CLEAN DEVELOPMENT MECHANISM
SIMPLIFIED PROJECT DESIGN DOCUMENT
FOR SMALL-SCALE PROJECT ACTIVITIES (SSC-CDM-PDD)
Version 02

CONTENTS

Revision history of this document

Version Number	Date	Description and reason of revision
01	21 January 2003	Initial adoption
02	8 July 2005	• The Board agreed to revise the CDM SSC PDD to reflect guidance and clarifications provided by the Board since version 01 of this document. • As a consequence, the guidelines for completing CDM SSC PDD have been revised accordingly to version 2. The latest version can be found at <http://cdm.unfccc.int/Reference/Documents>.

SECTION A. General description of the small-scale project activity

A.1. Title of the small-scale project activity:

>> Energy Efficiency Improvement in Electric Arc Furnace at Indian Seamless Metal Tube Limited (ISMT), Jejuri, Maharashtra.

Version: 01

Date: 05/06/2006

A.2. Description of the small-scale project activity:

>>

Purpose:

ISMT limited has an 'Electric arc furnace' (EAF), used for melting of iron. The purpose of project activity is to improve the energy efficiency of electric arc furnace by installing a high efficiency CoJet[1] burner in the electric arc furnace. CoJet gas injection system (burner) is a state-of-the-art oxygen injection system that improves productivity of electric arc furnace (EAF) operations. The CoJet burner technology provides a safe, easy operation method for lancing/decarburization, post-combustion, and burner operation in a single, integrated system using oxygen. The CoJet burner has improved the energy efficiency of the electric arc furnace, thus contributing to reduced GHG emissions.

Salient Features of the Project:

The project consists of reducing green house gas emissions (GHG's), by installing a high efficiency CoJet injection system in the electric arc furnace (EAF) at ISMT. The project uses, the combination of both electric energy and thermal energy (Liquefied Petroleum Gas (LPG) in the electric arc furnace.

Prior to the project activity, energy required for melting in the electric arc furnace was provided by electricity only. Also the oxygen and carbon injection for lancing, was by manual method.

Due to high efficiency of CoJet burner & oxygen and carbon injection as compared to the earlier arrangement, the project has resulted in reduction in the overall energy requirement for the electric arc furnace, thus reducing the net GHG emissions to the atmosphere.

View of project participants on the contribution of the project activity to sustainable development:

ISMT ltd which is the owner of the project activity, believes that the project activity has contributed and has further potential to shape the economic, environmental and social[2] life of the people in the region.

Social well being:

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[1] Cojet is registered name for type of burners manufactured by Praxair.

- Generated employment opportunities for the local people, both during construction and operation phases.

Economical well being:

- The project has created a business opportunity for local stakeholders such as suppliers, manufacturers, contractors etc.

Environmental well being:

- Since, the project uses clean fuel and efficient technology; it is leading to reduce emissions in the environment.
- The project activity is a step towards environmental sustainability by saving exploitation and depletion of a natural, finite and non-renewable resource like coal.

Technological well being:

- The technology selected for the power project is the energy efficient CoJet technology gas injection technology; which is a well proven technology worldwide. In India the CoJet technology is not common in practice. The CoJet supplied by the technology supplier (Praxair) is one of the first in Indian steel sector.

A.3. Project participants:

>>

Table A.1 Project participants of the CDM project activity

Name of Party involved ((host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
India (Host)	Indian Seamless Metal Tube Limited (Private Entity)	No

A.4. Technical description of the small-scale project activity:

>>

The CoJet Injection system consists of two injection burners located in the Furnace cold spots and mounted at the bottom of EAF water cooled panels. The injector assemblies are connected with Oxygen supply, LPG/LDO supply, Carbon injection supply and cooling water. The CoJet Injectors run through a pre-programmed operation cycle during each heat. The system has a proper oxygen and carbon injection system, to avoid water cooling panel puncture due to metal splashing and allow the formation of proper

[2] Ministry of Environment and Forest web site: http://envfor.nic.in/cdm/host_approval_criteria.htm

foamy slag. Due to highly accurate injection of Oxygen and carbon in the furnace at specific process stages higher energy efficiency is achieved.

A.4.1. Location of the small-scale project activity:

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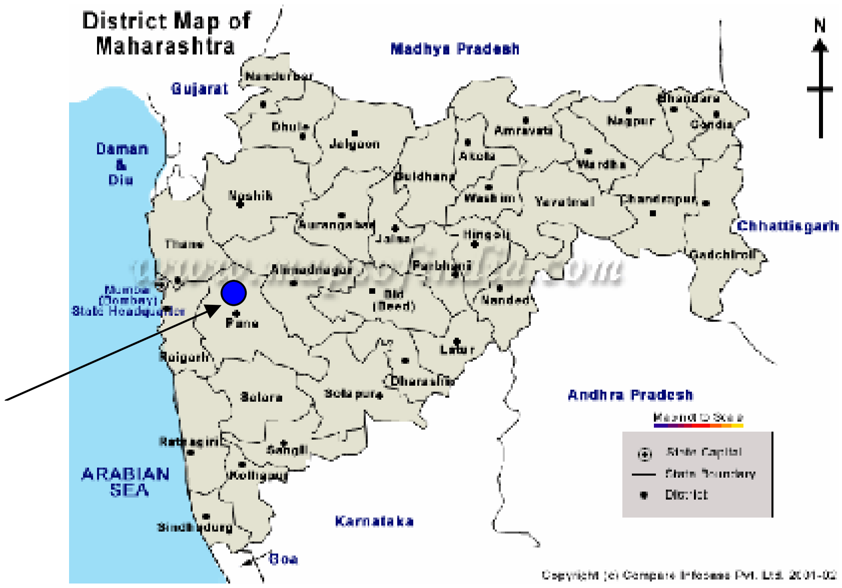


ISMT,
Jejuri

A.4.1.1. Host Party(ies):

>> India

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

>> Maharashtra

A.4.1.3. City/Town/Community etc:

>>Jejuri, Pune

A.4.1.4. Detail of physical location, including information allowing the unique identification of this small-scale project activity(ies):

>> The project activity is located in village Kolvihire in Jejuri industrial area, Pune. The latitude and longitude of Jejuri are 18.2833 (18^0 16' 60N) and 74.1667 (74^0 10' 0E) respectively. The detailed location of site is given in the table below:

Table A.2 Location of CDM project activity

Place	Village Kolvihire
Post Office	Jejuri
Dist.	Pune
Pin	412303
State	Maharashtra
Country	India

A.4.2. Type and category(ies) and technology of the small-scale project activity:

>> The project activity is a small scale potential CDM project, which fits under the Category 4: 'Manufacturing Industries' as per 'List of Sectoral Scopes' available in UNFCCC website. As per Appendix B of the simplified modalities and procedures for small scale CDM project activities, the small scale methodology AMS II.D i.e. "Type II – Energy efficiency improvement projects of Category II.D – Energy efficiency and fuel switching measures for industrial facilities" has been selected for the project as it meets the following requirements:

1. The project activity is an energy efficiency project implemented at a single industrial facility.
2. The energy efficiency measure involves installation of a CoJet burner aimed primarily to improve energy efficiency of Electric Arc Furnace.
3. The maximum electrical energy saving in the project activity is approximately 6 GWh_e/year which is below the limit of 15 GWh_e as specified in the methodology AMS II.D.

As explained above, the project activity meets all the applicability criteria of the methodology as well as the stipulations of small scale projects.

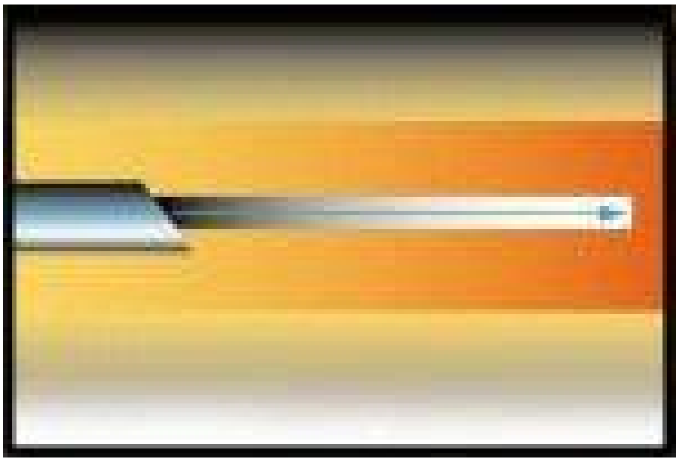
Technology Used

CoJet[3] Gas Injection Technology supplied by Praxair is a state-of-the-art oxygen injection system that improves productivity of Electric Arc Furnace (EAF) operations. The technology provides a safe, easy method for lancing/decarburization, post-combustion, and burner operation in a single, integrated system using oxygen.

Process

A process and injector nozzle delivers a 3- to 5-foot (0.9-1.5 meters) laser-like coherent jet of oxygen at supersonic speeds into the molten bath. The fixed, wall-mounted injector nozzle retains the original diameter and velocity of the oxygen jet, delivering precise amounts of oxygen to the steel bath with less cavity formation and splash compared to traditional manipulators. Once the oxygen jet impinges on the steel bath, the concentrated momentum of the oxygen beam dissipates in the steel as fine bubbles, providing deep penetration and effective slag-metal mixing. The nozzle also operates as a conventional sidewall burner to melt scrap and as a supplemental oxygen source for post-combustion, improving furnace productivity and decreasing power consumption. The indicative diagram of CoJet burner is given below:

CoJet Burner



The salient features of technology are as below:

1. Improves productivity of Electric Arc Furnaces (EAFs), Lower power consumption, extended furnace life, and decreased maintenance
2. Provides lancing, decarburization, and burner operation in an integrated, wall-mounted system
3. Totally eliminates the need for lance manipulators
4. Decreases refractory erosion, arc flare damage, and maintenance gunning
5. Decreases splashing and improves slag-metal stirring
6. Speeds decarburation and enhances slag foaming

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3 http://www.praxair.com/praxair.nsf/7a1106cc7ce1c54e85256a9c005accd7/bb48e958d6a287d9852569e500552e5e?OpenDocument

7. Allows for automatic furnace operation

A.4.3. Brief explanation of how the anthropogenic emissions of anthropogenic greenhouse gas (GHGs) by sources are to be reduced by the proposed small-scale project activity, including why the emission reductions would not occur in the absence of the proposed small-scale project activity, taking into account national and/or sectoral policies and circumstances:

>> The project activity aims at installation of CoJet burner in Electric Arc Furnace, which uses a combination of electrical and chemical energy from LPG/LDO. Prior to the project activity, only electrical energy was used in Electric Arc Furnace.

Due to installation of CoJet burner project activity has reduced the electricity consumption to great extent. The project activity reducing the net energy consumption per ton of liquid metal produced.

There are no current regulations for improving energy efficiency in the Electric Arc Furnace. Also no such regulations are envisaged to come in place in near future. The project proponent has implemented the project activity over and above the national and sectoral policies prevalent at this point of time. In the absence of project activity, higher electric energy would have been consumed in the furnace, resulting in higher emissions to the atmosphere. The project activity has resulted in to net decrease in GHG emissions related with Electric Arc Furnace amounting to 28.3 kg CO_2 per ton of liquid metal produced as compared to the pre project scenario.

A.4.3.1 Estimated amount of emission reductions over the chosen crediting period:

>> The estimated emission reductions for the chosen period of 10 years would be 68,160 tons CO_2.

Table A.3: Estimated emission reduction

Years	Annual estimation of emission reductions in tones of CO2eq
2006 (1st August to 31st December)	2840
2007	6816
2008	6816
2009	6816
2010	6816
2011	6816
2012	6816
2013	6816
2014	6816
2015	6816
2007 (1st January 31st July)	3976
Total estimated	**68160**

reductions (tCO2e)	
Total no of crediting years	**10**
Annual average over the crediting period of estimated reductions (tones of CO2 e)	**6816**

A.4.4. Public funding of the small-scale project activity:

>> No public funding is available for the project from countries included in Annex 1.

A.4.5. Confirmation that the small-scale project activity is not a debundled component of a larger project activity:

>> The proposed small-scale project activity is not a debundled component of a large project activity since there is no registered small-scale CDM project activity or an application to register another small-scale CDM project activity.

- With the same project participants
- In the same project category and technology/measure.
- Registered within the previous 2 years
- Whose project boundary is within 1 km of the project boundary of the proposed small-scale activity at the closest point.

