



## **ESSAR STEEL LIMITED**

### **HAZIRA**

**Essar Steel** is a global producer of steel with a footprint covering India, Canada, USA, Middle East and Asia. It is a fully integrated flat carbon steel manufacturer--from iron ore to ready-to-market products. Its products find wide acceptance in highly discerning consumer sectors, such as automotive, white goods, construction, engineering and shipbuilding. It is India's largest exporter of flat steel products and aims to reach 25 MTPA capacity by 2012.

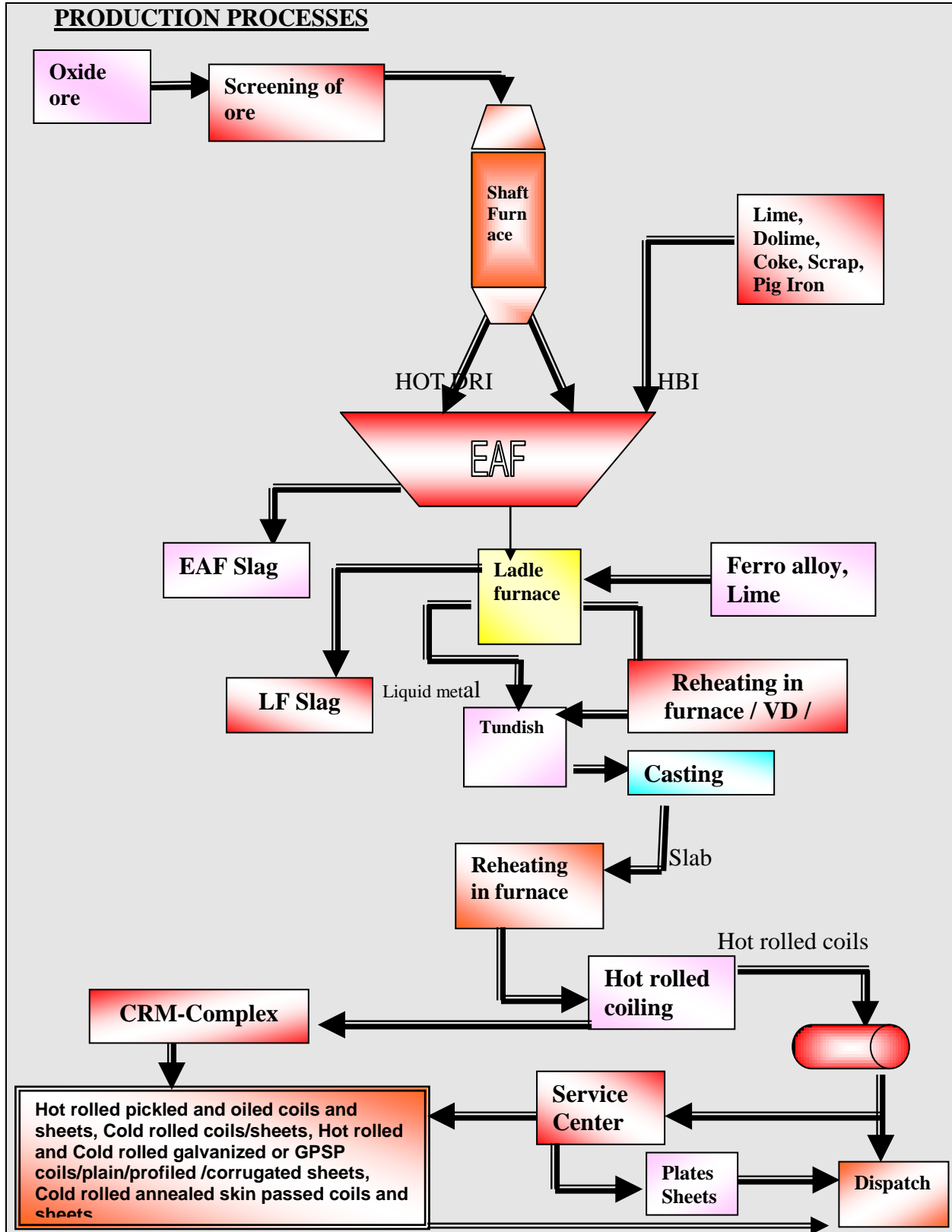
**Overview:** Our steel complex at Hazira, Gujarat, houses a 5.0 MTPA sponge iron plant, the world's largest gas-based HBI producer. The plant provides raw materials for our state-of-the-art 4.6 MTPA hot rolled coil (HRC) plant, the first and largest of India's new generation steel mills. This plant is fed with inputs from four electric arc furnaces and three casters. The complex's sophisticated infrastructure includes independent water supply and power, oxygen and lime plants, a township and a captive port capable of handling up to 8 MTPA of cargo with modern handling equipment like barges and floating cranes.

