ISO 50001 Energy Management System
Case Study

INDIA

JK Tyre and Industries Ltd., Chennai Plant (India)

JK Tyre, the leading tyre manufacturers in India and the world at large. First Tyre Company in Asia certified for ISO 50001 and second in the World.

JK TYRE & INDUSTRIES LTD., CHENNAI TYRE PLANT

Case Study Snapshot	
Industry	Rubber
Product/Service	Tyre
Location	Chennai , India
Energy management system	ISO 50001
Energy performance improvement period	6 Years
Energy Performance Improvement (%) over improvement period	26.3 %
Total energy cost savings over improvement period	1,790,676 US $
Cost to implement EnMS	746,559 US $
Total Energy Savings over improvement period	124,821 (GJ)
Total CO_2-e emission reduction over improvement period	144932 CO_2-e Tons (reduction from the base year 2013-14)

Organization Profile & Business Case

Chennai Tyre Plant in Tamil Nadu, state of India, is the 6th manufacturing plant of JK Tyre with State of Art Machineries and Technologies which went on stream on 05th February 2012 and presently produces 4.5 million Passenger Car Radial (PCR) tyres and 1.2 million Truck / Bus Radial (TBR) tyres per year. Chennai Plant is one of most energy efficient Tyre plants in the world and awarded First Prize from Bureau of Energy Efficiency (Government of India) and National Energy Leader from Confederation of Indian Industry.

"ISO 50001 strives us towards the path of continual improvement in our overall energy performance, which make us one of the Energy efficient leaders in Tyre industries"

—K. A. Unni Nayar, Unit Head

Salient Features of Chennai Tyre Plant

- Location Selection – Automobile Hub
- Most technologically advanced plant
- Machinery selection with high energy efficiency
- Zero Liquid Discharge (ZLD) Plant
- Environment friendly technology considered during Plant Inception itself
- Usage of maximum day light
- Highly optimized WIP (Work In Progress) material flow
- Modular designs for seamless expansion
- Young Workforce with an aptitude to save energy and environment

Drivers for energy and climate sustainability efforts, and goals

Over the years, depleting natural resources and their increasing demand has led to the concept of sustainability. Companies all over the world are paying closer attention on integrating sustainability into their processes. At JK Tyre – Chennai Tyre Plant, we endeavor to make earth livable and our quest continues to strengthen our sustainability practices and remain accountable to all our stakeholders.

"Putting sustainability at the heart of JK Tyre's culture has undoubtedly given us a competitive edge and has made us one of the most sustainable companies in the industry"

- S K Satpathy, Engineering Head (EnMs MR)

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.

The Company achieved a significant reduction in energy consumption, achieving a new milestone in energy consumption of the lowest 8.84 GJ/Tonne of finished goods, which stands among three best tyre manufacturing companies in the global sector.

As one of the Energy Management Program, we are substituting fossil fuel energy with Renewable Energy. Presently 49% of Overall Plant Electrical Power Consumption is met through Renewable Sources (6MW Solar Power Plant installed on Roof Top and 15.2 MW through Wind Power) this resulted in continuous drop in our carbon footprint year-on-year basis. All the above being reinforced by our Top Management Strategies on Energy Management.

Business Benefits

ISO 50001 allows JK Tyre 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.

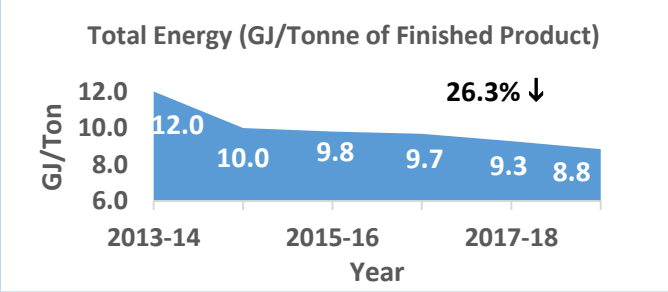
Energy performance achievement

In FY-2018-19, we achieved a total energy benchmark level of **8.84 GJ/ Tonne of production** which is almost **26.3%** less than as compared to **Base Year** (2013-14) and stands in the line with the top three best companies in the sector worldwide, which resulted in phenomenal **41.3%** reduction in Carbon Foot Print. Highlights of energy performance achievement during the period are as under:

- Reduction in energy cost by **20.7%**
- Reduction in thermal energy by **31%** and electrical energy by **17%**
- **30.1%** of total energy use is from renewable sources (Thermal -13% & Electrical – 17.1%)
- 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.

