

HINDALCO INDUSTRIES LIMITED
Renukoot, Sonbhadra (Uttar Pradesh)

Unit Profile

Hindalco Industries Ltd., the Flagship Company of Aditya Birla Group, India's one of the premium business houses was incorporated in 1958 and commercial production commenced in 1962. Company's principal products comprise of Aluminium Ingots, Aluminium Billets, Aluminium Wire Rods, Sheet Products, Extrusions, Aluminium Foils and Aluminium Alloy Wheels. The Company's by products include Gallium Metal, Vanadium Sludge and Aluminium Dross.

Hindalco, at Renukoot, houses a fully integrated plant, comprising of 3 main plants i.e. the Alumina, Smelter & Fabrication Plants. Each plant employs varying Technology. With integrated facilities, output from various plants is used by next, along with varying raw materials. Company has its own captive power plant at Renusagar (30 Km away from Renukoot) with installed capacity of 741.7 MW and 78 MW of Co Generation Plant at Renukoot itself.

Alumina Plant: - It was commissioned with an initial capacity of 40,000 MTPA, which has now increased, to 685,000 MTPA. The plant has been expanded in phases using new technology from time to time for energy efficiency and capacity enhancement. It employs the basic Bayer's process and the major raw materials for the plant are Bauxite, Steam, Caustic Soda and Furnace oil.

Aluminium Smelter: - It has 11 Potlines with 2067 Pots installed with annual production capacity of 3,45,000 MT. The Smelter employs the Hall Heroult Electrolysis Process for the extraction of Aluminium from Alumina. Basic raw materials for the smelter are Alumina, Power, Anodes and Aluminium Fluoride.

Fabrication Plant (Value Added Products): - The Fabrication Plant at Renukoot comprises of 4 Main Sections Remelt Shop, Cast House, Rolling Mills, Extrusion & Conform which produce Wire Rod, Sheets, Coils and Extruded Products.

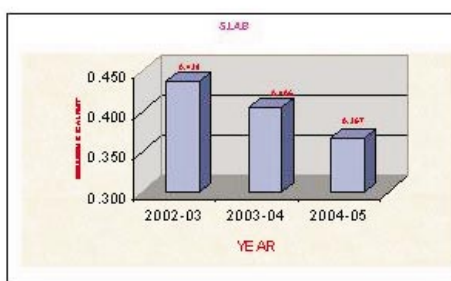
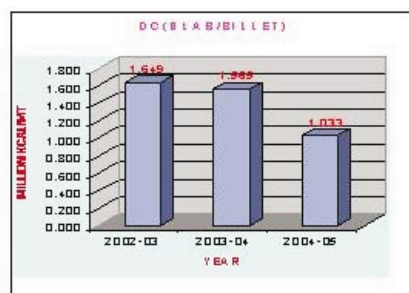
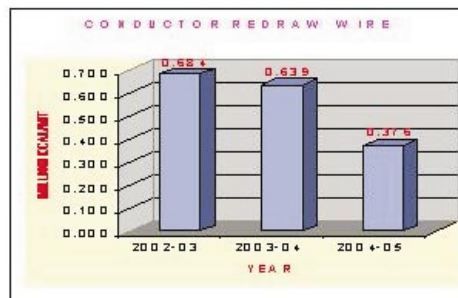
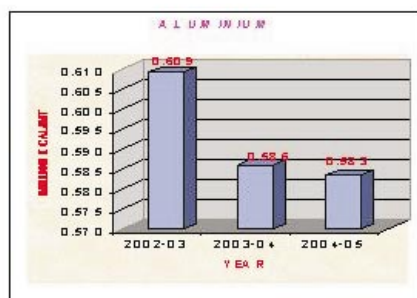
Hindalco, an ISO 14001, ISO 9002 and OHSAS 18001 Company, and has bagged 13 prestigious International & National Awards for Business Excellence, Quality, Energy Conservation and its efforts for preserving the Environment in last 4 years.

Energy Consumption

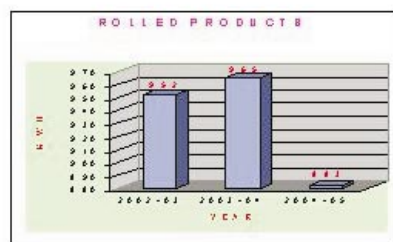
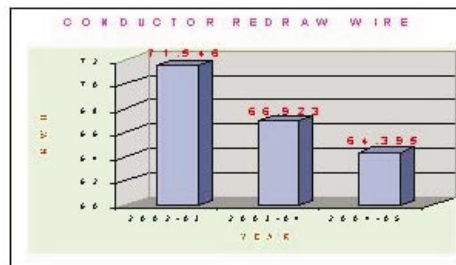
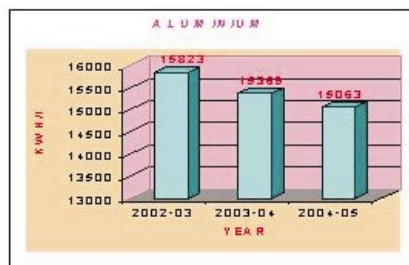
Manufacturing of Aluminium is a one of the most energy intensive process. The cost of Energy comprises about 40.78 % of the total input costs for producing Aluminium which has reduced from 41.1% of last year. Hindalco uses 3 type of Energy resources to manufacture Aluminium i.e. Coal, Oil and Electricity. Out of these three, electricity has the highest share (almost 77.78 % of total energy consumption). Total cost of energy for last year was Rs.699.44 crore, which includes Rs.95.746 crore for Fuel oil, Rs.543.72

crore for Electricity, Rs.54.387 crore for Coal & 5.2 crore for steam. Last year company consumed 450,549 MT of Coal, 79,719 KL of Fuel Oil and 56,144.64 Lakh kWh of Electricity. Due to sincere efforts in the direction of Energy Efficiency by the company there has been significant reduction in the consumption of energy.

