HIRA

GODAWARI POWER & ISPAT

HIRA

GODAWARI POWER & ISPAT

GODAWARI POWER & ISPAT LTD.
welcomes
All Dignitaries & Industry Partners

Energy Conserved is Energy Generated

WORKSHOP ON
"BEST PRACTICES IN ENERGY EFFICIENCY IN IRON & STEEL SECTOR"
&
"OPPURTUNITIES AND CHOICES IN ENERGY CONSERVATION AT GPIL"

Presented by:

RATNADEEP GUPTA
GM SID
GPIL

Walkthrough

1. GPIL Profile
2. Scope & Areas for Energy Conservation in Power Generation
3. Scope & Areas for Energy Conservation in Ferro Alloy Division
4. Scope & Areas for Energy Conservation in Sponge Iron Making
5. Conclusion

GPIL- Company Profile

Godawari Power & Ispat Ltd. (GPIL) is the Flagship Company of Hira Group of Industries; Raipur which was incorporated in 1999 to setup an integrated steel plant with captive power generation.

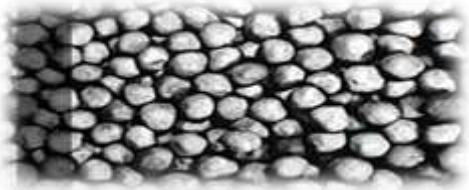
GPIL is certified for adapting and implementing the following management systems :

ISO:9001:2008 FOR Quality Management System
ISO:14001:2004 for Environment Management System
OHSAS ISO:18001:2007 for Occupational Health & Safety

Product Portfolio

PELLET
2.1 MTPA

SPONGE IRON
0.495 MTPA



POWER
73 MW

BILLETS
0.20 MTPA

HB WIRES
0.10 MTPA

SILICO MANGANESE
0.0165 MTPA

Scope & Areas for Energy Conservation in Power Generation

1.Modification of fuel feeding system:

Traditional Drag chain system replaced by Rotary feeding

- ✓ **Reduction of maintenance and power**
- ✓ **Saving cost by 8.12 Lacks per annum**
- ✓ **Additional benefits**
  - ✓ **Improvement in redundancy of AFBC**
  - ✓ **Pollution control**
  - ✓ **Reduced safety hazards caused by opened rotary parts.**

Scope & Areas for Energy Conservation in Power Generation

2.Modification of Old screw conveying system:

Dense Phase pneumatic ash handling system replaces old screw conveying system

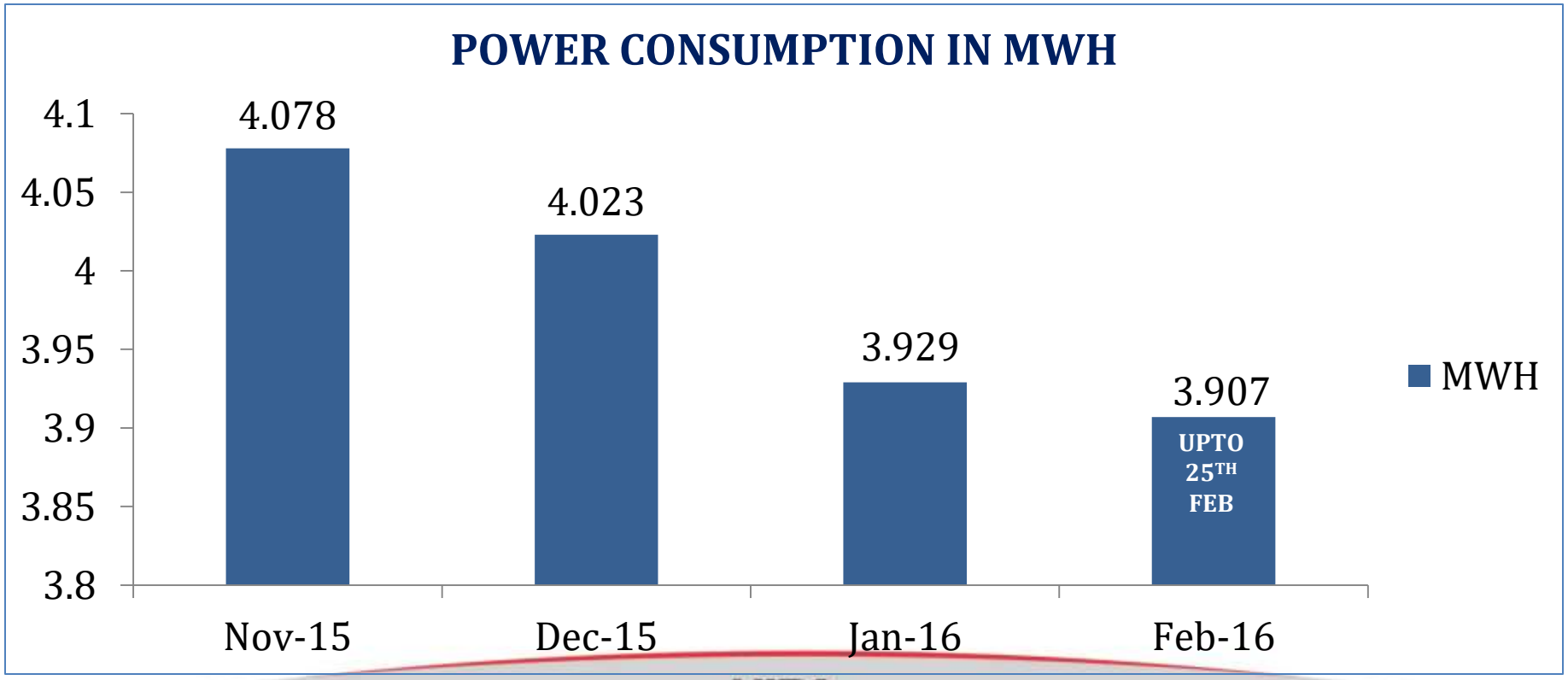
- ✓ **Savings of 19.35 Lacs Per annum & 56 Kilowatts of power.**

Scope & Areas for Energy Conservation in FAD

Energy Conservation in FAD Process

- Changing of charge mix, size of raw material
- Optimizing the operational control system
  - Periodic checking of electrode length by taking smelt down
  - Installation of FES (Fumes Extraction System)

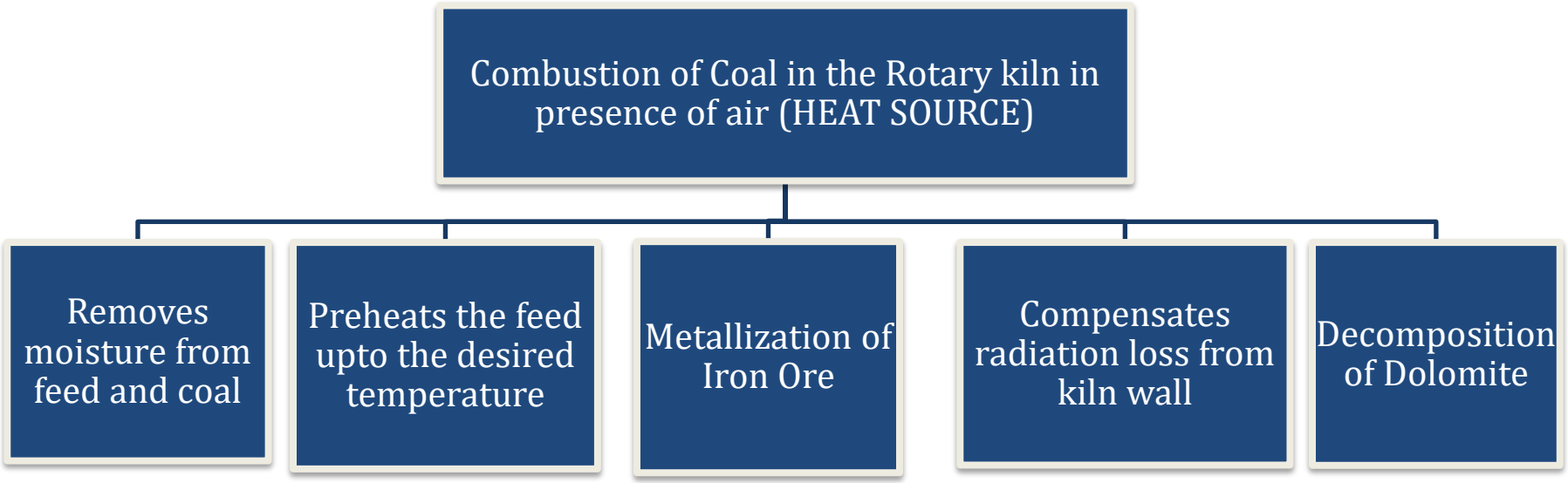
✓ Significant Reduction of Specific Power consumption