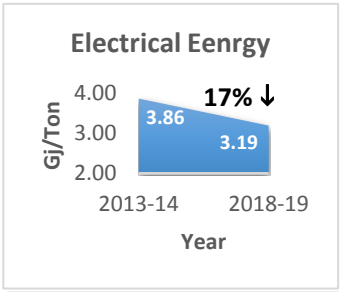
Other benefits

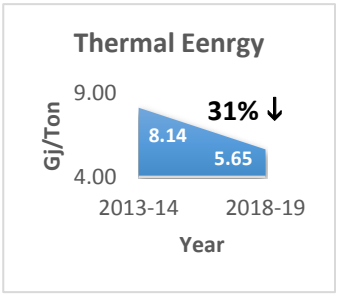
- Reduced water consumption by **56%**
- Regulatory and industry compliance
- Waste defect reduction
- Improved corporate image and credibility among customers, clients and stakeholders

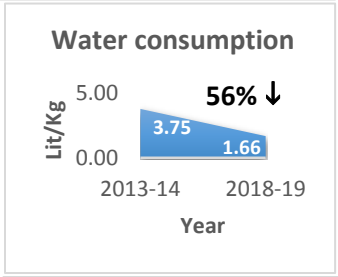


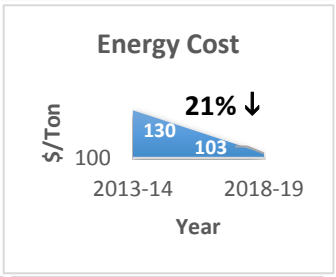
"Resource optimization with lower wastage is key to energy efficiency activities."

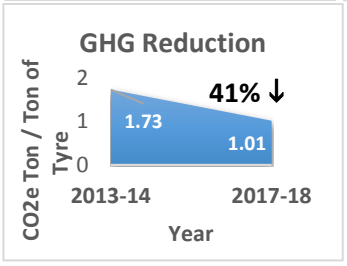
\- B Ramesh Kumar, Head EEI

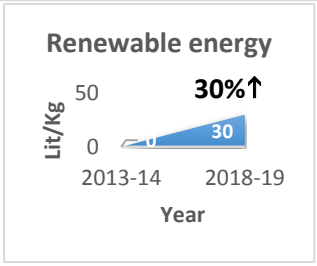












EnMS implementation cost and cost savings

Year	Activity	Cost (US $)
2013	Gap Assessment, audit consultancy, training and awareness program	4950
2013	Certification Audit	4250
2013	Energy Projects cost & trainings	3662
2014	Energy Projects cost & trainings	63662
2015	Projects, Energy audit & training	192592
2016	Projects, Energy audit & training	119649
2016	Recertification audit	4250
2017	Projects, Energy audit & training	159748
2018	Capacity building training and audit	4250
2018	Projects and Energy audit	189546
	TOTAL	746559

