



## Hindalco Industries Ltd. Hirakud Complex, (India)

Hindalco Industries Limited, metals Flagship Company of the Aditya Birla Group, is the industry leader in aluminium and copper. With a consolidated turnover of US\$18.7 billion, Hindalco is the world’s largest aluminium rolling company and one of Asia’s biggest producers of primary aluminium. Its state-of-art copper facility comprises a world-class copper smelter and a fertilizer plant along with a captive jetty. The copper smelter is among the world’s largest custom smelters at a single location.



HINDALCO INDUSTRIES LTD. HIRAKUD

### Organization Profile & Business Case

Hindalco Industries Ltd. Hirakud comprises an aluminium smelting plant & a captive power plant with a capacity of 216 KTPA & 467.5 MW respectively. Smelter plant has total 5 no. of plotlines with current capacity of 85 kA & 235 kA running in GAMI technology, Power plant has 5 units with 5 turbo-generator sets and 13 environment friendly CFBC boilers.

*“What we need to do is really improve energy efficiency standards, develop in renewable and alternative energy and use the one resource which we have in abundance, for creativity”*

—R K Gupta (Head – Sambalpur Cluster)

Case Study Snapshot	
Industry	Non – Ferrous Metals
Product/Service	Aluminum
Location	Sambalpur, India
Energy management system	ISO 50001
Energy performance improvement period	4 Years
Energy Performance Improvement (%) over improvement period	6.89%
Total energy cost savings over improvement period	14882055.6 USD
Cost to implement EnMS	4156.13 USD
Total Energy Savings over improvement period	90028 MTOE
Total CO <sub>2</sub> -e emission reduction over improvement period	240873 tCO <sub>2</sub>

### Salient Features of Hirakud Complex

- Location Selection – Near Water & Coal Body
- Whole plant modified by equipment’s with high energy efficiency
- Zero Liquid Discharge (ZLD) Plant
- 13 nos environment friendly technology boilers
- State of the art Cast Houses
- Young Workforce with an aptitude to save energy and environment
- All our 5 cast houses provides a total of 230 KT cold metal in form of sheets and rolling ingots to our own FRPs
- Our plant is connected to the world class rolling mill i.e. Hirakud FRP

**Drivers for energy and climate sustainability efforts, and goals**

At Hindalco, sustainability takes prime position. A Sustainability Board, comprising the top leadership team at Hindalco, under the leadership of the Managing Director oversees the company’s sustainability efforts. Hindalco has a well-rounded approach to sustainability – encompassing a variety of areas like sustainable mining practices, energy conservation, recycling, environment-friendly disposal of industrial wastes, safety practices, socio-economic development of the communities around the plant and empowerment of employees. Hindalco’s approach is to set clear policy and institutional framework, systematically monitor the performance, encourage continuous improvements and innovative practices, and deepen the dialogue with all stakeholders.

*“Every little bit counts, so rather looking for one big way to save a ton of energy, save in lots of small ways and get yourself up for success”*

- J P Nayak ( Head - Smelter)

We adopted the ISO 50001 – Energy Management System model of Continual Improvement since from the inception and committed to sustainable growth. Energy Management System (EnMS) provides a framework for establishing energy management best practice and helps us to improve the energy efficiency. This System enables us to establish, implement, maintain and review the Energy Policy, Objectives, Targets, Energy Performance Indicators (EnPIs) and Management Action Plans relating to Energy Performance.

We are high energy consuming industry, we need approx. 15000 kWh for producing 1 MT aluminum, and we have worked upon various fronts to become a benchmark figure in our category. We have targeted power plant efficiency, rectifier efficiency, electrolysis efficiency, and spent around USD 26326874 in 4 years.

The Company achieved a significant reduction in energy consumption, achieving a new milestone in energy consumption of the lowest 54.8 GJ/Tonne.

### Business Benefits

ISO 50001 allows Hindalco Industries Ltd. continually to monitor the energy use, and has helped businesses to make substantial reduction in energy cost. In addition,

there is market value for conforming to an internationally recognized standard, which enhance the brand and directly supports our Marketing strategy.

