

# *UNIT PROFILE*



**VISAKHAPATNAM STEEL PLANT  
RASHTRIYA ISPAT NIGAM LTD**

## 1. UNIT PROFILE

Rashtriya Ispat Nigam Limited is the corporate entity of Visakhapatnam Steel Plant. The steel plant is located 26 km south of Visakhapatnam city. The company also has a blast furnace grade limestone captive mine at Jaggayapeta, a captive mine for dolomite at Madharam, a manganese ore captive mine at Cheepurupalli. All the captive mines are located in the state of Andhra Pradesh. It has also got a mining lease for river sand in river Champavathi.

The foundation stone of the steel plant was laid by the then prime minister on 20<sup>th</sup> January 1971 and the plant was dedicated to the nation on 1<sup>st</sup> August 1992 by the then prime minister. The main facilities of the plant are detailed at Fig 1. The plant has a capacity to produce 2.656 Mt of saleable steel of which 2.410 Mt is finished steel.

Sl. No.	Department	Unit	Capacity
1	Coke oven	3 coke oven batteries of 67 ovens each, of height 7 m, with 100% dry quenching.	2.261 Mt of blast furnace coke
2	Sinter plant	2 sinter machines with 312 sq.m grate area	5.256 Mt gross sinter
3	Blast furnace	2 nos. 3200 cum blast furnaces with bell less top equipment and cast house slag granulation	3.4 Mt hot metal
4	Steel melting shop	3 nos. 133 cum LD converter with 6 nos. 4 strands bloom casters	3.0 Mt liquid steel 2.82 Mt cast bloom
5	Light and medium merchant mill	7 stands continuous billet mill and 26 stands 2 strands continuous bar mill with tempcore facility for rebar rolling	1.857 Mt billets 0.710 Mt bar products
6	Wire rod mill	4 strands 61 stands continuous mill with stelmor cooling	0.850 Mt wire rods
7	Medium merchant and structural mill	20 stands continuous mill	0.850 Mt medium structural products

**Fig 1 : Main facilities of the plant**

Besides receiving raw materials from the captive sources, the steel plant meets its iron ore requirements from Bailadilla mines of National Mineral Development Corporation, coking coal requirements through imports and coal washeries of Coal India Limited, SMS grade limestone through imports, quartzite requirements through purchase and boiler coal from the coal mines of Mahanadi Coal Limited.

The product profile of the plant comprises of wire rods, rounds, reinforcement bars (rebars), angles, channels, beams, squares, billets and blooms. The product profile also includes basic grade pig iron, granulated slag, coal chemicals and other by-products. The plant also exports power to AP Transco from its captive power plant.

The steel plant has many technological features, which are unique amongst the steel plants in the country. The company is a pioneer in introducing many new technologies in the country. The production of TMT rebars by tempcore process is



a shining example in this respect. Because of high level of technology existing throughout the plant, the company has a very good manufacturing capability to meet the needs of various customers.

Human resource initiatives at RINL are closely linked to the corporate strategy of the organisation. It has exemplary industrial relations where the entire work force (both executives and non-executives) works as a well-knit team for the progress of the company. Participative management, by involving cross-section of the employees, in development of the policy and strategy is actively implemented in the company. The productive wholesome environment provides an atmosphere of growth, both for the

employees as well as for the company. The welfare measures provided for the employees of the company are the best in the industry.

With the availability of the positive growth environment, the company is registering a steady and consistent up trend in the performance. It is achieving both incremental improvements as well as breakthrough improvements in its various performance measures. The theory of "success begets success" is very much visible here.

Exceeding of up rated capacities, which once seemed to be impossible, is a reality today. Records are being created only to be broken again. The company's rating amongst the largest steel producing companies in the world, as published by IISI is continuously improving.

