sponge iron plants has captive power generation facility based on waste heat recovery. The data is indicative of the fact that despite DRI gas being of no alternative use, sponge iron plants have not opted for power plants due to the barriers as described in sections above. The DRI based power generation plants do face barriers which are real. KSPCL's is one such project activity and is a true case for CDM registration as it is not business-as-usual case.

Step 5: Impact of CDM registration

The registration of the proposed project activity as CDM project would help in covering the risks involved with such projects. This will help in enhancing the viability of project which otherwise is affected by low PLF, unavailability of DRI gas due to shut-down or break-down and other factors. This will also encourage other sponge iron plants in Tamilnadu and on national level to come up with similar power generation plants. This would provide the required impetus to technology providers to further their efforts towards better technology development for the use of DRI kiln gas energy in power generation.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

Project Emissions

Project Emissions are applicable only if auxiliary fuels are fired for generation startup, in emergencies, or to provide additional heat gain before entering the Waste Heat Recovery Boiler.

$$PE_y = \sum_i Q_i \times NCV_i \times EF_i \times \frac{44}{12} \times OXID_i$$

where:

PE_y = Project emissions in year y (tCO_2)

Q_i = Mass or volume unit of fuel *i* consumed (t or m3 or KL)

NCV_i = Net calorific value per mass or volume unit of fuel *i* (TJ/t or m3 or KL)

EF_i = Carbon emissions factor per unit of energy of the fuel *i* (tC/TJ)

$OXID_i$ = Oxidation factor of the fuel *i* (%)

Baseline Emissions

$$BE_{electricity,y} = EG_y \cdot EF_{electricity,y}$$

where:

EG_y = Net quantity of electricity supplied to the manufacturing facility by the project during the year y; MWh

EF_y = CO_2 baseline emission factor for the electricity displaced due to the project activity during the year y; tCO_2/MWh

[6] "*Survey of the Indian Sponge Iron Industry : 2005-06*" by Joint Plant Committee

CO2 baseline emission factor in the baseline scenario is determined to be grid power supply, the Emissions Factor for displaced electricity is calculated as described ACM0002.

Leakage
No leakage is considered.

Emission Reduction

$$ER_y = BE_y - PE_y$$

where:
ER_y = Emission reduction of the project activity during the year y in tons of CO2
BE_y = Baseline emission due to displacement of electricity during the year y in tons of CO2
PE_y = Project emissions during the year y in tons of CO2

Grid Emission Factor
Grid Emission Factor for Southern Grid (Grid in the project activity) has been taken from "CO2 Baseline Database for the Indian Power Sector" – Central Electricity Authority (CEA); Ministry of Power

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

(Copy this table for each data and parameter)

Data / Parameter:	**Left blank with purpose**
Data unit:	
Description:	
Source of data used:	
Value applied:	
Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	

B.6.3 Ex-ante calculation of emission reductions:

Project Emissions:
No fuel requirement for start up in waste heat recovery boiler
hence,
PEy = 0.0 tCO2e/ annum

Baseline Emissions:

Power generation capacity from waste gas = 10 MW
Plant run hours = 7200 per annum (300 * 24)
Load factor = 70 % (For first year)
Auxiliary consumption = 10 %
Grid emission factor = 0.860 tCO_2e/ MWh
Net power generation = 10 X 7200 X 0.70 X (1-0.1) = 45360 MWh per annum

Baseline emissions BEy = 45360 X 0.860 = 39010 tCO_2e per annum

Emissions reduction = 39010 – 0.0 = 39010 tCO_2e per annum

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

Year	Estimation of project activity emissions (tonnes of CO2e)	Estimation of baseline emissions (tonnes of CO2e)	Estimation of leakage (tonnes of CO2e)	Estimation of overall emission reductions (tonnes of CO2e)
2007-08	0	39010	0	39010
2008-09	0	39010	0	39010
2009-10	0	41796	0	41796
2010-11	0	41796	0	41796
2011-12	0	44582	0	44582
2012-13	0	44582	0	44582
2013-14	0	44582	0	44582
2014-15	0	44582	0	44582
2015-16	0	44582	0	44582
2016-17	0	44582	0	44582
Total (tonnes of CO2e)	0	429106	0	429106

