

Second Prize

Integrated Steel Plants

BHILAI STEEL PLANT, SAIL Bhilai (Chhattisgarh)

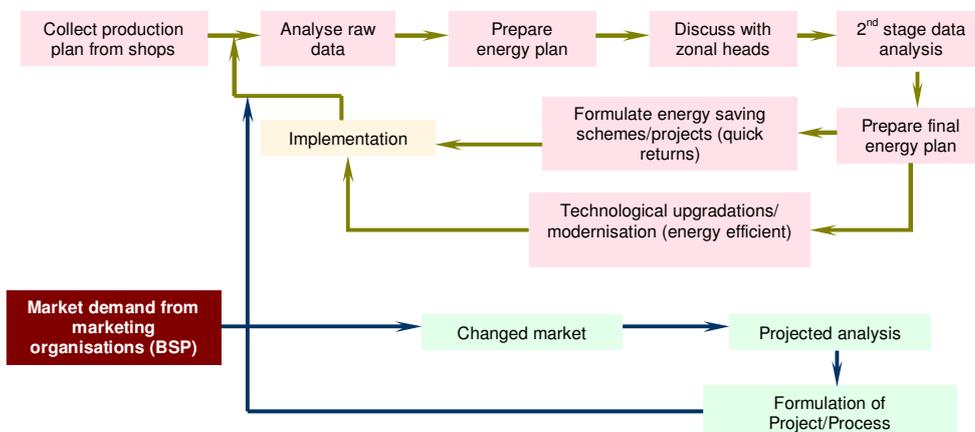
Unit Profile

Bhilai Steel Plant (BSP), flagship unit of Steel Authority of India Ltd. (SAIL) is a public sector undertaking, located about 40 kilometers from Raipur, capital of Chhattisgarh.

Bhilai Steel Plant, an integrated steel works, was commissioned in 1959 with present production capacity of 4.0 million tones. Currently, Bhilai Steel Plant has undertaken major Modernization and Expansion (MODEX) Plan for increasing crude steel production capacity to 7 Million Tones. With the installation of energy efficient technology in the MODEX units, the specific energy consumption of BSP is likely to reduce to 5.9 G Cal/TCS.

BSP produces a wide range of Plates, Rails (230 meters long rails) from cleanest rail steel with Hydrogen content less than 1.6 ppm, Heavy Structural, Merchant Products (TMT Bars, Angles, Channels, and Rounds) and Wire Rods (TMT, Plain, and Ribbed). BSP has been continuously improving its existing products and developing new products which have resulted in manufacture of value added and differentiated products. BSP products have found application in a number of prestigious infrastructure projects and defence projects of the country in the areas of rail lines, bridges, dams, air / sea ports, refineries, pipelines, etc. The product portfolio of BSP shall be enhanced by new age steel after MODEX.

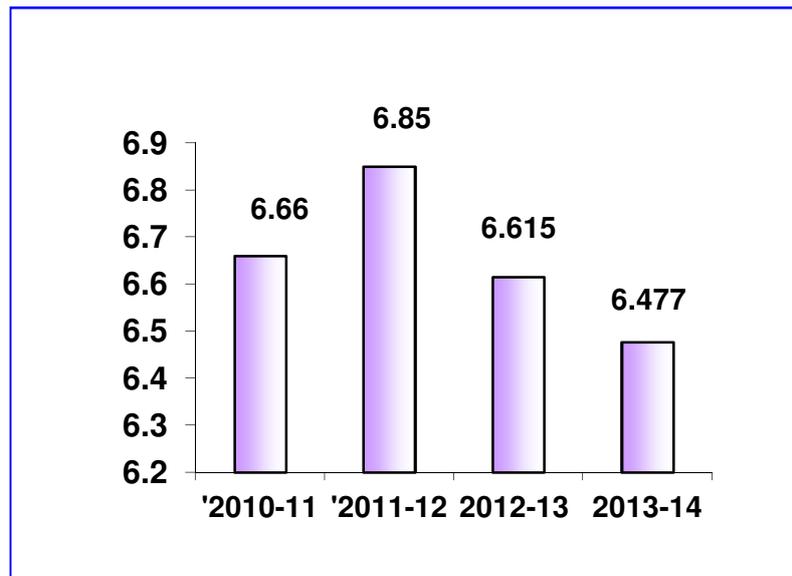
Energy Planning Process



Energy Consumption

Steel production in Bhilai Steel Plant, like any other integrated steel works, is highly energy intensive. As a result of conscious energy saving efforts, the net energy input into the plant in the year 2013-14 was 32.97 P Cal, approximately equivalent to 3.297 million TOE (tones of oil equivalent).