## II. Energy Consumption:

Steel making is energy intensive in nature and hence uses various types of energies for reduction of oxides and process heating. The main energy inputs are boiler coal (for power generation), furnace oil (in re-heating furnaces and boilers) and diesel. The electricity requirements were met from captive generation as well as imported from Grid. Surplus electricity is exported to grid. 96% of by product gases (Coke oven gas, Blast Furnace gas, LD gas) generated during the process of steel making at various stages are used for process heating. By-product liquid fuel (coal tar fuel) is used in kilns. The total energy consumption of main inputs and their monetary value during the last three years is given at Fig 2. The percentage of energy consumption in terms of manufacturing cost, for which coking coal and coke is considered in the energy bill, though these are mainly used as raw materials, is also detailed in Fig.2. The specific energy consumption and petrol-fuel consumption for the last three years is detailed at Fig 3 and Fig 4.

Type of fuel	Unit	2005-06	2006-07	2007-08
Coking coal	t	3250515	3278504	3227022
Coke	t	327328	247558	276601
Boiler coal	t	1429408	1373407	1352929
Furnace oil	K L	1049.494	533.834	534
Diesel	K L	2886.611	2309.947	2397
Electricity purchased	Lakhs K W H	979.28	1159.3	1196.76
Electricity exported	Lakhs K W H	1067.6	1437.0	798.7
Electricity consumption	Lakhs K W H	19737.8	19590.3	19264.1
Monetary value of energy consumed				
Coking coal	Rs.lakhs	170410	184144	167567
Coke	Rs.lakhs	36441	22369	33117
Boiler coal	Rs.lakhs	15566	15313	16817
Furnace oil	Rs.lakhs	131	74	75
Diesel	Rs.lakhs	879	781	736
Electricity purchased	Rs.lakhs	5608	6589	6495.03
Electricity exported	Rs.lakhs	2648.7	3595.4	2233.2
Energy cost	Rs.lakhs	226387	225675	222574
Manufacturing cost	Rs.lakhs	482825	533990	605960
% energy consumption in manufacturing cost		47	42	37

Fig. 2: Energy Consumption

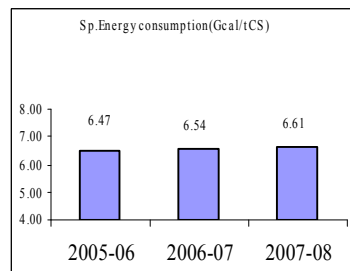


Fig.3

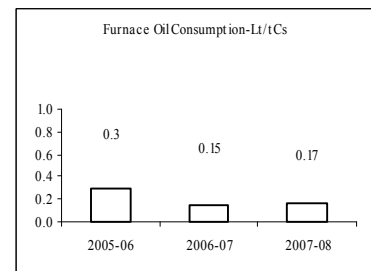


Fig.4

## III. Energy conservation commitment, policy and set-up:

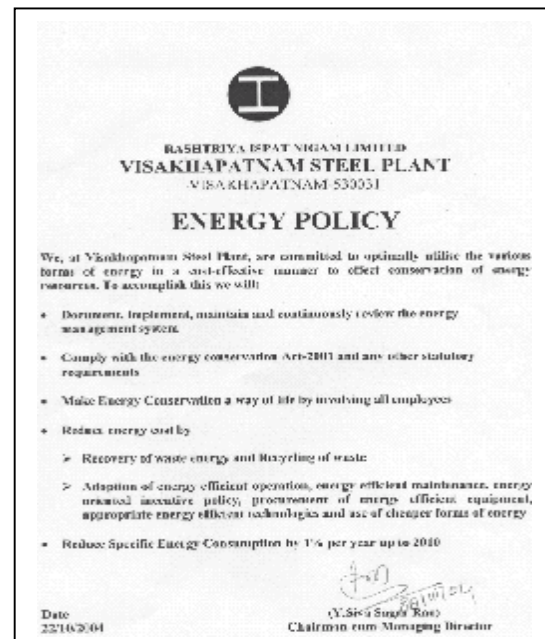
RINL has focussed on energy conservation in the design stage itself by adopting various types of waste energy recovery facilities like coke dry quenching, back pressure turbine station, gas expansion turbine station, LD gas recovery system, Supervisory control and data acquisition system,

evaporative cooling systems etc. These facilities are contributing significantly in reducing the wastage of energy.