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

B.7.1 Data and parameters monitored:

(Copy this table for each data and parameter)

Data / Parameter:	**EG_Y**
Data unit:	MWh
Description:	Net power supplied to manufacturing facility due to waste heat recovery
Source of data to be used:	Plant operation data on power generation in project activity
Value of data applied for the purpose of	45360 (For the first year)

calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	Calculated based on daily gross power generation and auxiliary power consumption in the power generation plant.
QA/QC procedures to be applied:	Refer section B.7.2
Any comment:	

Data / Parameter:	**EG_{GEN}**
Data unit:	MWh
Description:	Gross power generation from project activity
Source of data to be used:	Plant operation data on power generation in project activity
Value of data applied for the purpose of calculating expected emission reductions in section B.5	50400 (For the first year)
Description of measurement methods and procedures to be applied:	Gross power generation is measured directly using energy meter installed at the site. Frequency of measurement - Continuous
QA/QC procedures to be applied:	Energy meter is calibrated as per schedule.
Any comment:	

Data / Parameter:	**EG_{AUX}**
Data unit:	MWh
Description:	Auxiliary power consumption in project activity
Source of data to be used:	Plant operation data on power generation in project activity
Value of data applied for the purpose of calculating expected emission reductions in section B.5	5040 (at 10% of gross power generation)
Description of measurement methods and procedures to be applied:	Auxiliary power consumption in the project activity is measured directly. Frequency of measurement - Continuous
QA/QC procedures to be applied:	Energy meter is calibrated as per schedule.
Any comment:	

Data / Parameter:	**$EF_{electricity,y}$**
Data unit:	tCO2/ MWh
Description:	CO_2 baseline emission factor for the electricity displaced due to the project activity in year y
Source of data to be used:	"CO2 Baseline Database for the Indian Power Sector" – Central Electricity Authority (CEA); Ministry of Power
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.86
Description of measurement methods and procedures to be applied:	The combined margin has been estimated following the guidelines described in ACM0002, version 06. This is reliable data as it has been estimated by Central Electricity Authority, which has access to data on power generation from all the power plants in a grid and is therefore reliable. Frequency of monitoring: Yearly
QA/QC procedures to be applied:	Not required
Any comment:	

Data / Parameter:	**$EF_{OM,y}$**
Data unit:	tCO2/ MWh
Description:	CO_2 Operating Margin emission factor for the grid
Source of data to be used:	"CO2 Baseline Database for the Indian Power Sector" – Central Electricity Authority (CEA); Ministry of Power
Value of data applied for the purpose of calculating expected emission reductions in section B.5	1.00
Description of measurement methods and procedures to be applied:	The operating margin has been estimated following the guidelines described in ACM0002, version 06. This is reliable data as it has been estimated by Central Electricity Authority, which has access to data on power generation from all the power plants in a grid and is therefore reliable. Frequency of monitoring: Yearly
QA/QC procedures to be applied:	Not required
Any comment:	

Data / Parameter:	**$EF_{BM,y}$**
Data unit:	tCO2/ MWh
Description:	CO_2 Build Margin emission factor for the grid
Source of data to be used:	"CO2 Baseline Database for the Indian Power Sector" – Central Electricity Authority (CEA); Ministry of Power
Value of data applied	0.72

for the purpose of calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	The combined margin has been estimated following the guidelines described in ACM0002, version 06. This is reliable data as it has been estimated by Central Electricity Authority, which has access to data on power generation from all the power plants in a grid and is therefore reliable. Frequency of monitoring: Yearly
QA/QC procedures to be applied:	Not required
Any comment:	

B.7.2 Description of the monitoring plan:

KSPCL has procedure for monitoring and recording of data on operation & maintenance of the plant/ equipments. The equipments/ instruments used for CDM project are also part of the procedures and records on maintenance and rectification done on all the equipments are maintained.

Various departments at KSPCL are headed by respective HOD (Head of Department) supported by shift-in-charges & support staff. Departments are mainly divided into projects, mechanical, electrical & instrumentation, production, QC and administration. Mechanical & electrical department are responsible for the overall upkeep of plant, plant machinery and instruments.