**Cold Rolling Complex:** At the other end of the value chain, the Company's downstream facilities include a 1.4 MTPA Cold Rolling Complex, adds further muscle to our steel making facilities. The complex comprises two pickling lines of 1.4 MTPA capacity, a reversing mill and a 1.2 MTPA Tandem Mill, two Galvanizing lines of 0.5 MTPA, Batch Annealing Furnace of 0.5 MTPA, a Skin Pass Mill of 1.0 MTPA. This enables Essar Steel to get into the genre of products that are tailor-made for automotive, white goods, shipbuilding, agriculture and construction industries - segments that were the exclusive domain of a few international manufacturers.

Essar Steel is the first Indian steel company to receive an ISO 14001 certification for environment management practices. Essar Steel is also certified to ISO 9002, OHSAS 18001:1999, and ISO 27001.

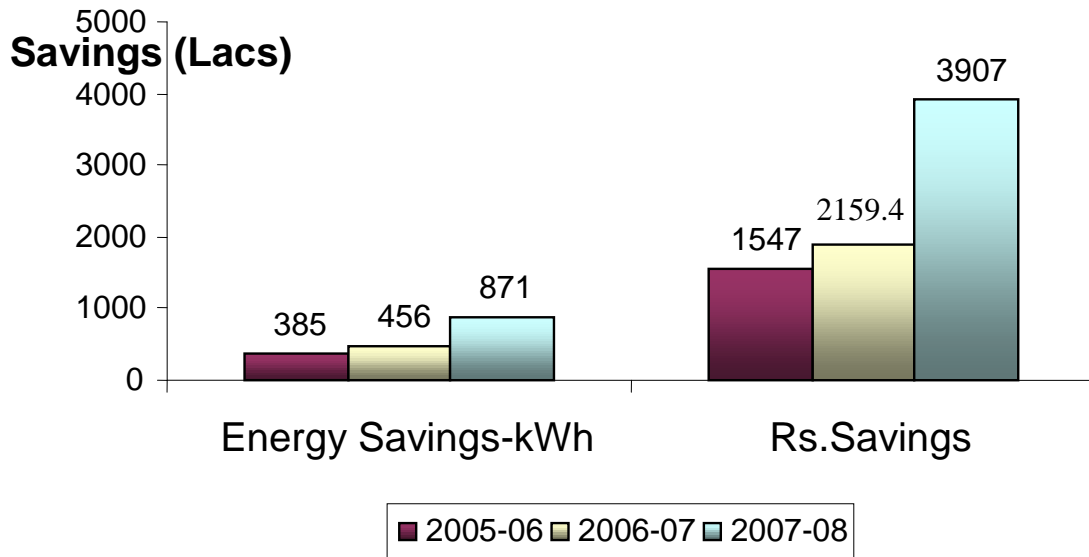
**Scale of Organization:** Large scale

# PROCESS FLOW CHART

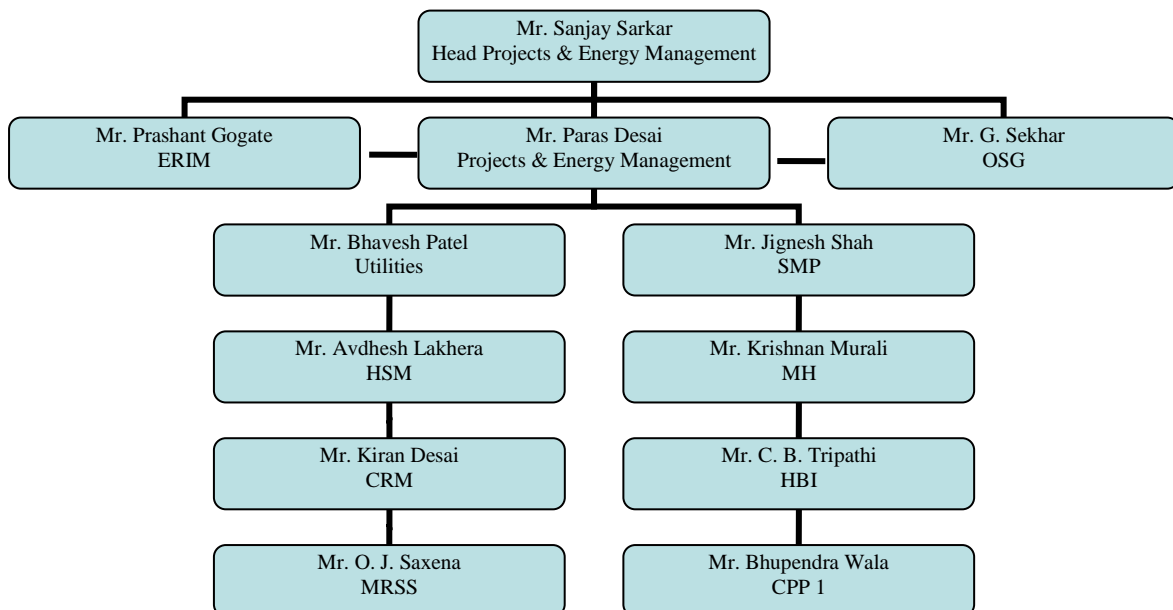


## ENERGY CONSUMPTION & SAVINGS


### Energy Saving Trend



## ENERGY CONSERVATION CELL



## POLICIES AT ESSAR



**ENERGY POLICY**

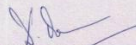
**ESSAR STEEL LIMITED**

Essar Steel Ltd, Hazira is committed to continual improvement in energy performance in all products, services and related operations.

To achieve Excellence in energy performance, we shall make all efforts to:

- ~ Reduce specific energy consumption in all our operations and activities.
- ~ Benchmark specific energy consumption with National & International standards and set up systems to achieve them.
- ~ Utilize energy resources (like Electricity, Natural Gas, Naphtha, LPG etc.) efficiently.
- ~ Upgrade technology, enhance capacity utilization and incorporate energy efficient designs & equipments in all projects.
- ~ Conduct regular "Energy Audits" internally & externally to improve energy efficiency in all areas.
- ~ Promote Energy conservation awareness in organization, increase employee involvement, monitoring, reviewing and recognize the initiatives.
- ~ Make efforts to reduce the cost continuously by adopting effective "**Energy Management System**"

Place : - Hazira (Surat)  