SECTION B. Application of a baseline methodology:

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

>>

Title: Small scale methodology AMS. II.D

Type II. Energy efficiency improvement projects.

Category D - Energy efficiency and fuel switching measures for industrial facilities.

Reference: Paragraph '3 and 4' as provided in Type II.D of Appendix B of the simplified modalities and procedures for small-scale CDM project activities - Indicative Simplified Baseline and Monitoring Methodologies for Selected Small-Scale CDM Project Activity Categories.

B.2 Project category applicable to the small-scale project activity:

>> The project activity is a small scale potential CDM project, which fits under the Category 4: 'Manufacturing Industries' as per 'List of Sectoral Scopes' available in UNFCCC website.

As per Appendix B of the simplified modalities and procedures for small scale CDM project activities, the small scale methodology AMS II.D i.e. "Type II – Energy efficiency improvement projects of Category II.D – Energy efficiency and fuel switching measures for industrial facilities" has been selected for the project as it meets the following requirements:

1. The project activity is an energy efficiency project implemented at a single industrial facility.
2. The energy efficiency measure involves installation of a CoJet burner aimed primarily to improve energy efficiency of Electric Arc Furnace.
3. The maximum thermal energy saving in the project activity is 9 GWh_e which is below the limit of 15 GWh_e as specified in the methodology AMS II.D.

As explained above, the project activity meets all the applicability criteria of the methodology as well as the stipulations of small scale projects. The emission reductions will be calculated based on the total heat input to Electric Arc Furnace. Following parameters will be monitored to arrive at the baseline emissions for the project activity:

Table B.1 Parameters used to determine baseline for the project activity

Sl No	Parameters used to determine baseline	Unit	Remarks
1	Liquid Metal Production	Ton/year	Monitored/calculated continuously

			reported monthly
2	Power Consumption of Electric Arc Furnace for liquid metal produced	kWh	Monitored continuously reported monthly
3	Auxiliary Power Consumption of Electric Arc Furnace for liquid metal produced	kWh	Monitored continuously reported monthly
4	O_2 consumption at EAF for liquid metal produced	SCM	Monitored continuously reported monthly
5	Specific Power consumption for O_2 production	kWh/SCM	Monitored/calculated continuously reported monthly

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 small-scale CDM project activity:

>>

In accordance with paragraph 7 of the simplified modalities and procedures for small-scale CDM project activities, a simplified baseline and monitoring methodology listed in Appendix B may be used for a small-scale CDM project activity if project participants are able to demonstrate to a designated operational entity that the project activity would otherwise not be implemented due to the existence of one or more barrier(s) listed in Attachment A of Appendix. B which are as below:

- Investment barrier
- Technological barrier
- Barrier due to prevailing practice
- Other barriers

The implementation of the project activity is a voluntary step undertaken by project promoter with no direct or indirect mandate by law.

The main driving factors to this 'Climate change initiative' are:

- Reduction in the use of fossil fuel quantities on account of better efficiencies
- GHG reduction due to lesser use of fossil fuels

The project proponent was aware of the various barriers associated to project implementation but it was realised that the availability of carbon financing against a sale consideration of carbon credits (generated due to project activity) would help to overcome these barriers. Some of the key barriers faced by the project proponent for the project activity are discussed below:

Technological Barriers

The technology used for the project activity is one of the firsts of its kind in India steel industry. ISMT has taken a bold step of trying a new technology, with very few credentials of successful operation available in

India. The technology is patented by the technology supplier Praxair metal technologies, USA. While going for new technology in the plant, ISMT had also identified following risks/barriers.

1. **Failures of water cooled panels:** In EAF the side walls are a network of water cooled panels. The CoJet system primarily is about installing the burners in these water cooled panels. The burners themselves are water cooled, therefore ISMT have a situation where additional water cooling was essential for these burners. The extreme heat generated by the flame can cause damage to either the burner or the panel housing it. In the absence of CoJet, the situation of concentrated heat flux close to the water cooled panels does not exist. In project activity scenario the water which is circulated at considerable pressure and high flow will make its ingress into the furnace in case of failure. If risk is not managed properly (which has been managed well by ISMT), this could damage the refractory lining of the furnace and in case there is liquid metal inside, it would have led to serious accidents.
2. **Poor Delta Life:** The delta is a refractory component mounted in the middle of the water cooled roof of EAF. As the electrodes are carrier of electricity, the area around the electrodes should not be conductive as this can lead to localized arcing due to lateral vibratory movement of electrodes. The delta which is a refractory, prevents such localized arcing and subsequent damage in case of a contact. As the CoJet technology will lead to more exhaust gases at considerable temperatures, the erosion of this delta is likely to be higher. Therefore the service life of this refractory component was expected to fall. If this would have happened, delta had to be replaced increasing the cost of the refractory as well as down-time require to carry out the installation. But this risk has been duly taken care of by ISMT.
3. **Handling of LPG:** Project activity requires use of LPG in the operation. Project proponent was not aware of handling and use of large volume of liquid gas. This risk was envisaged before the starting of the project activity and therefore the due efforts have been put by ISMT to mitigate the risk.

Barriers due to prevailing practices

Adaptation of entirely new technology is challenging in all respects. At the decision stage itself the project proponent had anticipated the problems from the operators about the adoption and operation of new equipment which could last for entire initial phase of operation. The barriers of new technologies were well proven by following incidents subsequent to installation of CoJet.

- the equipment did not work properly during initial phase.
- there were number of shutdown in plant due to improper operation of the equipment.
- operators were not ready to operate CoJet equipment.

In any adverse situation when CoJet burner is not in operation it has to be taken out from assembly. It generally takes 15 min time but reinstallation of the burner takes 30 min to 4 hrs. This also reduces the interest of operators in new technology.