SPECIFIC ENERGY CONSUMPTION (THERMAL) TRENDS



SPECIFIC ENERGY CONSUMPTION (ELECTRICAL) TRENDS



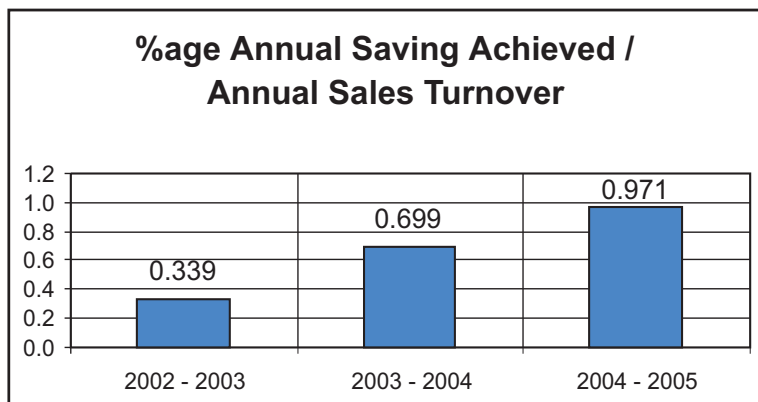
Energy Conservation Commitment, Policy and Set up

Energy Conservation continues to be focus area of the Company. The company has launched the Energy Policy to underscore its commitment to Energy Conservation. To inculcate awareness on the importance of Energy Conservation not only to the employees of the company but also to the society, the following setup is followed.

- Setting up a dedicated Energy Cell with following agenda to enable the Company to reduce specific energy consumption on continual basis and thus becoming one of the lowest cost producers in the World.
 - to identify potential area for energy saving in consultation with department
 - to take care of latest technological developments in the field of energy conservation
 - to suggests measures for better energy efficiency for the implementation in the operating plant and new projects.
 - to monitor the quantum of energy saved on account of energy conservation initiatives.
- Arrange Energy awareness program for School Children.
- Energy Conservation program for Housewives on “Cooking Gas – Proper Utilization of LPG”, “Saving Energy at Home”.
- Training program on “Fan engineering” for staff.
- In-house training program for staff & workmen for “Improved work practices for fuel efficient operation of Furnaces”, “Fuel & Furnaces” & “Cooling Tower”.
- Company encourages continuous improvement through **small group activities** under aegis of WCM in areas of Cost reduction, energy efficiency, quality and productivity improvement.
- In line with “Energy Conservation Act -2001” the company has trained 10 engineer to acquire the certificate for “Certified Energy Manager/Auditor” awarded by BEE.
- The Company believes in all the modern techniques like TPM, Quality Circle, 5S, TQM, WCM etc. and is striving to become a World class Company in all its operations by creating awareness among employees towards energy conservation as well as resource conservation.
- The company has well-structured suggestion schemes to encourage employee to give their suggestions for energy conservation and employees are suitably rewarded for viable suggestions.
- Since the company has strong commitment towards Energy Conservation, the projects, which require investments, are normally approved. Company takes special care to allocate funds for these projects.

Energy Conservation Achievements





The company has been receiving National Energy Conservation Awards, continuously since 1995. During 2002-2005 company has implemented 174 measures to improve Energy Efficiency (including capacity enhancement) by investing Rs. 522.80 Crore which resulted in a saving of energy worth Rs. 62.94 Crore / Year and also increased production.



| YEAR | No of Suggestions | ACHIEVEMENTS OF ENERGY SAVING (PER YEAR BASIS) | | |
|-----------|-------------------|--|------------------|-----------------|
| | | POWER LAKHS KWH | THERMAL (M Kcal) | TOTAL RS. LAKHS |
| 2002-2003 | 44 | 171.03 | 218130.02 | 804.72 |
| 2003-2004 | 60 | 1226.74 | 31778.99 | 2094.68 |
| 2004-2005 | 68 | 1403.96 | 297826.63 | 3428.50 |
| Total | 174 | 2801.74 | 547735.64 | 6294.56 |