Date : - 18/12/2006

  
Dilip Oommen  
Chief-Hazira Works

## ESSAR GLOBAL LIMITED

### HEALTH, SAFETY & ENVIRONMENT POLICY

Essar Group is committed to achieve excellence in Health, Safety & Environment (HSE) by providing and maintaining safe and healthy working conditions and following operating practices that will protect the environment. We will implement HSE Management systems to ensure health and safety of employees and those who work for us including contractors.

In fulfillment of this commitment, and our goal to have **an injury free & healthy work place**, and institutionalizing a culture of Safety in the organization, we will make continuing efforts to:

- Demonstrate visible commitment towards Health, Safety & Environment across all levels of management starting from the top.
- Increase HSE awareness & competence by training & education to facilitate safe working and enhance the health of employees by delivering quality health care.
- Integrate HSE in all phases of operations as well as at all stages of projects.
- Continuously recognize hazards, assess Health, Safety & Environmental risks in our operations through audits, risk assessments & review of Standard Operating Procedures and take steps to mitigate risks.
- Minimize pollution, reduce environmental footprint & optimize resource consumption by planning & carrying out operations through environmentally responsible processes, techniques & practices.
- Promote safe behaviour amongst those who work for us (including compliance by employees and others that personal protective equipment will be used by them, where required), Report all accidents & incidents and stop work that is unsafe and threat to Safety of people.
- Foster continual improvement, benchmark our HSE performance & adopt best practices in HSE.
- Comply with all relevant statutory & other requirements pertaining to HSE.
- Investigate accidents & incidents and occupational illnesses to prevent recurrence and laterally share 'Lessons Learnt' across all businesses. Extend HSE good practices in all spheres of our operations including outside of plants viz. during travel, in office, township, during sales & marketing related activities and off the job.