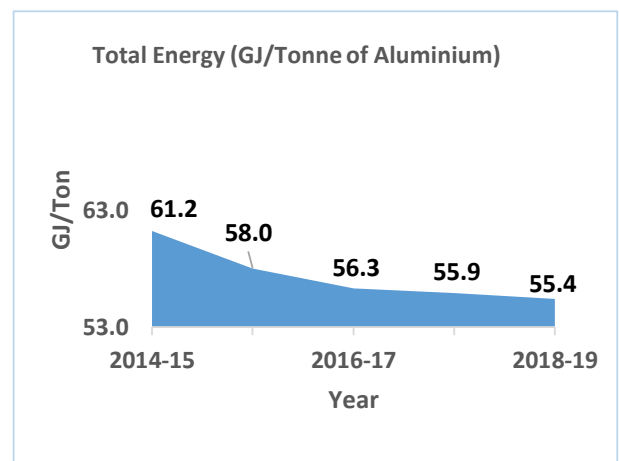
### Energy performance achievement

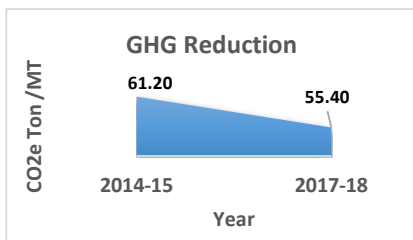
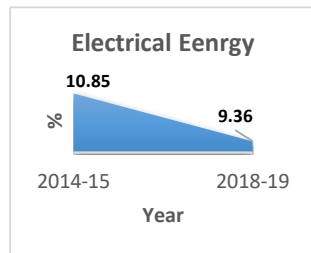
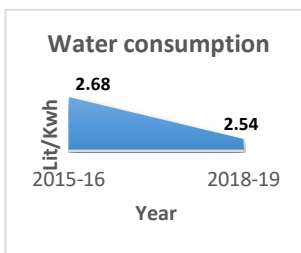
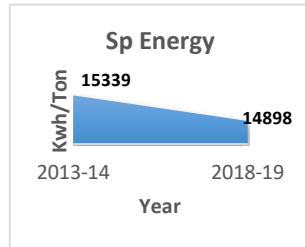
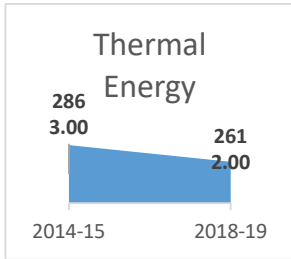
In FY-2018-19, we achieved a total energy benchmark level of **6.39 GJ/ Tonne of production** which is almost **11.65%** less than as compared to 2015-16, which resulted in phenomenal **6.63 %** reduction in Carbon Foot Print. Highlights of energy performance achievement during the period are as under:

- Reduction in thermal energy by **16%** and electrical energy by **5.63%**
- Helps in establishing state of art energy monitoring systems
- Increased energy efficiency awareness among employees at all levels
- Improves the ability of organizations to manage energy risks concerning possible impacts in an efficient and effective way.

### Other benefits

- Reduced water consumption by **5.5%**
- Regulatory and industry compliance Waste defect reduction Improved corporate image and credibility among customers, clients and stakeholders.





EnMS implementation cost and cost savings Energy projects implemented details

YEAR	Projects in (Nos)	savings in (ToE)	Savings in (USD)	Investment USD
2014-15	8	1359	381915	1142937
2015-16	20	37528.46	5817186	5734164
2016-17	13	11449	2107554	18152204
2017-18	17	5884	1210334	2208649
2018-19	22	35165.84	5748385	2964055
<b>Total</b>	<b>80</b>	<b>32834</b>	<b>14869418</b>	<b>29066273</b>