MAJOR PROJECTS IMPLEMENTED DURING THE YEAR 2004-2005 ARE LISTED BELOW :

| | |
|--|--|
| <p>Revamping of evaporation unit- II to increase steam economy.</p> <p>Technical & Financial Analysis: -</p> <p>Saving of Steam = 0.55 TPH</p> <p>Coal consumption per ton steam = 0.236 MT</p> <p>Coal saved (0.55*0.236*24*356) = 1109 MT/Year</p> <p>Money Saved @ Rs.1207.13/MT = 13.39 LPA</p> <p>Saving in Power = 1158612 kWh/Year</p> <p>Money Saved (Rs.1.60/kWH) = 18.54 Lakhs/Year</p> <p>Total Money saved = 31.93 Lakhs/Year</p> | |
| <p>Bypassing of the secondary cyclones & providing DSM screen in ball mill circuits to increase throughput.</p> <p>Technical & Financial Analysis: -</p> <p>Energy Saving (3.81*73.5) = 3.81 kWh/MT</p> <p>= 280.035 kWh/Day</p> <p>Annual energy saving (280.035*24*356) = 2392619 kWh/Year</p> <p>Money saving (Rs.1.60/kWH) = 38.28 Lakhs/Year</p> | |

| | |
|---|---|
| <p>Optimization of process parameter and loading in calciner to reduce the specific energy consumption.</p> <p>Technical & Financial Analysis: -</p> <p>Fuel oil saved (2.10*662064) = 2.10 Ltr/MT = 1390.33 KL/Year</p> <p>Money saved (@Rs.12010.41/KL) = 166.98 Lakhs/Year</p> |  |
| <p>Installation of condensate recovery pot in paste plant.</p> <p>Technical & Financial Analysis: -</p> <p>Steam consumption reduced = 0.5 TPH Annual Steam saved (0.5*24*350) = 4200 MT/Year Annual Coal Saved (@0.236/MT) = 991.20 MT/Year Money saved (Rs.1207.13/MT) = 11.97 Lakhs/Year</p> |  |
| <p>Optimization of line load, reduction metal tapping interval & change of anode covering material to reduce the specific energy consumption in smelter.</p> <p>Technical & Financial Analysis: -</p> <p>Specific energy saved over last year = 228 DC kWh/MT DC to AC conversion = 1.0269 Net Energy saved = 234 kWh/MT Metal Production in FY 04-05 = 343164.598 MT Annual Energy saved = 80300516kWH/Year Money saved (Rs1.60/kWH) = 1284.81 Lakhs/Year</p> |  |
| <p>Installation of scrap shredding & bailing machine to reduce the melt loss and specific oil consumption in slab casting.</p> <p>Technical & Financial Analysis: -</p> <p>Total Oil saving = 56.40 KL/Year Price of Fuel Oil = Rs.12010.41/KL Oil Saving per year = Rs.6.77 Lakhs/Year Melt Loss Saving = Rs.33.35 Lakhs Total saving = 40.12 Lakhs/Year</p> |  |
| <p>Increase in through put of properzi re – draw rod by increasing mould size, mill speed & NRT</p> <p>Technical & Financial Analysis: -</p> <p>Furnace Oil Saving (0.5*64161/1000) = 32.08 KL Total Saving (32.08*12010/100000) = 3.85 Lakhs</p> |  |

Modification in recuperator to increase its efficiency.

Technical & Financial Analysis: -

Gain in temperature (250-200) = 50 °C
 (1% fuel can be saved by increasing combustion air temp. 22 ° C)
 Saving in Fuel = 2 %
 Furnace Oil Saving(64161*(35.5-34.5)/1000)
 = 64.161 KL
 Monetary Saving (Furnace Oil Cost RS 12010/ KL)
 (64.161*12010/100000) = 7.70 Lakhs/Yr.



Provided V.V.F. drive for 50mm shear hydraulic motor in bliss hot mill.

Technical & Financial Analysis: -

Energy Saving (368+144-368) = 144 kW/ day
 = 144*360 = 51960 kWh / Yr.
 Total Saving (1.60 * 51960) = 0.83 Lakhs



In addition of above following 58 major projects have been implemented during 04 - 05 having annualized saving of Rs.1842.03 Lakhs with an investment of Rs.16631.57 Lakh.

- Use HP steam from a sister concern to create opportunity for more power generation at Co-generation Plant.
- Installation of condensate pots in place of maintenance intensive steam traps to save steam skippage.
- Mechanical cleaning of heaters replaced by less energy intensive chemical cleaning.
- A separate header erected to overcome dual problems of less power generation and inadequate supply of 100-psig steam to Alumina Plant.
- Modified The Lime Feed Circuit by bypassing lime holding tank thereby reducing running of its pump and agitator and feeding lime directly to Mud Causticisation Tank.
- Steam consumption reduced by feeding the lime in Ball Mill # 4 & 7 in place of Disilication Tank # 6.
- Modified the bad condensate circuit of Clarification area MC Unit to stop dual operation of pump.
- Replaced V-711 Valve by 14" knife valve equalizing lever of both cyclones over flow tanks and stopped the running of third pump of Cyclone over flow in seed Classification Area.
- Stopped The Running Of One Sump Pump, Which Was Used To Pump The Spent Liquor Tank Overflow.
- Reduction in sump pump operation by optimizing the feed flow of Settler according to flow from Digestion.
- Conversion Of Motor Connection From Delta To Star in tippler.
- Replacement Of 25 Hp Ventilation Fan With 800 Watt Exhaust Fan
- Replacement Of 125 Watt MV Lamp With 70 Watt Sodium Vapor Lamp
- Replacement Of 10 Watt Filament Type Indication Lamps With Led Type Lamp.
- Replacement Of Old And Inefficient Agitator
- Replaced 40 Watt Lamp With 1Watt Led Crane CRP