It will be our endeavour to have HSE at the centre of every business planning and decision making process. It is reiterated that Safety continues to be Line Management & Individual's responsibility.

Place: Mumbai  
Date: 24<sup>th</sup> September 2007

  
Shashi Ruia  
Chairman – Essar Group

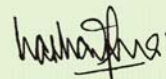


### ENVIRONMENTAL POLICY ESSAR STEEL LTD., HAZIRA

Essar Steel commits for prevention of pollution and continual improvement to enhance environmental quality. We also commit ourselves to the following:

- Minimize pollution at source through environment-friendly processes, techniques & practices.
- Reduce fugitive emission from loading / unloading and transportation of materials.
- Reduce work zone dust levels in Meltshop and Caster.
- Manage solid waste in environmentally acceptable manner.
- Comply with applicable environmental regulations.
- Develop adequate Greenbelt in and around the plant.
- Encourage our customers and suppliers to follow this policy.
- Educate and develop an environmentally aware work force at all levels.

This policy has been communicated to all employees of ESSAR STEEL LTD. and shall be made available to the public and all interested parties. All of us at ESSAR STEEL LTD. will work together to ensure that ESSAR remains Eco-friendly forever.



Prashant S. Ruia  
Managing Director  
Date : 05-06-2004

## WATER POLICY

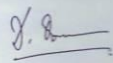
### ESSAR STEEL LIMITED

- Essar Steel Ltd, Hazira is committed to achieve excellence in water management.
- We are committed to efficient water management practices to provide sufficient and safe water to people & plant as well as to conserve water.
- In fulfilling of this commitment, we will make continuous efforts to:
  - Ensure minimal discharge by recycling of waste water after treatment.
  - Continual improvement in reduction of specific water consumption.
  - Community partnership, people involvement & campaigns for effective utilization and conservation of water.
  - Identification of new opportunities in saving water & integrate them with the process/operation through suitable modifications.
  - Minimize water pollution & resource consumption by planning & carrying out operations, through environmentally responsible processes, techniques & practices.
  - Water auditing & regular monitoring of water consumption.

"WATER ADDS VALUE TO PEOPLE & ORGANIZATION,  
CONSERVE IT INTELLIGENTLY"

Place - Hazira (Surat)

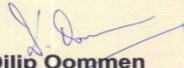
Date : 08-02-2008

  
Chief-Hazira works

## MAINTENANCE POLICY

- **ESSAR STEEL is committed to safely achieve equipment efficiency comparable to the best in the Industry.**
- **ESSAR STEEL is focused to make continual improvement & set new benchmark of Equipment Health, reliability and low maintenance cost in the steel Industry.**
- **ESSAR STEEL is committed to reduce downtime / breakdown time of Steel plant equipment on continuous basis.**
- **ESSAR STEEL shall strive to achieve optimal equipment health & implement best maintenance practices to avoid accident / incident and maintain safety standards as per the requirement of OHSAS – 18001: 1999.**
- **ESSAR STEEL will lay emphasis on equipment health monitoring by latest condition monitoring instrument.**
- **Reduction in oil & grease consumption as well as noise & air pollution will be a focal point during maintenance activity.**
- **The company shall achieve the above through efficient Predictive, Preventive maintenance & extensive FMEA studies of critical equipment & review of Maintenance practices supported by competent team work.**

Date : 1<sup>st</sup> December 2006  
Place : Hazira (Surat)

  
Dilip Oommen  
Chief – Hazira Works

## **1. Commitment**

- Organize management resources
- Formalize an energy management Policy or incorporate energy in to other business systems

## **2. Understanding**

- Appoint energy manager and plan Implementation
- Set up an energy use monitoring & reporting system