Scope & Areas for Energy Conservation in FAD

S.NO.	AREA	ACTIVITY	ENERGY SAVINGS
1.	Water Complex	Installation of VFD	120 Kwh/ Day
2.	Fume Extraction System - ID Fan	Installation of VFD	1968 Kwh/ Day
3.	Fume Extraction System - F.D. Cooler	Installation of VFD	144 Kwh/Day
4.	Furnace Air Cooling System	Reduced number of cooling fans from 6 to 3 by changing the capacities	242 Kwh/Day

Scope & Areas for Energy Conservation in Sponge Iron Making



- **Coal and air can be taken as hot utility streams - process integration terminology**
- **Potential possible areas where energy is being lost and can form a part of heat integration, are as follows:**

Scope & Areas for Energy Conservation in Sponge Iron Making

Scope 1

Energy lost in the Rotary Kiln can be derived through material and energy balance.

- Streams of sponge iron, char, waste gas and volatile matter

Counter Measure

- ✓ Process integration – best option to reduce:
  - Heat losses in the process of sponge iron making
  - Waste generation
  - Water consumption (Reduction in the highest quality heat (Coal and air) using proper heat integration in the process automatically reduces the cold utility (water) requirement)
- ✓ Better refractory selection and Reducing Shell temperatures
- ✓ Pre heating of feed material
- ✓ Optimization of C/Fe ratio
- ✓ F.C in Char to be optimized
- ✓ L.O.I control

Scope & Areas for Energy Conservation in Sponge Iron Making

Scope 2

Hot sponge iron is being cooled with water in rotary cooler. For this purpose water is being sprayed on the shell of cooler and the vapour generated from it goes directly to atmosphere. As a consequence of it the temperature of sponge iron drops from 1020 °C to 100°C. In this process the cold water is heated up from 30 °C to 34.7 °C

Counter Measure

- ✓ Cooling efficiency can be enhanced by time to time De Scaling of Cooler shell and by incorporating efficient cooling tower. Thus delta T can be increased and oxidation of product can be prevented from 0.5 -1% .

Scope 3

Clean waste gas is generated in ESP from where it goes to the chimney at the temperature of 170-180 °C and from there to the atmosphere, which is also a loss of considerably high temp. heat.

Counter Measure

- ✓ Efficient heat utilization in Power plant can retain the temperature of ESP outlet to 140-150°C through periodic soot blowing.

Scope & Areas for Energy Conservation in Sponge Iron Making

Scope 4

Feed material as well as air enters the process (mainly rotary kiln) at ambient temperature and reduction reactions are taking place at 1080-1100 °C. This requires feed to be heated up which needs the significant amount of heat generated from combustion of coal. This preheating could be done by the waste gas. However this is not done in all Kilns .As a result of it a large amount of coal is being utilized for preheating the feed material and air which otherwise could have been saved.