- Modification In Kaizen Gallery Lighting Circuit For Separation From The Main Light.
- Rationalization Of Illumination Level In Rodding Room
- Rationalization Of Illumination Level In Cathode Plant
- Implementations of closed loop control of Potline- 1, 2 , 3, 8, 9, 10 & 11 DSS Main Fan Inlet Dampers by monitoring motor current & other process parameters for energy saving.
- Provided door limit switch in Pot line # 5 to 7 DSS Blower Room light to avoid the unwanted glowing of lights.
- Modification in Compressor House Hot well Pump System.
- To Optimize The Running Of Office Air Conditioning Equipment Of Pot Line – 9 To 11.
- Separated Potline # 9 DSS Area Lighting Circuit From Receptical To Save Energy.
- Provided Logo In The Circuit Of Pot Line # 10 DSS Area Light & Controlled As Per Requirement To Avoid The Unnecessary Glowing Of Light.
- Pot Line # 7 & 8 Auxiliary MCC Light Controlled Through Limit Switches.
- Reduction In Compressed Air Consumption By Modification In Point Feeder Air Line Circuit In Pot Line-1.
- Modification In Gutter Alumina Handling System.
- Dss Bag House Diaphragm Solenoid Valve Hoses Replaced
- Elimination Of Vibration Screen From Secondary Silo Of Pot Line # 1 To 3
- Belt Conveyor Inter Locking & Optimum Loading To Save Operating Houses
- Compressed Air Saving At Master Belt Conveyor Tail Pulley.
- Modification At Secondary Silo Bag Houses To Eliminate The Bag House.
- Replacement Of Heater Type Air Drier With Refrigerated Type Air Drier.
- Elimination Of Idle Running Of Ai Welding Machine Bag Filter Fan.
- Modified The Lighting Circuit Of Pot room Crane Platform So That During Night 3 Bulbs Can Be Put Off Except One Bulb
- Modification In Alumina Handling System In Line # 4 Pilot Plant To Conserve Compressed Air.
- Use Of Metal Handling Cruce For Left Over Metal In The Snif Furnace During Alloy Change Instead Of Making The Solid Cake
- Reduction of Ingot Alloy Rejection In Pig Casting
- Modification In Control System Of Cooling Tower Fan Of Pig Ingot Casting Unit
- Revamping of Annealing Furnaces-1 & 2
- Provided V.V.F Drive for CPT Compressor Motor in Davy Cold mill
- Fuses provided for isolation of heater in Annealing Furnace no.1 to reduce cycle time due to grounding of heaters
- Reduction in speed of Fume exhaust fan of Davy Cold Cold Mill during roll change & Mill stoppage.
- Provide Off delay timer in Tension Leveler Line to avoid the idle running of Feeding Roll DC motor during line run.
- Timer provided in Caster for automatic control of lights
- Boiler # 1 Coal feeder (N & S):- ON & OFF switch was provided in the circuit for the 100 Watt bulb.(4 Nos)
- B # 1, 2 & 3 Door Limit Switch Provided in MCC room (3 Nos MCC) Total Tubes of 40 Watt-95 Nos

- Co - generation Stage-II in 50 MVA Transforemr-8 Nos. fans (500 Watt) were always running by circuit modification fan will start only at 68 degree centigrade and stop at 60 degree centigrade in auto.
- Co-generation Stage-II 20 Nos., 125 Watt Lights circuit changed and provide manual ON/OFF switching as and when required.
- By using Energy saving lamps (26 Watt X2 Nos.) in place of 125 Watt of MVL (6 Nos)
- Installation Of Energy Efficient Centrifugal Compressor In Boiler & Co-Generation
- Installation Of Co-Generation Unit # 2.
- Installation Of VAM Air Conditioning System In Boiler & Co-Gen Area.
- Installation Of Hydro Turbine For Generating The Power For Chemical Dosing Pump Operation Using The Head Available In Make Up Water Of Cooling Tower
- Energy Saving At Refractory Godown Cum Mould Making Area.
- Reduction of surface heat loss from Salt bath furnace at R& D Shop
- Energy saving by reduction in running of domestic water pumps
- Reduction of specific Energy Consumption in Raw material handling by Wagon Tippler.

Besides above a number of energy conservation projects have been completed through **Small Group Activities**; only some of these have been included above.