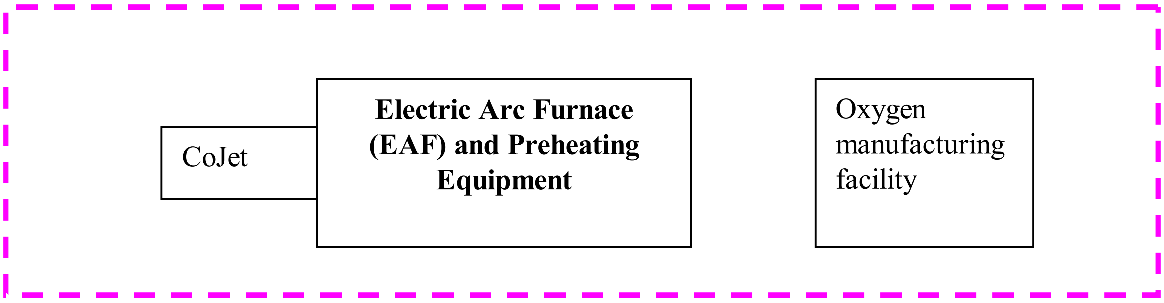
Project proponent organized training with technology supplier for better understanding of operation. Technology supplier visited many a times to the plant for the problems related with the equipment.

Other Barriers as perceived before taking decision on implementation of project

1. **Less Software Knowledge:** The technology supplier has given only operating technology of the software installed with the CoJet burner. Any problem in the software requires addressal by technology supplier and therefore incurs to loss in plant operation.
2. **Availability of suitable resource:** For the technology there is very less number of technical resources available. Therefore any problem in the equipment cause for calling the technology supplier and loss.
3. **Specific requirements of other resources:** The technology has very specific requirement for LPG and oxygen. The quantity of oxygen required is about 1100 m^3/hr, which required a big infrastructure to be built up by Oxygen supplier in the plant area.. of the infrastructure for LPG tank and piping was required because by providing cylinders fleet, the availability of LPG at right time was endangered. It was envisaged that the installation of CoJet would increase dependency on the plants from other suppliers.

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

>> As per the methodology used, the project boundary is the physical, geographical site of the industrial facility, processes or equipments that are affected by the project activity. The boundary for the project includes the electric arc furnace and the CoJet burner along with the pre heating equipment used prior to the electric arc furnace at ISMT plant site. Apart from this, the oxygen plant also comes in project boundary because quantity of oxygen used is different in pre and post project scenario.



B.5. Details of the baseline and its development:

>>

Date for completion of the baseline study: 05/06/2006

The baseline has been prepared by ISMT ltd. and its associated consultants.

Contact information: Indian Seamless Metal Tube Limited, Jejuri Morgaon Road, Vill. Kolvihire, P.O. Jejuri – 412303, Pune, Maharashtra, India. The entity is a project participant listed in Annex I.

SECTION C. Duration of the project activity / Crediting period:

C.1. Duration of the small-scale project activity:

>>

C.1.1. Starting date of the small-scale project activity:

>> April 2004

C.1.2. Expected operational lifetime of the small-scale project activity:

>> 20 years 0 months

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

>> Fixed crediting period has been considered for the project activity.

C.2.1. Renewable crediting period:

>> Not Applicable.

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

>> Not Applicable.

C.2.1.2. Length of the first crediting period:

>> Not Applicable.

C.2.2. Fixed crediting period:

>>

C.2.2.1. Starting date:

>> 01/08/2006

C.2.2.2. Length:

>> 10 years 0 months

SECTION D. Application of a monitoring methodology and plan:

>>

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

>>

Title: Monitoring Methodology for the category II D – Energy efficiency and fuel switching measures for industrial facilities.

Reference: ‘Paragraph 6 to 8’ as provided in Type II.D of Appendix B of the simplified modalities and procedures for small-scale CDM project activities - Indicative Simplified Baseline and Monitoring Methodologies for Selected Small-Scale CDM Project Activity Categories.

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

>> As established in Section A.4.2 and B.2, the project activity falls under Category II.D. The project activity proposes to replace part of electrical energy used in EAF with chemical energy of LPG/LDO, thereby improving the overall energy efficiency of EAF. The improved efficiency has resulted in reduced consumption of fossil fuels and reducing the GHG emissions to the atmosphere related with the activity.

GHG emission mitigation due to the project activity will be monitored by monitoring electricity and fuel consumption in EAF in both the pre-project and project scenarios, representing baseline and project emissions respectively. The difference in the baseline emissions and project emissions would be the emission reductions from the project activity.

D.3 Data to be monitored:

>>

ID number	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
Monitoring parameters during project activity								
P.1	Liquid Metal Production	Plant Records	Ton/year	*Monitored & Calculated*	*Monthly*	*100%*	electronic/ paper	*Weigh bridge*
P.2	Power Consumption of Electric Arc Furnace	Plant Records	kWh	*Monitored*	*Monthly*	*100%*	electronic/ paper	*Electronic meter*
P.3	Auxiliary Power Consumption of Electric Arc Furnace	Plant Records	kWh	*Monitored*	*Monthly*	*100%*	electronic/ paper	*Electronic meter*
P.4	O_2 consumption at EAF	Plant Records	SCM	*Monitored*	*Monthly*	*100%*	electronic/ paper	*Flow meter*
P.5	Specific Power consumption for O_2 production	Oxygen Supplier/IPC C	kWh/SC M	*Monitored and estimated*	*Monthly*	*100%*	electronic/ paper	
P.6	Specific LPG/LDO consumption	Plant Records	Kg	*C*	*Monthly*	*100%*	electronic/ paper	*Flow meter*
P.7	Calorific Value LPG/LDO	Plant Records/lab test	kCal/kg	*E*	*Monthly*	*100%*	electronic/ paper	

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	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
Monitoring parameters for baseline case								
B.1	Liquid Metal Production	Plant Records	Ton/year	*Monitored & Calculated*	*Monthly*	*100%*	electronic/ paper	*Weigh bridge*
B.2	Power Consumption of Electric Arc Furnace	Plant Records	kWh	*Monitored*	*Monthly*	*100%*	electronic/ paper	*Electronic meter*
B.3	Auxiliary Power Consumption of Electric Arc Furnace	Plant Records	kWh	*Monitored*	*Monthly*	*100%*	electronic/ paper	*Electronic meter*
B.4	O_2 consumption at EAF	Plant Records	SCM	*Monitored*	*Monthly*	*100%*	electronic/ paper	*Flow meter*
B.5	Specific Power consumption for O_2 production	Oxygen Supplier/IPC C	kWh/SCM	*Monitored and estimated*	*Monthly*	*100%*	electronic/ paper	
B.6	$EF_{OM, y}$	Published data from electricity board	tCO_2/MWh	C	Once at the beginning of the crediting	100%	Electronic	Calculated as Step 1 of ACM0002