## **3. Plan & Organize**

- Conduct energy audits
- Develop an action plan

## **4. Implement**

- Staff awareness and training programmes
- Implement projects from action plan

## **5. Control & Monitor**

- Regular reports
- Annual review

# **ENERGY SAVINGS AT ESSAR STEEL LIMITED**

## **1. ENERGY SAVINGS – Hot Strip Mill**



Description	Energy Saved – Lacs kWh	Investment Incurred – Lacs Rs.	Savings - Lacs Rs.
Electronic Ballast replacement	2.40	6.00	10.08
Indication Lamp	0.15	0.45	00.63
Stoppage of Idle equipments	4.05	----	17.01
Process Optimization	22.00	----	92.40
Installation of transparent sheet	0.70	14.00	2.94
Furnace Repairing	20 Kcal / Kg	300.00	372.00
160 W Lamps by 70 W Lamps	0.70	2.50	2.94
<b>Total</b>	<b>30 + NG saving</b>	<b>323</b>	<b>498</b>

Description	Energy Saved – Lacs kWh	Investment Incurred - Lacs Rs.	Savings - Lacs Rs.
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Chiller # 4: Enhanced the capacity by increasing the condenser water flow from 47 to 85 m <sup>3</sup> /hr.	2.47	0.48	10.37
Centrifugal Chillers (Capacity 300 TR – 04 nos.): Evaporator and condenser's tube sides (water) as well as shell side (refrigerant) were Chemically cleaned.	12.52	1.11	52.58
Instead of 01 HT + 01 LT compressor at CRM compressor house, 02 nos. LT efficient compressors commissioned.	8.61	32.00	36.16
EAF 3 Primary circuit – Orifice plate removed for reduction in pressure drop.	7.14	2.15	30.00
CRM Steam System – 1,323 m <sup>3</sup> Condensate recovered monthly. Fuel Energy saving of Rs. 0.92 lacs per month.	-	0.55	11.04
Crane 260 T # 2 Cabin A/C: Old ductable unit modified in split one.	0.30	0.89	1.26
Plant air and Instrument air system is separated after modification.	31.53	3.00	132.43
CRM Cooling Tower: Fan blade changed from aluminum to FRP.	0.014	-	0.06
CRM Pump House : Smaller diameter Impeller replaced	1.14	0.25	4.79
BAF Cooling Water system, CRM – Pump performance analyzed and enhanced after modification. One pump stopped.	3.46	-	14.53
RM Main Drive Ventilation System: Effectiveness of Heat exchanger increased by Chemical cleaning, Heat and Mass balance, Repairing of Partition plate. Chiller 4 stopped.	5	0.75	21.00
<b>Total</b>	<b>72</b>	<b>41</b>	<b>303</b>

## 2. ENERGY SAVINGS – Utility

## 3. ENERGY SAVINGS – SMP

Description	Energy Saved – Lacs kWh	Investment Incurred - Lacs Rs.	Savings - Lacs Rs.
Incremental in HOT DRI	625.92	-	2628.88
Installation of CFL	0.58	0.102	2.29
Installation of Electronic Ballast	1.33	3.36	5.57
<b>Total</b>	<b>628</b>	<b>3</b>	<b>2637</b>

#### 4. ENERGY SAVINGS – HBI/MH

Description	Energy Saved – Lacs kWh	Investment Incurred - Lacs Rs.	Savings - Lacs Rs.
Stoppage of idle running conveyors	0.96	----	4.03
Automatic lighting sensor	0.35	----	1.47
A high capacity pump Installed in HBI	5.37	11.3	22.55
Modification of suction lines	1.46	0.35	6.13
Hot water pump, KR fan and MR fan stopped	1.02	----	4.28
MR open pumps OP4.50-1/2 removed	2.04	0.25	8.57
One hot water pump stopped	8.74	----	36.71
Voltage of lighting is reduced to 230V	2.48	----	10.42
Additional 14” line provided at clarifier outlet water line	1.75	0.5	7.35
The motors’ terminal connection changed to star from delta	0.27	----	1.13
Top gas scrubber venturi and swirl nozzles diameter increased	3.64	0.1	15.29
Wiring and logic changed to put off the lights at night	0.36	0.1	1.51
Booster pump 1P2.133-1 removed	8.74	0.2	36.71
<b>TOTAL Savings</b>	<b>37</b>	<b>12</b>	<b>156</b>