Energy Conservation Plans and Targets

The following energy conservation projects are under active implementation during the financial year 2005-2006.

| | Energy conservation measures (planned) | Anticipated Savings in Rs in Lakhs | Approx. Investment (Rs. Lakhs) | Project commencement and completion year |
|---|---|---|---------------------------------------|---|
| 1 | To convert existing high temperature Digestion technology with energy efficient Double digestion technology | 1015.50 | 13200.00 | 2007 |
| 2 | Additional smaller capacity pumps and motors - To avoid duplicate pump running leading to power savings | 129.82 | 27.56 | 2006 |
| 3 | Sequencing of Evaporation units, increasing water circulation rate, upgradation of cooling tower for enhancing vacuum to increase evaporation rate and steam economy. | Under formulation | Under formulation | 2006 |
| 4 | Replacement of fluid couplings by direct couplings in Press filtrate pumps having 450 Hpdrive and PPT-Spent liquor pumps having 280 HP drive | 1.44 | NIL | 2005-06 |
| 5 | Installation of energy saver for lighting in Dig-III & Dig -ii area and thus reduce steam consumption. | 0.29 | 0.10 | 2005-06 |

| | | | | |
|----|--|--------|--------|---------------------------------------|
| 6 | Increase Stub diameter from existing 130 mm to 160 mm to reduce specific energy consumption (Presently this project is under trial on few pots and performance is being monitored. After successful trial it will be implemented in all the 11 pot lines.) | 762.23 | 290.50 | The time period is yet to be decided. |
| 7 | OPANOR treatment of anodes to reduce Net Carbon Consumption. | 153.72 | 484.00 | (Under Trial) |
| 8 | Use of Furnace oil in place of LDO in Slab & Billet casting regenerative type furnaces. | 369.33 | 38.00 | 2004-05 |
| 9 | Use of molten pitch in place of solid pitch to reduce steam consumption. | 31.70 | NIL | 2005-06 |
| 10 | To replace Dense Phase conveying system with Air slide to reduce the compressed air consumption in Pot line -4 DSS. | 4.43 | 10.71 | Mar'06 |
| 11 | Installation of recuperator in Alloy Ingot Casting Furnace to reduce the fuel oil consumption. | 34.28 | 9.00 | 2005-06 |
| 12 | Primary air slide fan & primary feed system blower to be stopped. | 0.55 | 0.50 | Mar'06 |
| 13 | FRP blades for cooling tower one fan. | 0.98 | 0.40 | Mar'06 |
| 14 | Individual point feeder operation. (Line II) (0.03% efficiency improvement. | 1.87 | 10.00 | Aug'05 |
| 15 | Potline- 4 to 11 Screening Area 43 nos. 250 watt MV lamp to be change with 125 Watt MV lamp | 0.71 | 0.56 | 2005-06 |
| 16 | To relocate the current monitoring system after the capacitor bank in Pot line # 4 first phase DDS fan. | 3.29 | NII | 2005-06 |
| 17 | To control the fan operation of Bail Press cooling tower fan of Slab Casting with temperature of cold water by providing temperature sensor. | 0.35 | 0.05 | 2005-06 |
| 18 | Air Conditioning System control with LOGO to switch OFF / ON Automatically to minimize the running of equipment of Pot line 9, 10 & 11 DSS control rooms. | 1.35 | 0.05 | 2005-06 |
| 19 | Capacitor bank to be provide in power circuit of spray water pump # 3 & 4 of Pot line 7 & 8. | 0.08 | 0.05 | 2005-06 |
| 20 | Revamping of Annealing Furnaces-3,4 & 5. | 6.34 | 48.00 | 2005-06 |

| | | | | |
|----|--|--------|-------|---------|
| 21 | Replacement of Crane Rail 15w indication lamps 99 no's by LED'S of 1 W | 0.19 | 0.26 | 2005-06 |
| 22 | To stop the idle running of fans in Junker Furnace | 0.72 | 0.00 | 2005-06 |
| 23 | To reduce specific fuel consumption in DC casting through optimizing the operating practices and minor modification. | 21.62 | 1.00 | 2005-06 |
| 24 | To install on line conductivity meter, Silica meter in DM Plant & CBD flow control operation from control room. For better monitoring of DM water quality. | 5.15 | 17.55 | Jun-05 |
| 25 | Installation of heat exchanger in new DM Plant to reduce the auxiliary steam consumption. | 20.00 | 30.00 | Jul-05 |
| 26 | Co-Gen stage-II TG MCC, UPS, Battery and Switch gear Room Door limit switch to be provided. | 0.56 | 0.02 | Mar-06 |
| 27 | By using Energy saving lamps (26 Watt X2 Nos.) in place of 125 Watt of MVL (10 Nos.) | 0.03 | 0.11 | Mar-06 |
| 28 | Replacement of high wattage light fitting with low wattage energy efficient fitting in different area | 0.29 | 0.346 | 2005-06 |
| 29 | Installation of Sewage treatment Plant for treating the sewage water of residential water and to use this water for plant process. | 101.29 | 650 | 2005-06 |