ID number	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
					period			
B.7	$EF_{BM, y}$	Published data from electricity board	tCO_2/MWh	C	Once at the beginning of the crediting period	100%	Electronic	Calculated as Step 2 of ACM0002
B.8	$F_{i,y}$	Published data from electricity board	Tonnes	C	Once at the beginning of the crediting period	100%	Electronic	Calculated based on the Total power generation, Average Net Calorific Value of the fuel used and the Designed
B.9	$COEF_i$	IPCC/local	tCO_2/ton of fuel	Standard / calculated	Once at the beginning of the crediting period	100%	Electronic	Calculated based on the IPCC default value of the Emission Factor, Net Calorific Value and Oxidation Factor of the Fuel used by the power plants of the state grid
B.10	$GEN_{j,y}$	Published	MWh /	M	Once at	100%	Electronic	Obtained from

ID number	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
		data from electricity board	annum		the beginning of the crediting period			authentic and latest local statistics

D.4. Qualitative explanation of how quality control (QC) and quality assurance (QA) procedures are undertaken:

>>

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.
P.1	*Low*	*ISO 9001 or similar type of quality system is required.*
P.2	*Low*	*ISO 9001 or similar type of quality system is required.*
P.3	*Low*	*ISO 9001 or similar type of quality system is required.*
P.4	*Low*	*ISO 9001 or similar type of quality system is required.*
P.5	*Moderate*	*ISO 9001 or similar type of quality system is required.*
P.6	*Low*	*ISO 9001 or similar type of quality system is required.*
P.7	*Low*	*ISO 9001 or similar type of quality system is required.*
B.1	*Low*	*ISO 9001 or similar type of quality system is required.*
B.2	*Low*	*ISO 9001 or similar type of quality system is required.*
B.3	*Low*	*ISO 9001 or similar type of quality system is required.*
B.4	*Low*	*ISO 9001 or similar type of quality system is required.*
B.5	*Moderate*	*ISO 9001 or similar type of quality system is required.*

B.6	*Low*	*Published data from government sources*
B.7	*Low*	*Published data from government sources*
B.8	*Low*	*Published data from government sources*
B.9	*Low*	*Published data from government sources*
B.10	*Low*	*Published data from government sources*

D.5. Please describe briefly the operational and management structure that the project participant(s) will implement in order to monitor emission reductions and any leakage effects generated by the project activity:

>> The operational and management structure that will monitor the project activity is described in Fig D.1 below and the monitoring activities and responsibility is also listed in Table D.1 below:

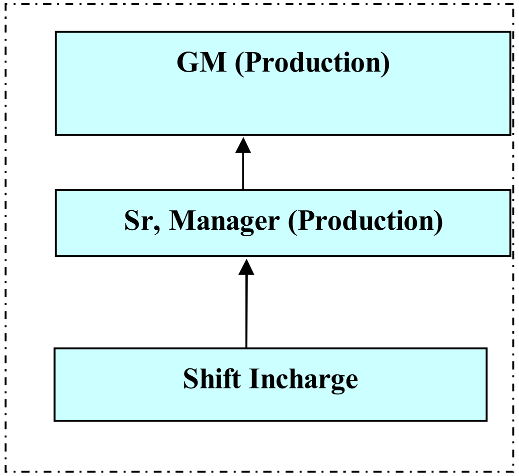


Fig D.1 Organisation structure and responsibility for CDM data gathering and reporting

Table D.1: Monitoring activities and responsibility

Monitoring activities	**Procedure and responsibility**
Data source and collection	ISMT has implemented quality management systems and the data would be collected as per the same.
Frequency	Monitoring frequency would be as per section D.3 of this chapter
Review	All received data would be reviewed by the Sr. Manager (Production)
Data compilation	All the data would be compiled and stored in the CDM cell.
Emission calculation	Emission reduction calculations will be done annually based on the data collected and recorded. Engineers/Executives of CDM cell will do the calculations
Review	Sr. Manager (Production) will review the calculation.
Emission data review	Final calculations would be reviewed and approved by GM (Production)
Record keeping	All calculation and data record will be kept with the CDM cell.

D.6. Name of person/entity determining the monitoring methodology:

>> ISMT and its associated consultants.

SECTION E.: Estimation of GHG emissions by sources:

E.1. Formulae used:

>>

E.1.1 Selected formulae as provided in appendix B:

>> No formula is provided in appendix B.

E.1.2 Description of formulae when not provided in appendix B:

>>

E.1.2.1 Describe the formulae used to estimate anthropogenic emissions by sources of GHGs due to the project activity within the project boundary:

>> The project emission calculation will be done as per the following:

Project emissions (PE)

$$PE = PE_{electricity} + PE_{LPG/LDO} + PE_{O2}$$

Where:

PE = Project emissions (tCO_2/annum)

$PE_{electricity}$ = Emission due to electricity used in the EAF (tCO_2/annum)

$PE_{LPG/LDO}$ = Emissions due to LPG/LDO used in the EAF (tCO_2/annum)

PE_{O2} = Emissions from the O2 used in EAF (tCO_2/annum)

$$PE_{electricity} = SEC_{Electricity} \times EF_{electricity} \times Q_{lmt}$$

$SEC_{electricity}$ = Specific electricity consumed in the EAF (kWh/ton)

$EF_{electricity}$ = Electricity emission factor ($kgCO_2$/KWh)

Q_{lmt} = Quantity of liquid metal produced (tons)

$$PE_{LPG/LDO} = SEC_{LPG/LDO} \times EF_{LPG/LDO} \times Q_{lmt}$$

$SEC_{LPG/LDO}$ = Specific energy consumption through LPD/LDO (GJ/ton of Liquid metal)

$EF_{LPG/LDO}$ = Emission factor of LPG/LDO (IPCC default factor) (kg CO_2/GJ)

$$PE_{O2} = SEC_{O2} \times SOC \times EF_{electricity} \times Q_{lmt}$$

SEC_{O2} = Specific electricity consumption for O2 production (kWh/SCM O_2 Produced)

SOC = Specific oxygen consumption per ton of liquid metal (SCM/ton Liquid metal)

E.1.2.2 Describe the formulae used to estimate leakage due to the project activity, where required, for the applicable project category in appendix B of the simplified modalities and procedures for small-scale CDM project activities