The commitment to energy conservation has reflected in the energy policy of RINL where in it is committed to reduce specific energy consumption by 1% per year up to 2010AD. The Energy policy is given below

The energy conservation activities are reviewed at apex level on regular basis through various review meetings (Co-ordination meetings, cost control meetings).

To monitor energy conservation activities, RINL has Energy Management Department headed by Dy. General Manager. He reports to General Manager(Utilities) who is also the Designated Energy Manager of the company. The Energy Management Department monitors the levels of specific energy consumption on daily basis and provides base line information to top management for initiating appropriate action. RINL follows a cost effective energy conservation policy. Improving process management and increasing waste energy recovery from the existing facilities ( CDCP,BPTS,GETS,ECS etc) by actively involving people is the strategy adopted for conservation of Energy. Involvement of people at working level in large numbers is achieved by formation of Departmental Energy Teams (DET).The team consists of people from all functional disciplines(Mechanical, Operation, Electrical & Instrumentation etc). QIP's are formed for energy conservation as a part of ISO-9000 and management objectives are taken on energy conservation as a part of ISO-14001.Awareness on conservation of energy at various levels is brought through month long energy conservation celebrations. Employees are empowered by encouraging suggestions and quality circles. RINL has successfully implemented strategy of minimizing petrofuel consumption by augmenting by product gases generation as well as usage.



To increase awareness among VSP collective, energy conservation programmes were conducted at departmental level. About 3000 employees were covered in this programme. Various training programmes like Waste management, Energy Management & Audit were conducted to employees. About 250 employees were covered. Energy Conservation Month Celebrations were conducted from 14th December to 13th December by conducting various competitions among employees of VSP. As part of energy conservation month celebrations, RINL conducted an innovative Quiz namely *Telequiz* for raising awareness on energy conservation. It was an overwhelming success. Various competitions for school children were conducted and the painting competition in particular evoked tremendous response from the school children and children portrayed the need for energy conservation in very attractive way. Awards

were given away to best implemented suggestions during energy conservation month celebrations, various competitions like best technical presentation, best energy auditor, best departmental energy teams. To assess the performance, RINL introduced panel of judges concept, where in few general managers had evaluated the teams performance objectively. To broad base energy conservation movement, RINL has included Non-executive employees also in the existing departmental energy teams. To further expand energy conservation movement, RINL has formed departmental energy teams in T&DC, administration, central electrical maintenance, afforestation. RINL has launched renewable energy policy for VSP. To encourage petro crops, RINL has planted 85000 jatropha and pongamia saplings in an estimated area of 350 hectares. RINL expects to produce equivalent bio-diesel of 2550 tonnes by 2012. As part of Energy Conservation week celebrations, RINL conducted various competitions to increase awareness among VSP employees and school children.

As part of National Campaign on Energy Conservation initiated by Bureau of Energy Efficiency, RINL has undertaken various training programmes to increase Energy conservation awareness. Energy Conservation Awareness Campaign to School children of Ukkunagaram Schools. 320 School children were covered. Another programme aimed at bringing awareness on LPG and Energy conservation among house wives of Ukkunagaram was conducted namely "Energy Conservation@home" and 220 house wives were covered.