Environment and Safety

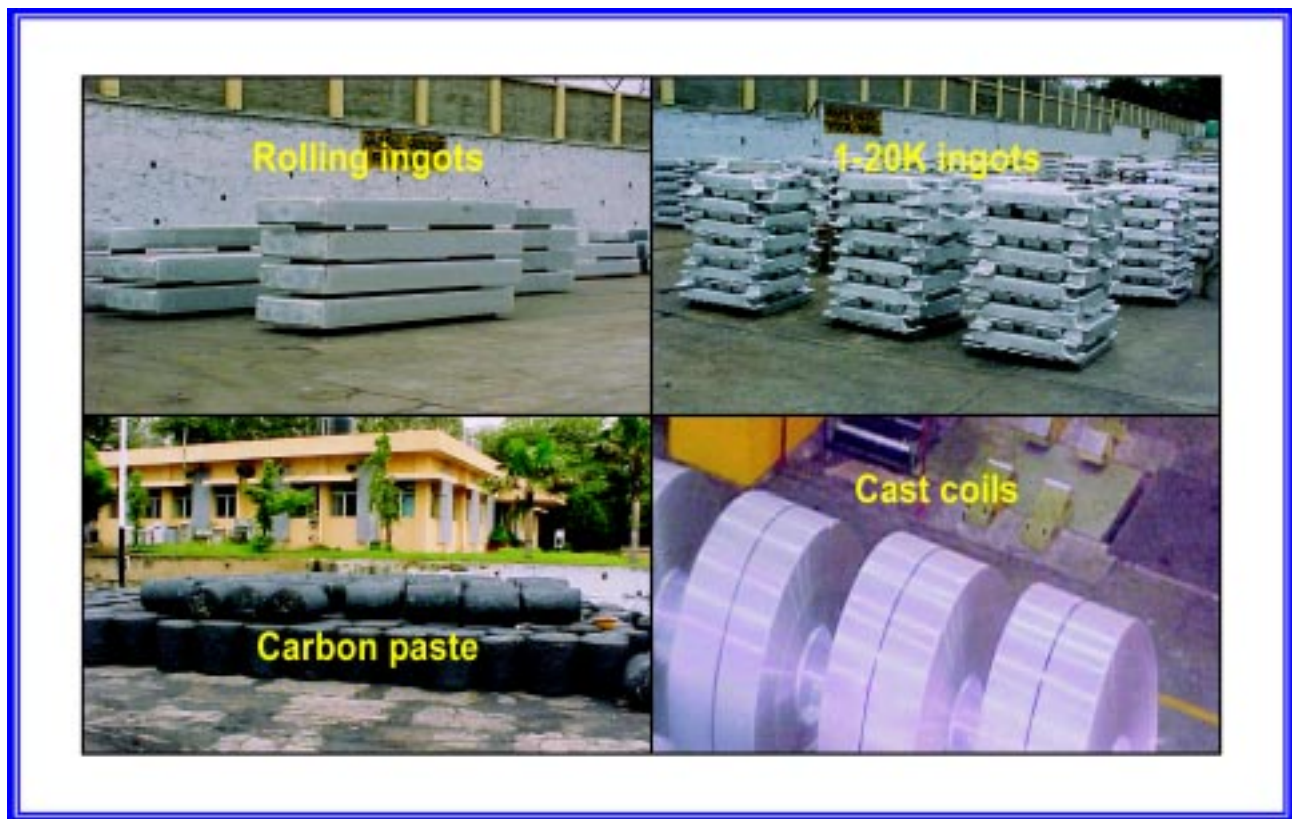
Hindalco Industries firmly believes in good corporate governance. The company is well aware & respects its obligations to the society and is committed to ensuring a pollution free and healthy environment to its employees and the community at large. This being the cornerstone of the company's work philosophy, all its business decisions are integrated with the environmental dimensions not only since inception but also during the continuous expansion phases. During the latest expansion to increase its annual metal producing capacity by approximately 100000 MT the company has ensured that the environment in and around the factory is pollution free and that the levels of pollutants are maintained within the prescribed limits.

Institutionalization of sound environmental management practices and striving for continual improvement in environmental performance has been the key guiding principle of the company through adoption of cleaner technologies and inculcating the culture of pollution prevention, waste minimization, maximizing treatment of inevitable wastes and environmentally compatible disposal systems.

HINDALCO INDUSTRIES LIMITED Hirakud Smelter, Hirakud (Orissa)

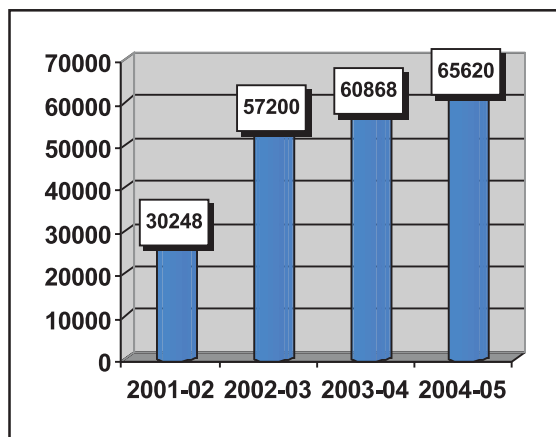
Unit Profile

Hindalco, Hirakud smelter produces primary aluminium (99.6% purity) and is presently having a capacity of 65000 MT per annum. The technology for production of aluminium is being done by HSS (**horizontal stud soderberg**). The HSS technology has become obsolete now a day, but the unit maintains high standard of performance and presently operating at its peak efficiency. The lining life of pots and paste consumption factor are some of the performance parameters where the unit has its own benchmark. Smelting of aluminium is being done by reduction method by the well-known process known as Hall Heroult process. The main raw material for production of primary aluminium is alumina and electricity. The smelter unit gets alumina from its sister plant **Muri Works** and electricity is being produced by its captive power plant, presently having capacity of 167.5 MW. Also the unit is connected to state grid for meeting power requirement during emergency situation. The main products of the units are **aluminium rolling ingots, cast coil and carbon paste**. The unit has the state of art continuous caster plant for producing cast coils. The products from the unit are preferred for all the down stream specialty products because of its purity and quality.