>> Not applicable

E.1.2.3 The sum of E.1.2.1 and E.1.2.2 represents the small-scale project activity emissions:

>> Same as E.1.2.1

E.1.2.4 Describe the formulae used to estimate the anthropogenic emissions by sources of GHGs in the baseline using the baseline methodology for the applicable project category in appendix B of the simplified modalities and procedures for small-scale CDM project activities:

>>

Baseline emissions (BE)								
BE	=	$\mathbf{BE_{electricity}}$	+	$\mathbf{BE_{O2}}$				
Where: BE = Baseline Emissions (tCO_2/annum) $BE_{electricity}$ = Emission due to electricity used in the EAF (tCO_2/annum) PE_{O2} = Emissions from the O2 used in EAF (tCO_2/annum)								
$\mathbf{PE_{electricity}}$	=	$\mathbf{SEC_{Electricity}}$	x	$\mathbf{EF_{electricity}}$	x	$\mathbf{Q_{lmt}}$		
$SEC_{electricity}$ = Specific electricity consumed in the EAF (kWh/ton) $EF_{electricity}$ = Electricity emission factor ($kgCO_2$/KWh) Q_{lmt} = Quantity of liquid metal produced (tons)								
$\mathbf{PE_{O2}}$	=	$\mathbf{SEC_{O2}}$	x	**SOC**	x	$\mathbf{EF_{electricity}}$	x	$\mathbf{Q_{lmt}}$
SEC_{O2} = Specific electricity consumption for O2 production (kWh/SCM O_2 Produced) SOC = Specific oxygen consumption per ton of liquid metal (SCM/ton Liquid metal)								

Calculation of electricity baseline emission factor

The electricity baseline emission factor (EF_y) is calculated as a combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) factors according to the following three steps. Calculations for this combined margin must be based on data from an official source (where available) and made publicly available.

Step 1: Calculate the Operating Margin emission factor(s)

Out of the four methods mentioned in ACM0002, simple OM approach has been chosen for calculations since the low-cost/must run resources constitute less than 50% of the total grid generation in the state grid mix. Simple OM factor is calculated as under.

$EF_{OM,\ simple,\ y}$ is calculated as the average of the most recent three years

$$EF_{OM,simple,y} = \sum_{i,j} F_{i,j,y} \times COEF_{i,j} / \sum_{j} GEN_{j,y} \qquad (1)$$

Where

$COEF_{i,j}$ - is the CO_2 emission coefficient of fuel i (t CO_2 / mass or volume unit of the fuel), calculated as given below and

$GEN_{j,y}$ - is the electricity (MWh) delivered to the grid by source j

$F_{i,j,y}$ - is the amount of fuel i (in a mass or volume unit) consumed by relevant power sources j in year(s) y, calculated as given below
j - refers to the power sources delivering electricity to the grid, not including low-operating cost and must-run power plants, and including imports from the grid
The Fuel Consumption $F_{i,j,y}$ is obtained as

$$\sum_i F_{i,j,y} = \left(\sum_j GEN_{j,y} \times 860 \Big/ NCV_i \times E_{i,j} \right) \quad \textbf{(2)}$$

Where
$GEN_{j,y}$ - is the electricity (MWh) delivered to the grid by source j
NCV_i - is the net calorific value (energy content) per mass or volume unit of a fuel i
$E_{i,j}$ - is the efficiency (%) of the power plants by source j
The CO_2 emission coefficient $COEF_i$ is obtained as

$$COEF_i = NCV_i \times EF_{CO_2,i} \times OXID_i \quad \textbf{(3)}$$

Where
NCV_i -is the net calorific value (energy content) per mass or volume unit of a fuel i
$EFCO_{2,i}$ -is the CO_2 emission factor per unit of energy of the fuel i
$OXID_i$ -is the oxidation factor of the fuel

Step 2: Calculation of the Build Margin emission factor ($EF_{BM,y}$)

It is calculated as the generation-weighted average emission factor (t CO_2/MWh) of a sample of power plants m of grid, as follows:

$$EF_{BM,y} = \sum_{i,m} F_{i,m,y} \times COEF_{i,m} / \sum_m GEN_{m,y} \quad \textbf{(4)}$$

Where

$F_{i,m,y}$, $COEF_{i,m}$ and $GEN_{m,y}$ - are analogous to the variables described for the simple OM method above for plants m.

Considered calculations for the Build Margin emission factor $EF_{BM,y}$ as ex ante based on the most recent information available on plants already built for sample group m of state grid at the time of PDD submission. The sample group m consists of the 20 % of power plants supplying electricity to grid that have been built most recently, since it comprises of larger annual power generation.

Further, none of the power plant capacity additions in the sample group have been registered as CDM project activities.

Step 3: Calculate the electricity baseline emission factor (EF_y)

It is calculated as the weighted average of the Operating Margin emission factor ($EF_{OM, simple, y}$) and the Build Margin emission factor ($EF_{BM, y}$):

$$EF_y = W_{OM} \times EF_{OM,Simple,y} + W_{BM} \times EF_{BM,y} \quad \textbf{(5)}$$

where the weights w_{OM} and w_{BM}, by default, are 50% (i.e., $W_{OM} = W_{BM} = 0.5$), and $EF_{OM, Simple, y}$ and $EF_{BM, y}$ are calculated as described in Steps 1 and 2 above and are expressed in t CO_2/MWh.

$$BE_y = EF_y \times EG_y \quad \textbf{(6)}$$

Where

BE_y - are the baseline emissions due to displacement of electricity during the year y in tons of CO_2

EG_y- is the net quantity of electricity generated by the project activity during the year y in MWh, and

EF_y- is the CO_2 baseline emission factor for the electricity displaced due to the project activity in during the year y in tons CO_2/MWh.