Counter Measure

- ✓ Pre heater, thus helps in feeding the material at 900^0C and helps us in saving 5% of energy.

Areas of Energy Conservation in Sponge Iron Plant

We have also identified following areas where we can effectively adopt initiatives to conserve energy

Challenges:

1. Kiln Availability
2. Campaign Life
3. Production Rate
4. Operational Losses
5. Specific Coal Consumption
6. Optimum Utilization of pre-heater
7. Utilization of Solid Wastes

1. Kiln Availability

- Frequent kiln breakdown due to mechanical, electrical and operational interruptions have a significant effect on Kiln availability which also leads to poor efficiency.
- **At GPIL, we had overcome this by implementing best maintenance planning and Robust Preventive and Predictive Maintenance.**

2. Campaign Life

- Frequent kiln shutdown due to accretion formation, DSC clinker formation and refractory damage affects its capacity utilization and also consume more energy in reviving the kiln.
- **At GPIL, we had overcome this by Better Process Control and monitoring, Selection and Application of quality refractory material and Restriction of Undersize in feed material. Today the average campaign life is around 250-300 days.**

3. Production Rate

- Reasons for Low Production rate identified leading to low capacity utilization are Low Yield, Process Interruptions at Central Burner , Feeding and Injection systems which can lead to increase energy consumptions.
- **At GPIL, we had over come this by:**
  - **Proper blending of Imported & Domestic coal to maintain required F.C.**
  - **Utilization of high TI Pellet .**
  - **Conducted Fe Balancing to analyze yield losses.**
  - **Fabrication of CB & Coal Injector Trolley for fast operation.**
  - **Restriction of Undersize in material.**

4. Operational Losses

- There are various operational losses which needs to be saved for efficient energy conservation
- Major Losses
  - Emission of flue gas from slip seal, Cooler Discharge and stack cap
  - Radiation losses
  - Spillages from feed and injection area
  - Yield Losses

Initiatives taken:

- ✓ **Better sealing done in stack cap to capture fugitive emission**
- ✓ **For Better sealing, pneumatic cylinders installed at slip seal to maintain gaps in seals**
- ✓ **Thorough inspection of old and worn out refractory and application of best quality refractory which reduced in radiation losses**
- ✓ **Inspection of spillages if any and arresting**
- ✓ **We have done analysis of Yield losses by conducting Fe Balancing where it is evidenced that under sized ore is poison for kiln**
- ✓ **Using minimum coal during Shut down & Light up and following Ramp up plans**
- ✓ **D.P. Valve Installation at Cooler Discharge**

5. Specific Coal Consumption & C/Fe

- High Specific Coal Consumption leads to immense waste of energy. So it is the area of greater concern and must be addressed.
- Optimum utilization of coal to minimize C/Fe is a big challenge

Initiatives taken:

- ✓ **Optimum Utilization of coal by proper Screening and Blending**
- ✓ **Optimum C/Fe level for safe and better campaign**
- ✓ **Total 3-4 % of carbon is allowed in Non Mag. Product**
- ✓ **Effective use of coal fines in injection Coal**

6. Optimum Utilization of Pre-Heater

- We have a arrangement of Pre Heater in two 500 TPD kilns which helps in higher production rate by 10 – 15 % but we faced various challenges in running it,
  - Process control is tough
  - High fines generation
  - High FeT in fly ash (30% - 40%)
  - Yield loss of 1 %

Initiatives taken:

- ✓ **Utilization of high TI Pellet with minimum Under sized (Max 2%)**
- ✓ **By the help of pre heater, waste gas generated in kiln increases the temperature of pellet to 700 – 900°C, hence low coal is required to satisfy the need for reduction and thus specific consumption of coal is low in the kiln. Furthermore it enhances the production rate.**

7. Solid Waste Utilization and Disposal – Green Productivity

Reduce

- Reduction of **accretion** by using pellet and Imported coal
- Reduce Fe in **Fly ash** by using high Tumbler index(>94) pellet ore
- Reduce LOI in flue gas by proper process control in Kiln and ABC
- Reduce emission by installing bag filters
- Proper sealing of all leakage prone points