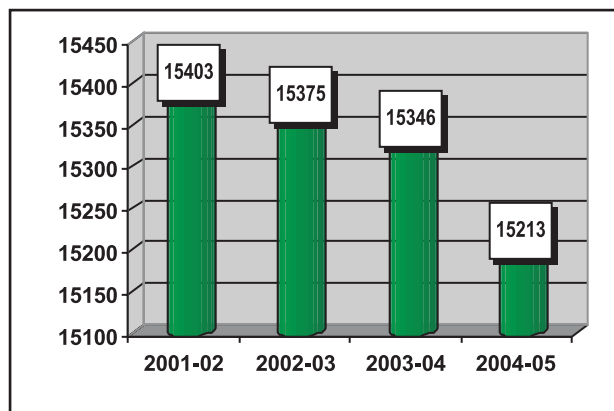


Energy Consumption

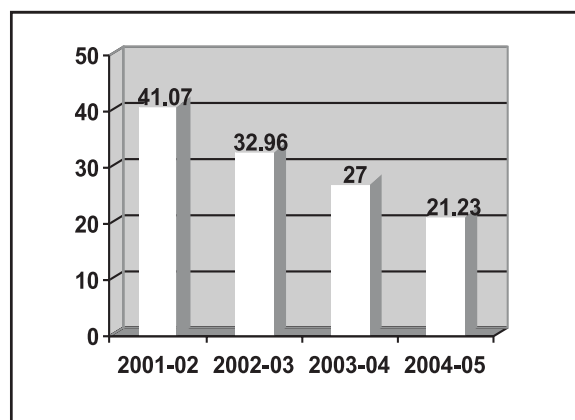
| DESCRIPTION | UNIT | 2002-03 | 2003-04 | 2004-05 |
|---|--------------|---------|---------|--------------|
| Annual production | MT | 57200 | 60868 | 65620 |
| Total electrical energy consumption/annum | Lakhs Kwh | 6494 | 10333 | 10930 |
| Specific energy consumption (electrical) | Kwh/tonne | 15375 | 15346 | 15213 |
| Total thermal energy consumption | Mkcal | 11152 | 14987 | 14340 |
| Specific energy consumption (fuel) | Litres/Tonne | 32.96 | 27.00 | 21.23 |



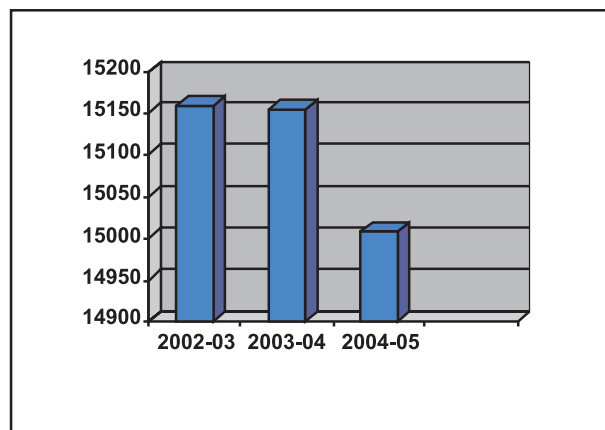
HOT METAL PRODUCTION



SPECIFIC ELECTRICAL ENERGY



SPECIFIC ENERGY (FUEL)



TOTAL DC ENERGY POT

Energy Conservation Commitment, Policy and Set up

HINDALCO's HIRAKUD Smelter management believes that energy and resource conservation are the two building blocks for HIRAKUD Smelter's sustainable development. The Plant has an **Environment and Resource Conservation (E&RC) cell** which primarily focuses on energy conservation in addition to environmental issues. The activities of E&RC cell are reviewed once a month. Measurement, monitoring, managing and implementing new small group activities / in-house projects/new technologies for energy conservation are the functions of this cell. The new proposals for energy conservation projects are discussed in the E&RC cell. Key issues like conducting energy audit through external agencies and financial approval for identified energy conservation projects also constitutes the agenda of the meeting.

In an unending endeavor to improve the energy efficiency and capacity utilisation, the unit has constituted an apex body namely **World Class Manufacturing (WCM) Steering Committee** which is headed by the Chief Executive. The World Class Manufacturing is a holistic approach which incorporates the key features of contemporary initiatives and guides to excel in the field of energy conservation, waste reduction and optimisation of resource consumption. Under this concept, excellence and competitiveness go hand in hand which facilitates and encourages all the employees to maintain abnormality free environment and operating conditions. WCM Steering Committee constitutes of 12 WCM sub committees under which there are 48 operating teams across the entire cross section of the plant.