E.1.2.5 Difference between E.1.2.4 and E.1.2.3 represents the emission reductions due to the project activity during a given period:

>> Emission Reduction = Baseline Emission – Project Emission

E.2 Table providing values obtained when applying formulae above:

>>

Years	**Annual estimation of emission reductions in tones of CO2eq**
2006 (1st August to 31st December)	2840
2007	6816
2008	6816
2009	6816
2010	6816
2011	6816
2012	6816
2013	6816

2014	6816
2015	6816
2007 (1st January 31st July)	3976
Total estimated reductions (tCO2e)	**68160**
Total no of crediting years	**10**
Annual average over the crediting period of estimated reductions (tones of CO2 e)	**6816**

SECTION F.: Environmental impacts:

F.1. If required by the host Party, documentation on the analysis of the environmental impacts of the project activity:

>> As per Ministry of Environment & Forests, Government of India notification, the project does not fall under the purview of Environmental Impact Assessment (EIA). Hence, the project proponent has not carried out the same. The project is an environmentally friendly project and reduces the GHG emissions to the atmosphere, resulting in improvement to the local and global environment. However the environmental aspects related with the project activity had been studied and the project does not result in any significant adverse impacts on environment.

Environmental Impact Assessment table

SL. NO.	ENVIRONMENTAL IMPACTS & BENEFITS	REMARKS
A	CATEGORY: ENVIRONMENTAL – AIR QUALITY	
1.	The project activity is using LPG as fuel for EAF. LPG is cleanest fossil fuel, so the activity has reduced the emissions based on the electricity.	The project activity reduces emission of CO_2 -a global entity.
B	CATEGORY: ENVIRONMENTAL –WATER	
1	The project activity does not contribute to water pollution.	
D	CATEGORY: ENVIRONMENTAL – NOISE GENERATION	
1	The project activity does not contribute to noise pollution.	-

SECTION G. Stakeholders' comments:

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

>> Identification of stakeholders

ISMT had organised stakeholder consultation meetings with local stakeholders, employees in the area with the objective to inform the interested stakeholders on the environmental and social impacts of the project activity and discuss their concerns regarding the project activity. Invitation for stakeholder consultation meetings were sent out requesting the members to participate and communicate any suggestions/objections regarding the project activity.

The other stakeholders identified for the project activity were as under:

1. Local population
2. Employees
3. State pollution control board
4. Local administrative body
5. Consultants
6. Equipment suppliers

Stakeholders list includes the government and non-government parties, which are involved in the project activity at various stages. At the appropriate stage of the project development, consulted/would consult stakeholders / relevant bodies to get the comments. The comments received are available on request.

G.2. Summary of the comments received:

>> The summary of the comments received is as under

Local population comprises of the local people in and around the project area. The project does not require displacement of any local population. Project activity will reduce the electricity consumption and thus will be helping to bridge electricity demand supply gap in the host country

Thus, the project will not cause any adverse social impacts on local population. ISMT has already completed the necessary consultation and documented the approval by local population for the project and received positive comments. The village surpanch has appreciated the project proponent about the project activity.

SPCB has prescribed standards of environmental compliance and monitors the adherence to the standards. SPCB have issued Consent to Establish (CTE) and consent to operate (CTO).

Projects consultants were involved in the project activity to take care of the various pre contract and post contract issues / activities like preparation of basic and detailed engineering documents, preparation of tender documents, and selection of vendors / suppliers. They would be further involved in supervision of project operation, implementation, successful commissioning and trial run.

The general comments received are given below:

1. *Plant Employees:*
The project has resulted in betterment of working conditions in the plant.
2. *Local Representative:*
The project helps in reducing pollution to the atmosphere, by reducing energy consumption and using cleaner fuel.

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

>> No adverse comments were received for the project activity

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Indian Seamless Metal Tube Limited
Street/P.O.Box:	Jejuri Morgaon Road, Village Kolvihire
Post Office:	Jejuri
City:	Pune
State/Region:	Maharahtra
Postfix/ZIP:	412303
Country:	India
Telephone:	91 2115/253116/253117/253361
FAX:	91 2115/253040/253362
E-Mail:	ns.natarajan@ismt.co.in
URL:	www.ismt.co.in
Represented by:	
Title:	Assistant General Manager
Salutation:	Mr.
Last Name:	Natarajan
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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding from annex 1 countries are available in the project activity

Enclosure I

Stakeholder comments received for project local administrative body

ISMT Ltd., Steel Division, which is situated in Jejuri, is one of the largest steel producers in this region who specialises in alloy steel for critical applications. It has demonstrated its concern towards environment and social responsibility by installing state of the art technology from Praxair, USA towards reducing electrical power consumption and using clean fuel. This project called CoJet has been successfully implemented and the benefits of the same are seen in the company records. Not only has the power consumption (electrical) has come down but the productivity of the plant has also gone up adding more security and prosperity to this industrial belt. As a representative of the people of this area I strongly appreciate the efforts taken by this company in its innovative approach in implementing new technologies.

Enclosure 2
Reference List

i. Kyoto Protocol to the United Nations Framework Convention for Climate Change (UNFCCC) www.cdm.unfccc.int

ii. Website of CDM India, Ministry of Environment and Forests, Government of India www.cdmindia.nic.in

iii. Website of Maps of India www.mapsofindia.com

Appendix A

List of Abbreviations

AGM	Assistant General Manager
CDM	Clean Development Mechanism
FY	Financial Year
GHG	Green House Gas
ISMT	Indian Seamless Metal Tube
ISO	International Organisation for Standardisation
KWh	Kilo Watt Hour
Lmt	Liquid Metal Tonne
LPG	Liquefied Petroleum Gas
MoEF	Ministry of Environment and Forest
PO	Post Office
QA	Quality Assurance
QC	Quality Control
R&D	Research and Development
SCM	Standard Cubic Metre
UNFCCC	United Nations Framework Convention on Climate Change