Reuse

- Use of Fly Ash for making Bricks & tiles
- Char & Dolochar is used AFBC boiler for power generation
- Started using Bag filter dust in ABC which led to increase in steam generation by 2-3 tph

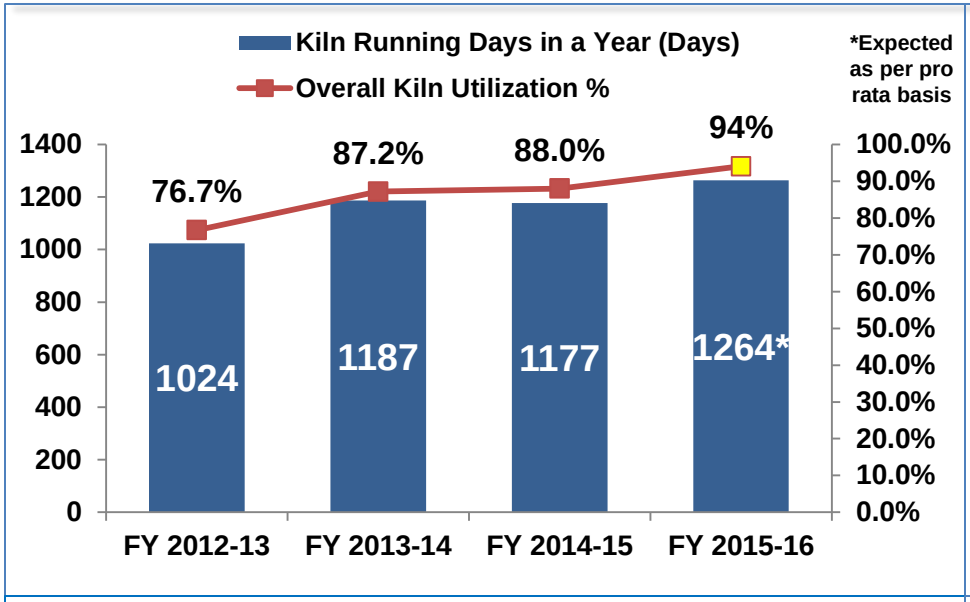
Recycle

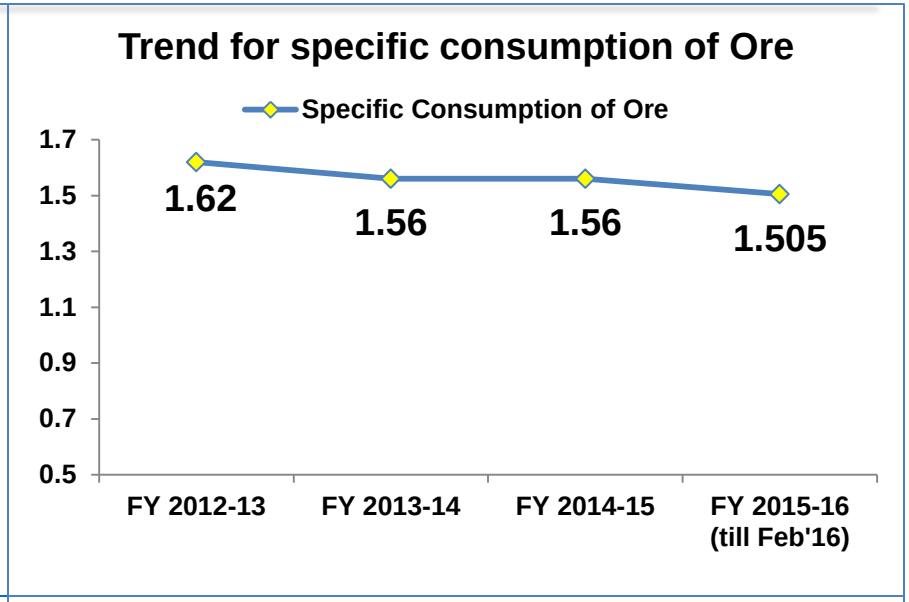
- Recycle the back flow material after screening
- Fines generated in Iron Ore is being used in pellet plant