Operational savings (Without investment) – USD762426

Operational savings is 28.47% of total savings achieved

Plan

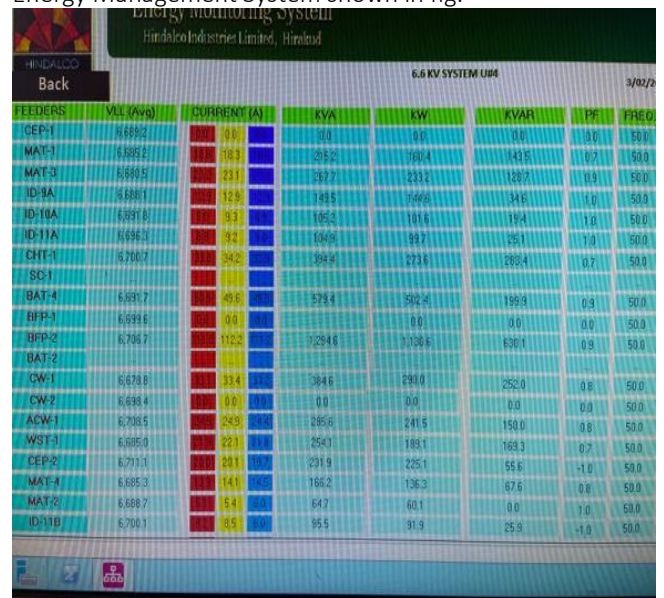
Management Commitment

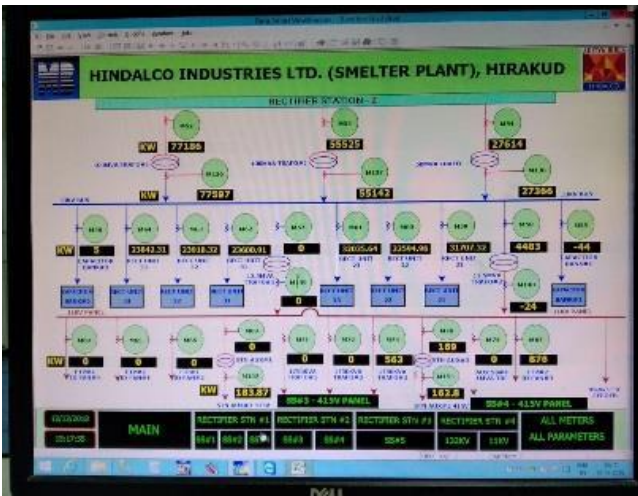
To demonstrate the top management commitment, an energy policy is formulated in accordance with the ISO 50001 requirement, and communicated throughout the organization. EnMS Team formed comprises of Energy Management Representative, a Certified Energy Manager and EnMS Coordinators from various departments that represent each department in the team.

Energy Planning

Based on ISO 50001, Energy review is performed. Our team performs the energy audit on monthly basis and we have an dedicated Energy Management system by which we monitor the energy consumption and the review is being conducted and the monthly action plan is been prepared for which the task force is being formed area wise.

Energy Management System shown in fig.



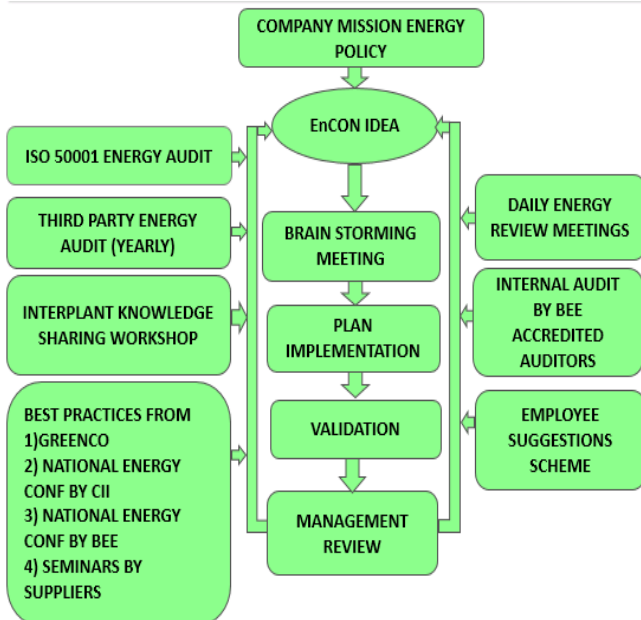


**Arriving Energy Baseline**

Base line energy is arrived by taking the average of last one-year energy consumption considering factors influence like capacity utilisation, climate change, new product development etc.

**Energy Strategy**

Our energy strategy is based on ISO 50001 systematic approach (plan-do-check and act). Please refer Figure



**Planning - Target setting**

**Energy audit** is being conducted every year by CTES (Corporate Technical Energy Services) of ABG group, and energy performance improvement opportunities are prioritized and planned to implement in next 12 months period with required CAPEX budget allotment. Target fixed is based on the base line energy value and planned energy improvement activities for the current financial year.

All legal requirements and other requirements are also taken in to account. Overall Energy Targets fixed and breakdown in to Area wise, Equipment wise and Component wise. As an example, target setting of plant’s electrical energy use is shown below.

ISO 50001 facilitates the clear understanding of Sustainable Energy Practices which helped our Organization become more energy efficient & sustainable.

**Do, Check, Act**

**Implementation process**

Top management has assigned the responsibility and authority to the energy management team to ensure that the EnMS is established, implemented, maintained and continually improved.

**Training and awareness creation**

Energy Management Team creates awareness for all employees and Stakeholders who are involved with the EnMS according to their role for successful implementation and maintenance of the system in following ways

Class room training, Visual aids / displaying posters, Small group discussion, Motivation by Awards & Recognition

**Communication**

We have an excellent system in place for both internal and external communication of information related to EnMS for our Employees, Stakeholders and interested parties, like Knowledge exchange platform, Power-Con, ABG Energy Portal, Kaizen mela, energy celebration week, Energy Webinar, Energy management system, Energy Metrics display, suggestion box and Monthly Communication Meeting.