**Specific Energy Consumption
(GCal/tcs)**



Energy Conservation measures implemented during 2013-2014

1. VVVF drives for Cooling tower fan motors (3 x 110 kW) at Oxygen Plant-II

Commissioning of energy saving VVVF drive in Cooling Tower fan motors was done with energy saving of 650 MWh and cost savings of Rs. 36.1 Lakhs per year (approx).

2. Replacement of MG sets for operating the roller table section 220-222, 320-322 with three no. of VVVF drives at Merchant Mill with in-house resources (Drives are old drives removed from other applications earlier after commissioning of IPU projects)

Energy intensive old MG sets were replaced with VVVF drives which were not purchased but were reclaimed ones from other applications. It has resulted in energy savings of 408 MWh and cost savings of Rs. 22.7 lakhs.

3. Installation of VVVF drive in 1 no. gas booster in Plate Mill Booster Station

This drive was idle asset of the Plant and it was lying idle in CO&CCD; it was salvaged and commissioned successfully. When we use conventional motor control system, in which AC motor is run at full speed, the flow of gas is

regulated using the damper/ throttle control. VVVF drive installation has eliminated damper/throttle control.

Energy Saving (kWh/year) = 2100 x 300 = 630000 kWh/year

Power saving of 630 MWh has been achieved with a cost saving of Rs. 35 lakhs per year.

4. Illumination control by use of LED flood lamps of 120 W in place of 500 W GLS in 4 Coke pusher machines & Voltage reduction in lighting circuit from 250 V to 230 V

This has resulted in a savings of 1300 MWh with an electrical energy cost saving of Rs. 72.2 lakhs.

5. Improvement of import P.F. from 0.98 (last year's average) to 0.985 by regular Monitoring (less kVA consumption)

This has resulted in a power saving of 707 MWh and cost saving of Rs. 26 lakhs annually.

6. Replacement of old & inefficient motor by energy efficient motor in Gas Cleaning Plant No. 4 of SMS-1.

The motor rating is 2.2 MW, and current drawn by the new energy efficient motor is less by 40 A. This has resulted in a power savings of 2378 MWh and a cost saving of Rs. 132 Lakhs per annum.

7. Stoppage of in-efficient equipment and installing energy efficient Oxygen and air production equipment

One block at OP-1 of 3.3 MW & 2 nos. air compressors of 2.4 MW were stopped because of their energy inefficiency and replaced with energy efficient oxygen and air production units. This has resulted in a savings of 183 lakh kWh and cost saving of Rs. 1017 Lakhs.

8. Installation of energy saving panels for street lights inside the plant

This has resulted in a savings of 9.180 MWh and cost saving of Rs. 0.5 Lakhs.

9. Coke Oven Batteries 2 and 10 commissioned

Both Coke Oven Batteries 2 and 10 are very old and had been taken up for repairs to improve their operational efficiency. Energy efficiency is closely linked with operational efficiency. After repair and recommissioning of the Coke Oven Batteries 2 and 10, the yield of Coke Oven gas (CO gas) in NM³/Ton of Dry Charge has improved from 307 in 2012-13 to 315 NM³/TDC in 2013-14, due to better carbonisation of coal and also due to reduced leakages of CO gas from battery doors and ovens.

Increased CO gas yield has resulted in increased availability of CO gas, which has in turn helped Bhilai Steel Plant to reduce the purchase of boiler coal for use

in Power Plant-I and consumption of Furnace Oil in Plate Mill and the Refractory Materials Plants.

Savings in boiler coal was around 189000 Tons and savings in FO was around 23000 KL. Cost saving was around Rs. 25000 Lakhs.

10. Replacement of air preheated blocks in 2 nos. Russian boilers at Power and Blowing Station to enable the consumption of more BF gas

Increased consumption of BF gas has enabled the decrease in consumption of CO gas which has in turn helped in reducing dependence on purchased fuels as well as optimum utilisation of available CO gas so that the operation of Rolling Mills could take place without gas delays. This has resulted in savings of 187560 GCal/year and a cost saving of Rs. 4274 Lakhs

11. Replacement of recuperates in Plate Mill and Rail & Structural Mill and optimisation of furnace operation in these mills, according to the production volumes and profile of product to be rolled

This has resulted in thermal energy saving to the tune of 142070 GCal and cost saving of Rs. 2979 Lakhs annually.