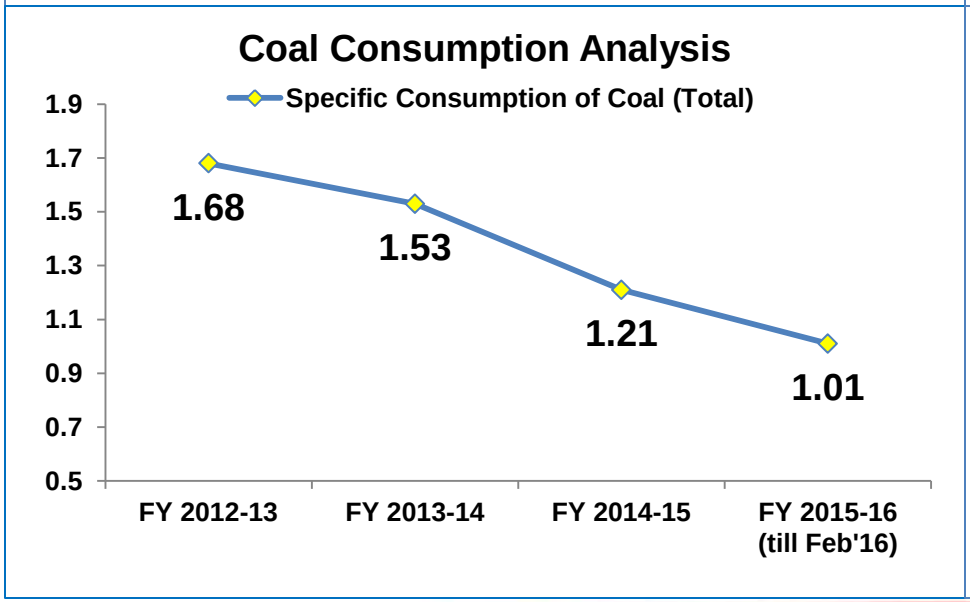
Recover

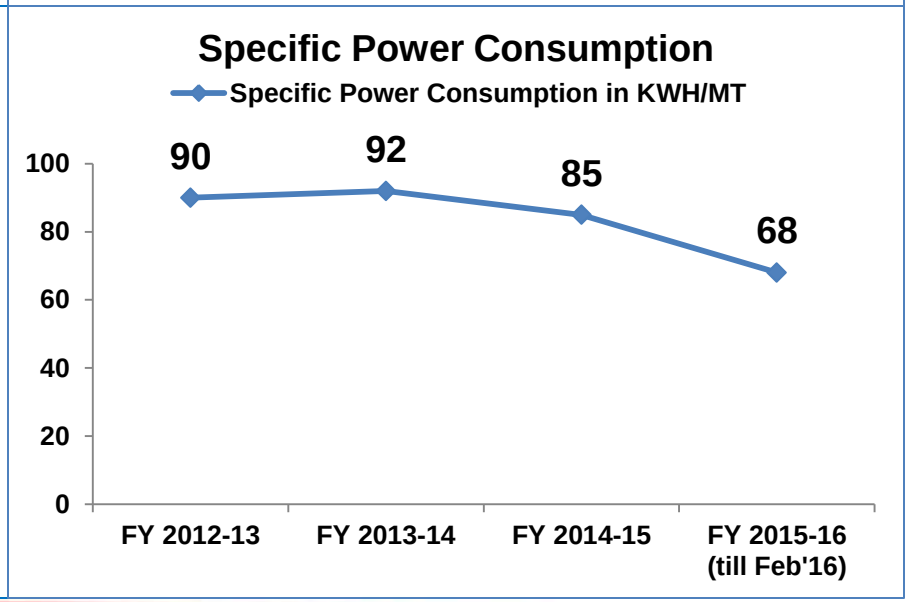
- Recovery of waste heat in WHRB for power generation