Mr. Sunil Patodia-Managing Director is responsible for the overall functioning of the sponge iron plant. KSPCL proposes adoption of following procedures to assure the completeness and correctness of the data needed to be monitored for CDM project activity.

Formation of CDM Team:
A CDM project team is constituted with participation from relevant sections. This team is responsible for data collection and archiving. This team will periodically review CDM project activity, check data collected, emissions reduced etc. On a monthly basis, the monitoring reports will be checked and discussed by the senior CDM team members. In case of any irregularity observed by any of the CDM team members, it will be informed to the concerned person for necessary actions. Further these reports will then be forwarded to the management monthly basis.

- *Unit Head:* Overall responsibility of compliance with the CDM monitoring plan.
- *Power plant In-charge:* Responsibility for completeness of data, reliability of data (calibration of meters), and monthly report generation
- *Shift In-charge:* Responsibility of data monitoring & recording

Day to day data collection and record keeping:
Plant data will be collected on operation under the supervision of the respective Shift-in-charge and record is kept in daily logs.

Reliability of data collected-
The reliability of the meters is checked by testing the meters on yearly basis. Documents pertaining to testing of meters are maintained.

Frequency-
The frequency for data monitoring is as per the monitoring details in Section B.7.1 of the document.

Archiving of data-
Data shall be kept for two years after the crediting period (total 12 years)

Checking data for its correctness and completeness:
The CDM team is overall responsible for checking data for its completeness and correctness. The data collected from daily logs is recorded after verification from respective departments.

Calibration of instruments:
KSPCL has procedures defined for the calibration of instruments. A log of calibration records is maintained. Electrical & Instrumentation department in the company is responsible for the upkeep of instruments in the plant.

Maintenance of instruments and equipments used in data monitoring:
The process department is responsible for the proper functioning of the equipments/ instruments and informs the concerned department for corrective action if found not operating as required. Corrective action is taken by the concerned department and a report on corrective action taken is maintained as done time to time along with the details of problems rectified.

Emergency preparedness
The project activity does not lead to any unintentional emissions. So, there is no need for any emergency preparedness in project activity.

Report generation on monitoring:
After verification of the data and due diligence on correctiveness if required an annual report on monitoring and estimations shall be maintained by the CDM team and record to this effect is maintained for verification.

B.8 Date of completion of the application of the baseline study and monitoring methodology and the name of the responsible person(s)/entity(ies)

Date: 20/12/2006

Sunil Patodia – Managing Director
Kamachi Sponge & Power Corporation Limited (Also a project participant)
21, Jones Street, II Floor
Chennai, Tamilnadu-600 001, India
Phone: 044-25234393/ 25230394
Fax: 044-25234393
Mobile: 098410 13844

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:

21/11/2005

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

25 years

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

C.2.1. Renewable crediting period

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

NA

C.2.1.2. Length of the first crediting period:

NA

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

01/07/2007

C.2.2.2. Length:

10 years

SECTION D. Environmental impacts

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

An Environment Impact assessment study for the project was done. The impact of project activity was considered on the environment.

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

Aspects	Assessment Description	Impacts
Water environment	The wastewater generated shall be treated to meet stipulated standards of State Pollution Control Board. Zero discharge of wastewater from the proposed project will be implemented by recycling treated waste for cooling, dust suppression and green belt development.	No adverse impact envisaged
Air environment	The changes in baseline ambient air quality status with respect to SPM, SO_2 and NOx are expected to be negligible in the region due to the proposed activities. The levels of air pollutants will not exceed the stipulated standards of Central/ State Pollution Control Board in the region. The development of green belt shall reduce impact due to proposed activity.	No adverse impact envisaged
Land environment	There will not be any change in the existing landscape, as the proposed activities are within the facilities of Sponge Iron plant. The ash generated form proposed power plant will be disposed appropriately without deteriorating environment.	Development of green belt will reduce any adverse impact.
Noise environment	The impact of noise generated from process units on the neighboring population is expected to be insignificant. The noise exposure to the workers shall not exceed the stipulated limits with proper noise mitigation measures. The increase in noise level due to transportation activities would be insignificant.	No adverse impact
Socio-economic environment	Adverse impact on socio-economic component within the impact zone would be insignificant due to proposed project. Due care will be taken from the planning stage of proposed sponge iron production unit for mitigation of occupational health along with necessary social welfare activities in the surrounding villages. The project	No adverse impact

	will provide employment opportunities to local population.	