#### IV. Energy Conservation Achievements

During the last three years, RINL implemented energy saving ideas generated from various sources. The departmental energy teams have taken many initiatives in electrical energy and thermal energy consumption and contributed significantly in reducing energy consumption. Some of the energy conservation projects implemented during the year are:

- Reduction electricity consumption at Water management pump houses by reducing number of running pumps in Pump House – 09 and modification in lighting system
- Reducing coal requirement in Coke ovens by recycling of Tar sludge, Benzol muck, coke dust, crude benzol sludge, ASP sludge and MBC sludge in to coke ovens
- Reducing electricity consumption in Coke Ovens by installation of Variable Frequency drives in Coke Ovens at CDCP Ventilation fans, Coke sorting plant Dust extraction system fans etc.
- Reducing Nitrogen consumption at Coke Ovens by optimizing usage in mill fans and reducing leakage in fan recirculation system
- Reducing Nitrogen Consumption at BF by adjusting top gas temperature
- Reduction of BF Gas bleeding by optimum gas distribution at SCADA.
- Improving LD Gas CV from 1781 to 1847 Kcal/Neum at SMS LD Converter by maintaining skirt pressure, avoiding simultaneous opening of both bottom gates to reduce puffing and air ingress, lance height correction etc.
- Reduction of specific power consumption at ASP through optimizing distillation column, installation of load manager, periodical cleaning of heat exchangers
- Reducing electricity consumption through installation of Electronic Controllers in ESPs of Boilers, Replacement of Fluorescent lamps with CFL
- Increasing feed water temperature by 10<sup>0</sup> by replacement of HP Heaters in Turbo generators.
- Improving Benzol Yield at Coke Ovens through nozzle modification and technological cleaning of scrubber no.4
- Reducing thermal energy consumption by replacement of Gas Recuperator & Air Recuperators in MMSM
- Reducing coke breeze requirement through usage of LD Slag in sinter & Iron making
- Reducing electricity consumption through replacement of existing chillers with eco friendly and energy efficient chillers in Chilled Water Plant -3

#### V. Energy Conservation Plans and Targets

The following projects are planned for implementation during the next 3 years, as given at Fig 5.

- Auxiliary fuel injection in Blast Furnaces.
- Additional stream for LD gas recovery
- Up gradation of SCADA
- Waste heat recovery from Hot sinter

**Fig 5: Energy conservation projects**

## VI. Environment and Safety

Environment protection measures have been incorporated in the design stage itself with an investment of Rs 488 cores. The major environment protection facilities are detailed at Fig 6.

The commitment towards Environment is enunciated through the company's Environment Policy. A copy of the same is enclosed. RINL obtained ISO 14001:1996 for Environmental Management System.

- Elaborate dust extraction systems at all production units
- Mechanical, Biological and Chemical Treatment Plant for treating toxic effluents.
- Sewage treatment plants for effluent treatment

**Fig6: Environmental protection facilities**

Solid waste recycling has been given prime importance in RINL. Some of the fresh initiatives taken during the year at RINL are given at Fig 7.

As a commitment towards Safety and occupational health, RINL is following occupational health and Safety Management Systems (OHSAS: 18001:1999). Towards, this, RINL has formulated Occupational health and safety policy. The Occupational health Service and Research Centre is carrying out many activities as part of Occupational health and safety policy.

- *Recycling of BF gas sludge into Sinter plant*
- *Recycling of GCM sludge*
- *Usage of LD slag in Sinter plant, Blast Furnaces, Steel Melt Shop.*
- *Recycling of Benzol muck and tar sludge*
- *Usage of coke dust in coke ovens*
- *Usage of MBC sludge, ASP sludge and Coke dust ludge in coke.*

The efforts of RINL are being recognised by various forums. Conservation Award in Integrated Steel Sector, RINL has been bestowed with Prestigious "Prime Ministers Trophy-2003 & 2005" for Steel Industry for overall improvement. Some of the major awards received by RINL are given at Fig.8

In addition to National Energy

- ❖ Energy conservation awards (continuous) by Ministry of Power.
- ❖ PM Trophy for Best Steel Plant
- ❖ CII GBC award for excellence in Energy Management

Today RINL is moving forward with an aura of confidence and with pride amongst its employees, who are determined to give their best for the company, so that it can scale higher and higher heights.