Year on Year Analysis

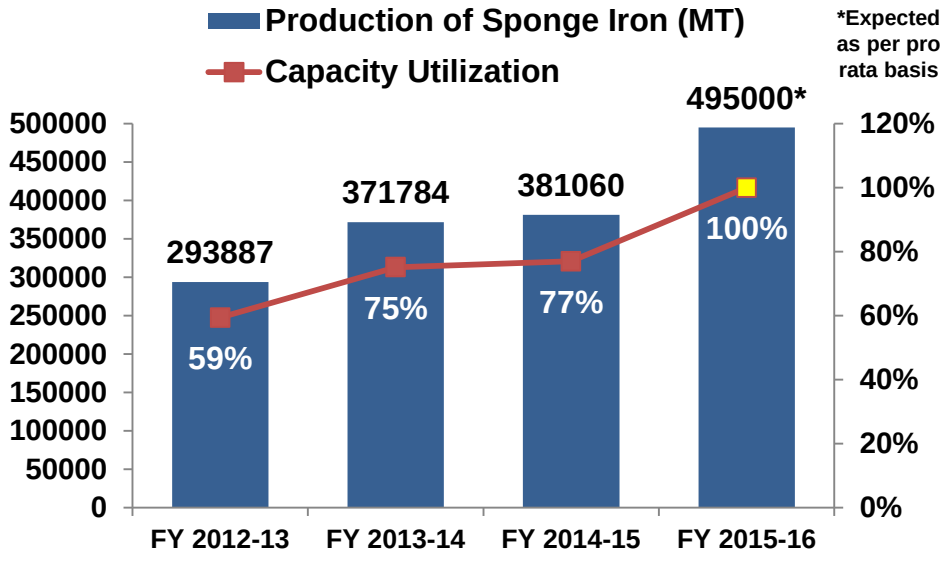


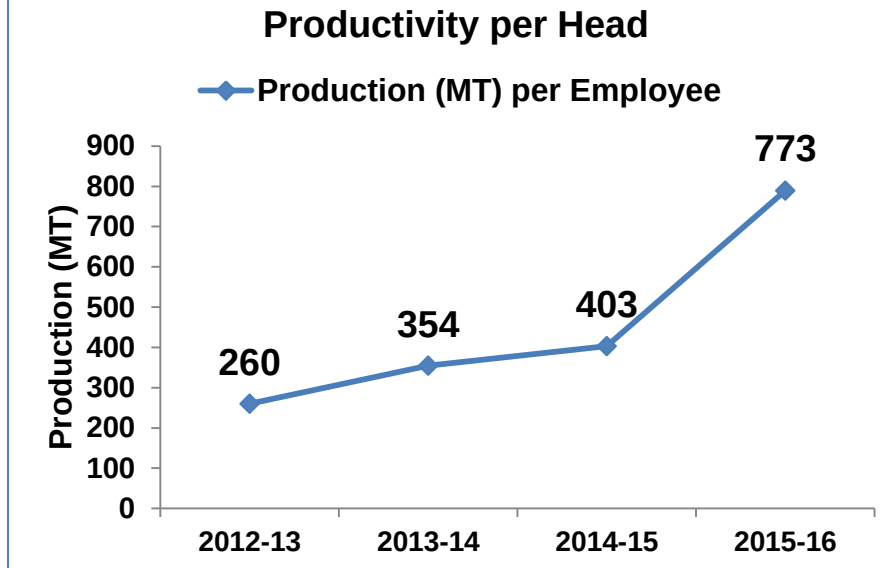


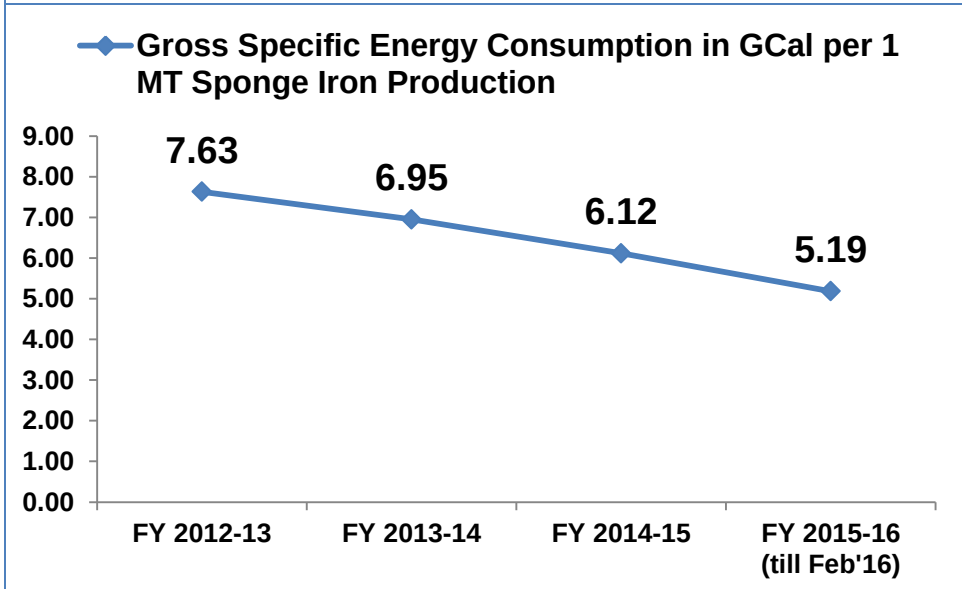


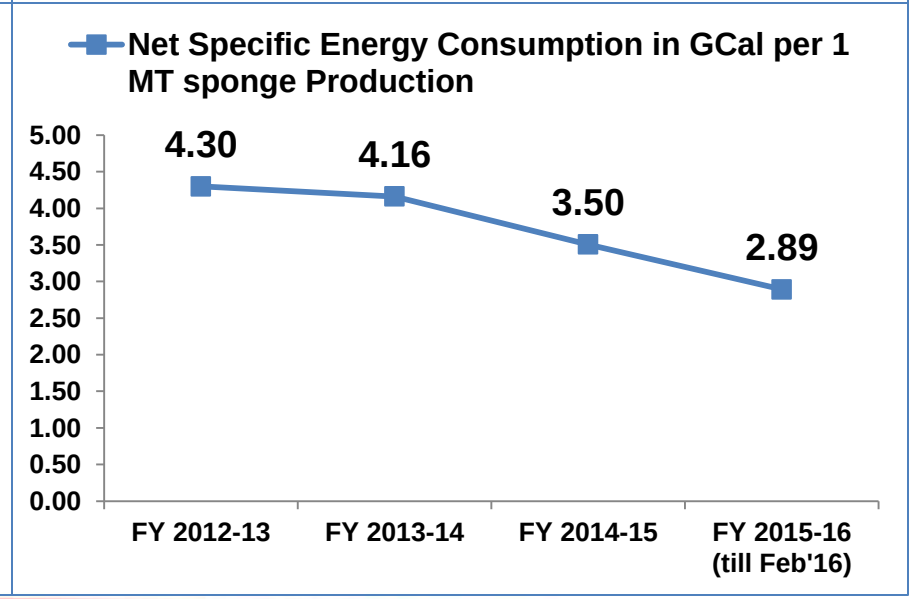


Year on Year Analysis









Conclusion

It is concluded that in Iron and Steel making, the opportunities of energy conservation are significant. If adequate awareness is created and actions are taken, then losses of energy can be brought down to a large extent.

Any spillage or leakage is not limited only to emissions rather, it is the loss of natural resources and nation's loss.

Energy Conserved is Energy Generated.

Thank You