SECTION E. Stakeholders' comments

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

Stakeholder consultation is carried out at different levels to cover a wide section of stakeholders. Local people, local government authorities and pollution control board were identified as stakeholders to project activity. KSPCL invited local people to attend a general meeting. An advertisement was also published on the project activity requesting people to give their suggestions/ comments. Local gram panchayat was reached and a letter requesting a meeting with Commissioner-Gummidipoondi Panchayat on project activity was sent. District Collector - Thiruvallur was also sent a letter with details of project activity with a request for discussion on project activity.

E.2. Summary of the comments received:

Meeting with general public was held at KSPCL plant premises. Project activity was first explained and how it would help in better environment conditions in and around the area. The impact of the project activity due to reduction in emissions of greenhouse gases was also discussed. People enthusiastically participated in the proceedings and congratulated KSPCL for doing the good work.

Summary of Meeting held with stakeholders for the project activity –

Meeting was attended by Panchayat President, Ward member and other people of the region. Mr. Vinod Kothari – Director represented KSPCL. Mr. Ramamoorthy Manager welcomed all and explained the advantages of project activity on society and its environment. A brief of queries raised by the participants are as follows –

Q 1: Whether the Government of Tamilnadu support the WHR Power Projects. What are your personal interests in the project?

A 1: Yes. The government of Tamilnadu very much support the Project as the setting up the project, controls the emission of waste heat and used for power generation. The environment is protected from pollution.

Q 2: What are advantages to the general public?
A 2: Project provides employment opportunities to the people. And also help in assisting total power needs of the region. Greenhouse gases are not let out in the atmosphere and pollution is controlled.

Q 3: If the Government approvals are required for the project?

A 3: Yes. The approvals for setting up the facility have been obtained.

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

Project activity from KSPCL received no negative comment from any of the stakeholders consulted. The participants appraised the project and suggested that some more companies should come forward to install such projects.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Kamachi Sponge & Power Corporation Limited
Street/P.O.Box:	21, Jones Street
Building:	II Floor
City:	Chennai
State/Region:	Tamilnadu
Postfix/ZIP:	600 001
Country:	India
Telephone:	044-25234393/ 25230394
FAX:	044-25234393
E-Mail:	
URL:	
Represented by:	
Title:	Managing Director
Salutation:	Mr.
Last Name:	Patodia
Middle Name:	
First Name:	Sunil
Department:	
Mobile:	91-98410 13844
Direct FAX:	044-25272110
Direct tel:	044-25234393/ 25230394
Personal E-Mail:	eandcc@gmail.com; glkotari@vsnl.com

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding from Annex 1 and / or ODA for the project activity.

Annex 3

BASELINE INFORMATION

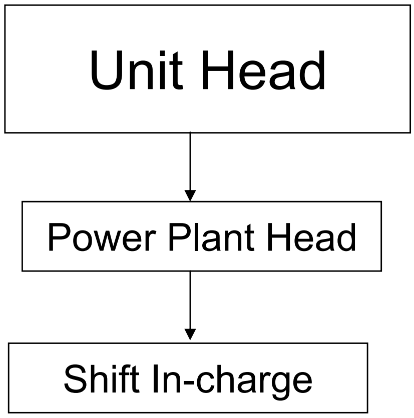
Grid emission factor for the Southern Grid is taken as suggested in "**CO2 Baseline Database for the Indian Power Sector"** by Central Electricity Authority (CEA), Ministry of Power, Government of India.

The value for Combined Margin for Southern Grid (grid in the project activity) is given as 0.860 tCO_2e/ MWh.

Annex 4

MONITORING INFORMATION

Organization Structure:



Details of monitoring plan are given in section B.7.2 of this document.

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