Energy projects implemented details

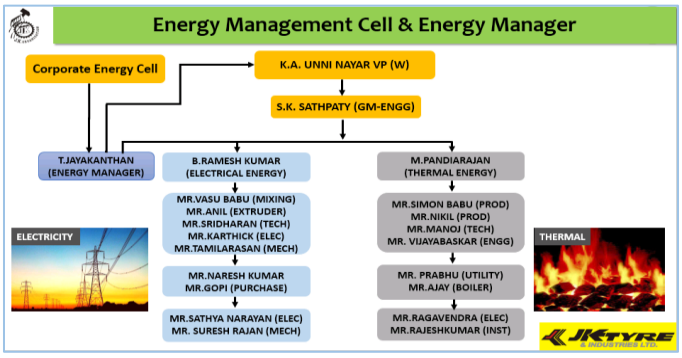
YEAR	Projects in (Nos)	savings in (GJ)	Savings in (US $)	Investment in (US $)	Payback (Months)
2013-14	14	35518	308732	3662	0.1
2014-15	10	4372	100704	63662	8
2015-16	19	11180	347465	188592	7
2016-17	16	17359	476479	111549	3
2017-18	12	43338	435352	154648	4
2018-19	12	13054	121944	186296	18
Total	83	124821	1790676	708408	5

Operational savings (Without investment) – 5.79 million US $
Savings from projects (with capital investment) – 12.11 million US $
Operational savings is 32.3% of total savings achieved

Plan

Management Commitment

To demonstrate the top management commitment, an energy policy is formulated in accordance with the ISO50001 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 plant.

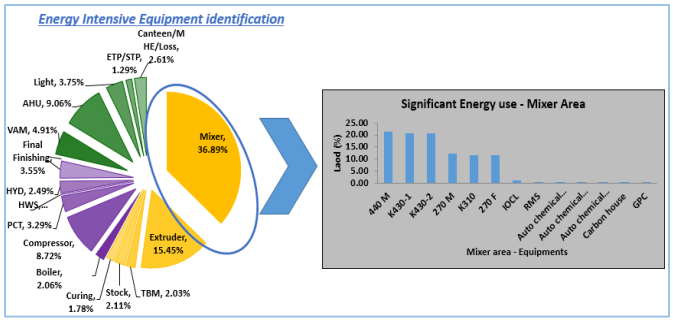


Energy Planning

Based on ISO 50001, Energy review is performed. From the review, thermal energy use was found to be the most significant energy use (65%) followed by electricity (35%). The specific energy use (EnPI) trend shows that the energy consumption is not directly proportional to the production and reveals that three components are contributing to the EnPI: **variable** (Proportional to Production), **Semi fixed** (Energy X Prod + Constant), and **Fixed** (Constant - irrespective of production).

The energy trend plotted for area wise, equipment wise and energy users has identified significant energy users and equipment's were identified, which allowed management to have a closer look at detailed energy consumption.

Sample energy profile shown in fig.



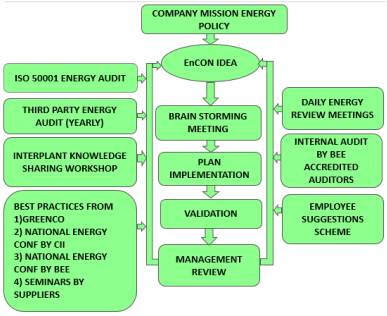
Arriving Energy Baseline

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

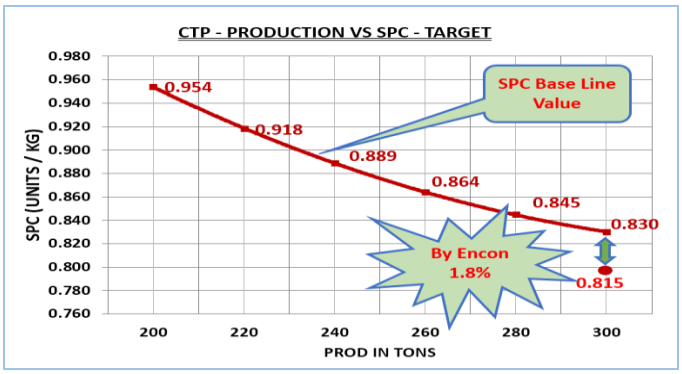
Our energy strategy is based on ISO 50001 systematic approach (plan-do-check and act).

Please refer Figure



Planning - Target setting

Energy audit is being conducted every year 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 in above fig.