As a continued effort towards achieving excellence in the field of energy conservation, a **Specific Energy Policy** has been formulated for HIRAKUD Complex, which reflects the commitments of the top management towards conservation of energy, resources and environment. The unit is in fact the first Indian Company in the aluminium sector to have formulated the energy policy. **The said policy was also made public by publishing it in one of the national newspaper "The Times of India" on 23 August 2002.**

Having formulated the Energy Policy & involving people through SGA approach, the next priority for the Plant is the consolidation of the fundamentals of the Small Group Activities (SGA) at the grass root level which is a challenge being faced by the HIRAKUD Smelter's management. For reaping the advantages and the benefits of a concept or a practice in order to add on to the bottomline of the company, the concepts and the practices adopted need to be streamlined in the form of a well adopted system. Having established and maintained three effective and internationally recognised systems viz Quality Management System ISO 9001, Environment Management System ISO 14001 and Occupational Health and Safety Assessment Series (OHSAS) 18001 at our HIRAKUD Smelter, we are in process of amalgamating the best practices of all the three systems and thereby evolving a new common system which will cater to the needs of all the three established systems besides the **Energy Conservation and Management** at Hindalco HIRAKUD Smelter.

Key best practices of HIRAKUD smelter

- First to formulate a comprehensive energy policy in aluminium sector in India.
- Adopt SGA as an integrated effort to achieve sustained energy saving
- Integration of SGA with ongoing WCM culture to derive better result
- Propagate SGA learning through experience sharing in TWO aluminium task force meeting

- Celebrate a week long (Dec-14-21) as energy conservation week.
- Propagation of ENCON movement to colony ladies and also near by schools
- Initiated the FUN AND LEARN tour with E. Railway to bring awareness among school children about energy and resource conservation
- SHARING the knowledge of SGA projects In other task force meeting
- Selected by BEE-GTZ to be filmed as a promoter of energy conservation in industries in 2004
- Initiated SGA in near by schools by lunching project
- Facilitate and conduct program for school children, employees and ladies through events, exhibition and competitions

Energy Conservation Achievements

| Year | No of SGA | Investment (Rs lakhs) | Savings (Rs lakhs) | Simple pay Back period |
|--------------|------------|--------------------------|-----------------------|---------------------------|
| 1999-2000 | 21 | 227 | 169 | 16 |
| 2000-2001 | 29 | 152 | 179 | 10 |
| 2001-2002 | 31 | 240 | 212 | 13.5 |
| 2002-2003 | 35 | 89 | 197 | 5.5 |
| 2003-2004 | 36 | 806 | 712 | 13.5 |
| 2004-2005 | 35 | 476 | 496 | 11.5 |
| Total | 187 | 1990 | 1965 | 12.1 |

List of innovative SGA projects in the year 04-05

- Modification of air slide blower
- Auto firing system of furnace A and B
- Optimization of carbon plant throughput
- VFD in rectifier cooling tower cold well pump motor
- VVFD for LT and CT of EOTC 1,2 and 3
- Lighting transformer for main and riverside colony
- Replacement of fuses by MCCB
- Common cooling tower for compressor house 2 and 3
- VVFD in old 1-20 K ingot casting machine
- Separate pump motor for 1-20K ingot casting machine
- Auto switch off of casting plant emergency water pump motor

- Digital pressure transmitter for compressor 2 and 3
- Optimization of cooling fans of rectifiers
- Use of 18 W and 36 W energy saver lamps in offices
- Replacement of low efficient induction motor with EE motor
- Replacement of 18.5 kW jockey pump motor by 7.5 kW motor
- By passing of cold well pump motor of R/S cooling tower during winter
- Installation of MRS

Sample innovative projects for the year 04-05:

1. Reduction of DC energy in pots:

DC energy constitute nearly 90 % of the total Electrical power in any aluminium smelter. Being in HSS technology again is more power intensive smelter. The installation of EPC (electronics pot controller) in the year 2002-03 has tremendous impact on DC energy. But suitable modification in software for anode effect predicting etc matching to the performance of the HSS technology has been carried out in the year 04-05 and also the report generation and data analysis taking the help of EPC has been strengthen for better effectiveness. The impact of these actions brought down the DC level from a value of 15153 Kwh/tonne to 15009 Kwh/tonne. Total saving achieved = 257.2 lakhs



2. lighting transformer for colony:

The lighting circuit of colony is being feed from the state grid and utilizes the incoming 440 V supply. As a result of this the lighting circuit gets approximately 250 V supply, which is relatively high as compared to the requirement. Hence a lighting transformer having 3 tap changing option with a bypass system has been installed to take care of the colony lights. The project is giving a recurring saving of Rs 10 lakhs with an investment of Rs 80,000/-



3. Air supply to fine bin chutes:

The air supply to the fine bins of carbon plant was continuous to avoid any interruption in material flow. The above process was consuming huge amount of compressed air. In order to avoid this separate solenoid valves are fitted in all the 4 bins and respective switches are given in the control room. Now the operator only allows the air flow if he finds any difficulty in the material movement. The project has given nearly 4.2 lakhs of saving with an investment of Rs 50,000/- only



4. Pressure transmitter for compressors:

Use of digital pressure transmitter for the load and unload of compressor bypassing the conventional pressure switches. The accurate arrangement and change in settings during peak and off-peak hours largely reduces the running hour of operation. The project has been implemented with an investment of Rs 3 lakhs and giving a recurring saving of 20 lakhs of rupees



MRS installation for stabilization of power supply



Integration of WCM and ENCON board at the entrance of the plant