Appendix B

Grid Emission Factor

CALCULATION OF GRID EMISSION FACTOR OF WESTERN ELECTRICITY GRID						
Year of offer	**2002-03**		**2003-04**		**2004-05**	
Generation Mix	-	-	-	-	-	
Sector	**MU**	**%**	**MU**	**%**	**MU**	**%**
Thermal Coal Based-Western Region	129253.12	78.47	128817.10	76.17	130461.68	75.97
Thermal Diesel Based-Western Region	0.00	0.00	0.00	0.00	0.00	0.00
Thermal Gas Based-Western Region	18388.84	11.16	21051.40	12.45	25272.47	14.72
Hydro-Western Region	8121.76	4.93	9226.42	5.46	10523.76	6.13
Wind-Western Region	878.52	0.53	1521.76	0.90	0.00	0.00
Nuclear-Western Region	5600.00	3.40	5305.74	3.14	4496.51	2.62
Import from Self Generating Industries	2467.87	1.50	3196.81	1.89	978.14	0.57
Total	**164710.11**	**100.00**	**169119.23**	**100.00**	**171732.56**	**100.00**
Total generation excluding Low-cost power generation	147641.96		149868.50		155734.15	
Generation by Coal out of Total Generation excluding Low-cost power generation	129253.12	87.54	128817.10	85.95	130461.68	83.77
Generation by Diesel out of Total Generation excluding Low-cost power generation	0.00	0.00	0.00	0.00	0.00	0.00
Generation by Gas out of Total Generation eexcluding Low-cost power generation	18388.84	12.46	21051.40	14.05	25272.47	16.23
Imports from others						
Imports from NREB	1124.49		1137.41		1093.26	
Imports from SREB	466.82		0.00		1766.61	
Imports from EREB	257.20		1450.41		9094.76	
Estimation of Baseline Emission Factor (tCO_2/MU)	-	-	-	-	-	-
Simple Operating Margin	-	-	-	-	-	-
Fuel 1 : Coal						

Avg. Efficiency of power generation with coal as a fuel, %		36.732		36.576		36.487
Avg. Calorific Value of Coal used (kcal/kg)		4171		3820		3820
Estimated Coal consumption (tons/yr)		72553424		79289960		80496903
Emission Factor for Coal-IPCC standard value (tonne CO2/TJ)		96.1		96.1		96.1
Oxidation Factor of Coal-IPCC standard value		0.98		0.98		0.98
COEF of Coal (tonneCO2/ton of coal)		1.645		1.506		1.506
Fuel 2 : Diesel						
Avg. Efficiency of power generation with diesel as a fuel, %		41.707		41.707		41.707
Avg. Calorific Value of Diesel used (kcal/kg)		9760		10186		10186
Estimated Diesel consumption (tons/yr)		0		0		0
Emission Factor for Diesel-IPCC standard value (tonne CO2/TJ)		74.1		74.1		74.1
Oxidation Factor of Diesel-IPCC standard value		0.99		0.99		0.99
COEF of Diesel (tonneCO2/ton of diesel)		2.998		3.129		3.129
Fuel 3 : Gas						
Avg. Efficiency of power generation with gas as a fuel, %		45		45		45
Avg. Calorific Value of Gas used (kcal/kg)		11942		11942		11942
Estimated Gas consumption (tons/yr)		2942817		3368913		4044423
Emission Factor for Gas- IPCC standard value(tonne CO2/TJ)		56.1		56.1		56.1
Oxidation Factor of Gas-IPCC standard value		0.995		0.995		0.995
COEF of Gas(tonneCO2/ton of gas)		2.791		2.791		2.791

EF (OM Simple, excluding imports from other grids), tCO2/MU		863.87		859.68		851.08
EF (NREB), tCO2/MU		790.00		740.00		730.00
EF (SREB), tCO2/MU		770.00		760.00		740.00
EF (EREB), tCO2/MU		1190.00		1190.00		1180.00
EF (OM Simple), tCO2/MU		863.58		861.93		866.96
3 years Average EF (OM Simple), tCO2/MU						**864.16**
Considering 20% of Gross Generation						
Sector	**MU**	**%**	**MU**	**%**	**MU**	**%**
Thermal Coal Based-Western Region					21298.88	57.52
Thermal Diesel Based-Western Region					0.00	0.00
Thermal Gas Based-Western Region					9816.20	26.51
Hydro-Western Region					4804.29	12.98
Wind-Western Region					0.00	0.00
Nuclear-Western Region					1106.27	2.99
Import from other Regions					0.00	0.00
Import from Self Generating Industries					0.00	0.00
Total					37025.64	100.00
Generation by Coal out of Total Generation					21298.88	57.52
Generation by Diesel out of Total Generation					0.00	0.00
Generation by Gas out of Total Generation					9816.20	26.51
Built Margin	-	-	-	-	-	-
Fuel 1 : Coal						
Avg. efficiency of power generation with coal as a fuel, %						36.487
Avg. calorific value of coal used in UPPCL, kcal/kg						3820
Estimated coal consumption, tons/yr						1314174 2

Emission factor for Coal (IPCC),tonne CO2/TJ						96.1
Oxidation factor of coal (IPCC standard value)						0.98
COEF of coal (tonneCO2/ton of coal)						1.506
Fuel 2 : Diesel						
Avg. Efficiency of power generation with diesel as a fuel, %						41.707
Avg. Calorific Value of Diesel used (kcal/kg)						10186
Estimated Diesel consumption (tons/yr)						0
Emission Factor for Diesel-IPCC standard value (tonne CO2/TJ)						74.1
Oxidation Factor of Diesel-IPCC standard value						0.99
COEF of Diesel (tonneCO2/ton of diesel)						3.129
Fuel 3 : Gas						
Avg. Efficiency of power generation with gas as a fuel, %						45
Avg. Calorific Value of Gas used (kcal/kg)						11942
Estimated Gas consumption (tons/yr)						1570914
Emission Factor for Gas- IPCC standard value(tonne CO2/TJ)						56.1
Oxidation Factor of Gas-IPCC standard value						0.995
COEF of Gas(tonneCO2/ton of gas)						2.791
EF (BM) (tCO2/MU)						**653.06**
Combined Margin Factor (Avg of OM & BM) (tCO2/MU)						**758.61**

Baseline data

Month	Power requirement for EAF	Power requirement LF	EAF auxiliary	O2 Consumpiton	Power Requirement for O2 production	Total Power consumption
	kWh/lmt	kWh/lmt		m3/lmt	kWh/lmt	kWh/lmt
Apr-03	485	99	115.30	46.50	48.825	748.125
May-03	482	95	95.18	43.30	45.465	717.645
Jun-03	485	95	106.65	43.80	45.99	732.64
Jul-03	468	92	93.13	47.30	49.665	702.795
Aug-03	499	96	93.99	48.90	51.345	740.335
Sep-03	499	93	90.00	47.30	49.665	731.665
Oct-03	503	93	89.98	45.30	47.565	733.545
Nov-03	492	89	74.82	41.30	43.365	699.185
Dec-03	504	90	84.64	46.30	48.615	727.255
Jan-04	506	89	88.11	43.60	45.78	728.89
Feb-04	535	90	89.60	44.90	47.145	761.745
Mar-04	522	95	88.83	43.70	45.885	751.715