ISO 50001 gave us the clear understanding on Sustainable Energy Practices, which helped our Organization become more sustainable.

A. K. Makkar, Manufacturing Director

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 like 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 Kiosk, Energy Scorecards, advance EnMS Software with Mobile Application, Energy Metrics display, suggestion box and Monthly Communication Meeting.

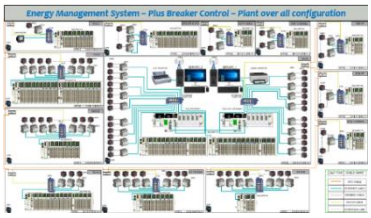
Operation control, documentation and procurement

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 1013 Energy meters and 256 Nos Breakers, which has the efficiency to monitor even 0.1% of energy consumption also.

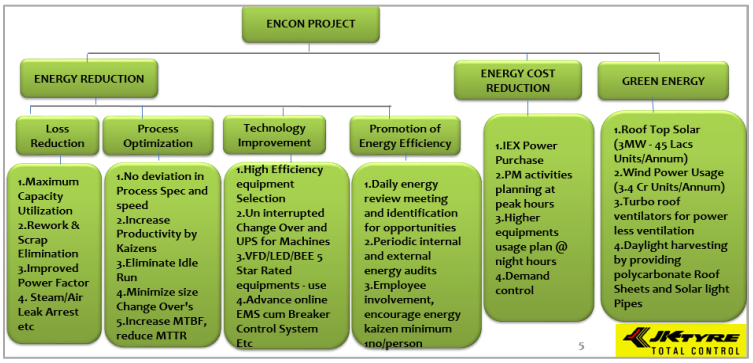


System alerts the excess energy consumption immediately through Auto SMS, and E-mail helps to take appropriate actions immediately

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

- Air ventilation fans performance improvement by replacing belt driven low efficiency centrifugal fans with high efficiency direct coupled axial fans
- Compressors energy reduction by installing intelligent flow controllers over and above VFD controls.
- ATS (Auto transfer switch) switch installed to avoid power interruption to equipment's during planned power changeover which eliminated product wastage
- UPS installed to critical machines to eliminate tyre scraps
- Nitrogen tyre curing introduced in place of Hot water tyre curing, hence hot water generation system completely eliminated
- 100% plant lightings converted to LED lights
- 100% VFD applications used for equipment
- Various projects implemented for steam and condensate recovery, boiler efficiency improvement, trap management and coal savings.

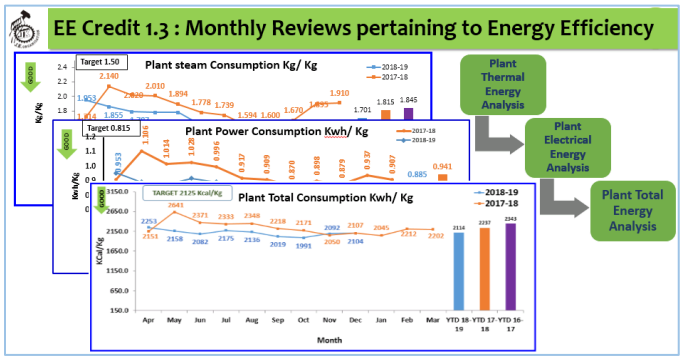
Energy performance validation

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.



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 strongly believe on to that

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 Global survey of Carbon Disclosure Project - Climate Change.

Awards and Accolades for Energy Management

Golden Peacock Energy Efficiency Award 2017

National Energy Leader for Excellence in Energy Management 2018

SEEM National Energy Management Award 2016 & 2017

BEE – National Energy Conservation Award 2014 & 2015

CII - Green Factory Certification 2016

CII - Green Co Certification 2014

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.
- 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**, **IATF**, **ISO 45001**, **SA 8000, ISO 17025, ISO 14064-1:2006**
- Energy Management System implementation provides good respect and potential business from clients who prefer to associate with socially responsible and sustainable companies.