ENERGY AWARENESS PROGRAM

**Operation control, documentation and procurement**

Operational criteria has been set for the effective operation and maintenance of significant energy uses to prevent from significant deviation and appropriately communicated the operational controls to our employees and relevant stakeholders and it has been well documented in terms of manuals, procedures, energy review Formats etc.

Green Procurement guideline have been formulated based on the inputs from Energy Management System and it has been mandated for all products and services, which have an impact to the significant energy use. As part of our sustainable practices, we insist our vendors to adopt the green practices there by we mutually get benefited.

**Energy monitoring system (EMS)**

Very advance EMS system connected with 675 Energy meters, which has the efficiency to monitor even 0.1% of energy consumption also.

System alerts the excess energy consumption immediately through E-mail helps to take appropriate actions immediately

**Top management support for implementation**

- Implementing, Maintaining and Reviewing the Energy Policy, Objectives, Targets, Energy Performance Indicators and Management Action Plans relating to Energy Performance. .
- Identification and allocation of resources for the system.
- Overall Review of the Energy Performance and Energy Management System.

- Ensure compliance with relevant Energy regulations.

**En Con -Project Selection Methodology**

**Key Energy performance activities implemented during the period**

- 100% VFD applications used for equipments.
- 100% plant lightings converted to LED lights
- Replacement of less efficient pumps with energy efficient pumps.
- Capacity reduction of identified pumps.
- Energy Savings thru operational excellence.
- Voltage optimization / Pf improvement thru installation of capacitor banks.
- Audit on Compressed air network.

**Best Practices:**

- Monthly Performance Guarantee tests for Boiler, TGs & Auxiliaries.
- Flow measurement of Critical / Non – Critical Pumps with a Pre – Defined schedule.
- Voltage / Pf Mapping, Voltage unbalance, Motor / Transformers loading criteria.
- Thermography of Boilers / TGs / Motors / Terminal Boxes etc.
- Leak detection thru Ultra sonic leak detectors.
- Identification of energy loss thru Ultra sonic leak detectors in Switchyards / HT / LT Panels.
- Planned shutdown / outage of equipment / Boilers / TGs based on findings of Performance guarantee tests, for efficiency improvement.

**Way Forward:**

- 1st time in India in Aluminum Sector, Replacement of dirty furnace oil by Coal gas to meet stringent environment norms / reduce pollution load.
- Conversion of Sambalpur Municipal solid waste into pallets / LDO to use in Boilers as an alternate fuel.
- Use of Bio Oxy booster to reduce moisture in Coal at Coal yard.
- Alternate fuel in Boilers, Natural Husk / Rice Husk.

**Energy performance validation**

**Internal audit** is being carried at regular 6 months period of intervals to make sure that the EnMS is in line with requirement of ISO 50001, and conforms to the established objectives, savings achievement and targets

met. Based on audit results required corrective and preventive actions are being initiated and implemented.

### Performance and target review

- Daily Review Meeting chaired by Plant Head
- Monthly Energy Review meeting chaired by Director Manufacturing
- Monthly Business Review Meeting chaired by President – India Operations
- EnMS Management Review Meeting chaired by Plant Head (UMR) – Half Yearly. UMR Review Energy Management Action Plans are implemented thus achieving the Energy Objectives and Targets relating to the various sections.

- Energy Management System makes us aware the potential risks of energy security and helps to address through renewable energy sources.
- Need of advanced energy monitoring to identify and eliminate the energy wastage.
- Integration with other management systems and standards, such as **ISO 14001**, **ISO 45001**, etc.
- Energy Management System implementation provides good respect and potential business from clients who prefer to associate with socially responsible and sustainable companies.

### Plant Energy Management Team

#### Transparency

Transparency allows us not only display our successes, but also honestly reflect upon our weaknesses, driving innovation and improvement.

We are voluntarily publishing our EnMS Performance in Sustainability Reporting as per GRI, GHG Report that is publically available on our Website. Moreover, we are participating in energy audit, water audit and environment related audit through BEE or CII.

### Awards and Accolades for Energy Management



### Lessons Learned

- Energy Management System is a major asset, which build a robust system that will maintain energy efficiency at all level of production
- Dedicated, trained and committed team to drive the project.

Through the Energy Management Working Group (EMWG), government officials worldwide share best practices and leverage their collective knowledge and experience to create high-impact national programs that accelerate the use of energy management systems in industry and commercial buildings. The EMWG was launched in 2010 by the Clean Energy Ministerial (CEM) and International Partnership for Energy Efficiency Cooperation (IPEEC).

For more information, please visit [www.cleanenergyministerial.org/energymanagement](http://www.cleanenergyministerial.org/energymanagement).