#### 5. ENERGY SAVINGS – CRM/DSC

<b>Description</b>	<b>Energy Saved – Lacs kWh</b>	<b>Investment Incurred - Lacs Rs.</b>	<b>Savings - Lacs Rs.</b>
Energy saving by reducing voltage from 440 v. to 400 volts.	7.76	NIL	32.66
Power Saving due to VVVF Drive Installation for Rapid Cool Motor	0.19	15.0	0.83
Power Saving due to reducing the Speed ( 1000 RPM ) of Base Fan Drive	0.35	-	1.49
APFC panel installation in CRM comp.	0.089	-	0.37
Crane-1 & 13 Drive installation	3.20	20	13.50
Harmonic Filter commissioning in MRSS (5th ,7th & 11th )	2.41	5.5	10.15
DSC crane drives installation	6.43	17.5	27.05
V30 and V31 DOL replacement by drives	4.85	12	20.40
Periphery lighting switching operation by installation of timer	0.43	0.2	1.84
<b>TOTAL Savings</b>	<b>26</b>	<b>70</b>	<b>108</b>

## **6. ENERGY SAVINGS – MRSS/CPP 1**

<b>Description</b>	<b>Energy Saved – Lacs kWh</b>	<b>Investment Incurred - Lacs Rs.</b>	<b>Savings - Lacs Rs.</b>
Switching off SVC's During shutdown (1,2,3,4)	43.4	---	182.28
Operated only one cooling tower in winter Season	0.11	---	0.46
Switched off one Primary cooling water pump.	0.08	---	0.34
VVF drive installation at new cooling tower fan CPP1 & Side stream filtration unit fixed in new cooling tower CPP1	36	250	151.2
<b>TOTAL</b>	<b>80</b>	<b>250</b>	<b>334</b>

## **ENERGY SAVING AREA**

### **1. Reduction in Lighting Transformer Voltage**

2. **Installation of CFL lamps in place of other lamps**
3. **Installation of LED type indication assembly**
4. **Electronic Ballast in tube light fittings**
5. **Installation of HPSV fittings in place of HPMV**
6. **Timer in Lighting network**
7. **VVVF Drive Installation**
8. **Delta Star conversion**
9. **Process Optimization**
10. **Transparent sheet at roof for natural lights**
11. **Optimization of use of AC**
12. **Accumulator banks in system to avoid stand by pump operation**
13. **Conversion of electric equipment to pneumatic**
14. **Impeller trimming / orifice modification in pumps**
15. **Pulley replacement (Motor & Fan) in blower**

### **SMALL SCALE ENERGY CONSERVATION PROJECTS, 2008-09**

<b>PLANT</b>	<b>Energy Saved - Lacs kWh</b>	<b>Savings - Lacs Rs.</b>
Hot Strip Mill (HSM)	51.79	217.52
Utility	57.68	92.29
Steel Melt Shop (SMP)	650.00	2730
HBI and MH	19.87	83.45
MRSS and CPP1	20.29	85.22
<b>TOTAL</b>	<b>800</b>	<b>3208</b>

**LARGE SCALE ENERGY CONSERVATION PROJECTS, 2008-09**

Energy Conservation Measures (Planned)	Anticipated savings		Approx. investment (Lakhs Rs.)	Project Commencement & Completion year
	<u>Energy Value MWH</u>	<u>Lakhs Rs.</u>		
19MW Power Generation At HBI	131400	7884	9000	2009-10
Fume Extraction System, 40MW	350400	21024	32000	2010-2011
Mod-1,2,3,4 Top Gas Fuel Heat Recovery, 15MW	113880	6833	12000	2010-2011
HyTemp Project For Hot DRI Charging at EAF-1 in 09-10 & EAF-3 in 10-11	146860	8812	5900	2009-10
Corex Liquid Steel Charging In EAF-2	209800	12588	2805	2009-10