

Global Energy Management System Implementation: Case Study

INDIA

JK LAKSHMI CEMENT LTD, DURG

First cement plant in this cluster to cap ISO 50001:2011, within one year of commissioning.

Fastest stabilized plant (Reached rated production level within 10 days) after commissioning in year 2015.

IMS was introduced from Aug' 2015 & certification granted to the plant in Oct'2016. Hence, the Improvement period considered is from Aug'15 to Dec'16.



guidelines, obligations, instruments, code of practices & their interpretations. JK Lakshmi Cement, Durg has been granted the prestigious certificates ISO: 9001, ISO: 140001, OHSAS: 180001 & ISO: 50001 in Oct'16.

Case Study Snapshot

Industry	JK LAKSHMI CEMENT LTD
Product/Service	Cement
Location	Ahiwara, Chhattisgarh
Energy Management System	ISO 50001
Energy Performance Improvement Period	Aug'15 – Dec'16
Energy Performance Improvement (%) over improvement period	Electrical Intensity = 7.20% Thermal Intensity = 1.54%
Total energy cost savings over improvement period	4,00,096 USD
Cost to implement EnMS 1USD = Rs.68.20	4,22,288 USD
Payback period on EnMS implementation (years)	12.67 Months
Total Energy Savings over improvement period (GJ)	1,12,883
Total CO ₂ -e emission reduction over improvement period (Metric tons)	14,189

Business Case for Energy Management

Company Profile:-

Under the umbrella of JK Organization, JK Lakshmi Cement Ltd has total capacity of 11.0 Million Tones of cement, with its major plants located at Sirohi, Durg, Kalol & Jhajjar. The Durg unit has a capacity of 2.7 million Tones of cement. JK Lakshmi Cement Durg plant is one of the most modern dry process cement plant, with state of art and ultra modern equipments. The company complies with all applicable legislations, statutory requirements,

Drivers:

In cement manufacturing operations energy consumption cost accounts for 65% of total production cost.

Energy Management system gives us competitive edge which helps the employees to innovate on day to day basis.

Objective to implement ISO 50001 was to achieve higher level of energy efficiency ultimately leading to operational efficiencies. Long term scenarios including resources constraint, global environmental concern, implications for energy efficiency to align our effort along with NAPCC under the umbrella of PAT. PAT (Perform Achieve and Trade): is an innovative, market-based trading scheme announced by the Government of India in 2008 under its National Mission for Enhanced Energy Efficiency (NMEEE) under National Action Plan on Climate Change (NAPCC).

Energy management program:-

This is the first participation for Durg Unit in Energy Related Awards.

Energy reduction approach:

Cement manufacturing is energy intensive process. Hence, energy reduction process is a top priority of our plant. For energy efficiencies, steps have been taken from designing stage. After commissioning, JKLC Durg Plant has taken various steps to enhance the capacity and Performance through Sustainable Innovations & Modifications.

Key to Success:-

1. Commitment & support of top management toward all energy management activities.
2. Selection of energy efficient equipments.
3. Periodic review for the effectiveness of all implemented EnMP's.
4. Involvement of cross functional teams from all the levels.
5. Implementation of Plan, Do, Check & Act concept.
6. Implementation of best practices like Golden Rule derived in house.

7. Internal Audits.
8. Young enthusiastic work force always quick to learn & eager to innovate & think out of the box.
9. Energy savings is part of performance appraisals at JK Lakshmi Cement.

We at JK Lakshmi Cement Limited are committed to be one of the Best Energy Efficient Plants in India by adopting best energy saving measures & technology.

Sr.GM (Electrical)

Business Benefits Achieved

Business Benefits (Summary) –

JK Lakshmi Cement, Durg has achieved following benefits by implementing Energy Management System (EnMS) ISO 50001:-

1. We started benchmarking ourselves with best in cement industries.
2. Got a systematic approach to sustain.
3. Got a structured platform for energy consumption, energy conservation & energy management activities.
4. Quantification & close monitoring of all significant and non significant activities related to energy viz Fuel Consumption, Compressor operation, Lighting and Sizing of equipments.
5. Improvement in the awareness of employees as well as stakeholders regarding energy consumption & energy conservations.
6. Improvement in operational efficiencies as well as different approach towards maintenance and procurement procedures.
7. Minimized environmental effects by reducing gas emissions.
8. Maintained & achieved optimum energy procurement & utilization of plant operation.
9. Reduced peak hours operation of Mills.
10. Helped to minimize energy costs/waste by implementing new technology and equipments.

11. Thermal energy intensity reduced from 715Kcal/Kg of clinker to 704Kcal/Kg of clinker.
12. Overall electrical energy intensity reduced from 78.56 Units/T of cement to 72.9 Units/Ton of cement.
13. Helped a lot to brand image of company.

Following energy saving /capacity enhancement projects under progress:-

1. Installation of Waste Heat Recovery Boilers for electricity generation.
2. Up gradation of both cement mills.
3. Optimization of compressed air used.
4. Replacement of DOL feeders with VFD in some fan applications.
5. Procurement of high efficient LED lights for WHR and replacement of existing HPSV lights with LEDs.
6. Up gradation of clinker cooler fans to increase the capacity of kiln up to 6000 TPD.

- Defining the roles and responsibility of energy leader, energy manger and energy team members.
- Identification of significant energy uses.
- Establishment of energy objective and targets and providing all necessary resources to achieve the same.
- Providing training to all personnel on energy conservation awareness.
- Reviewing periodically the energy performance of the plant.

Energy review and planning

Energy review is the heart of this management system. All the aspects of EnMS depend on energy Review. So a proper energy planning and review is must for successful implementation of EnMS. Energy planning flow chart includes:-

- Identification of energy sources used in our plant.
- Analyze energy uses & consumption.
- Finding out significant energy use & consumption.
- Analyze past & present energy consumption thereby finding the baseline for each section.
- Identify opportunities for improvement.
- Setting of energy objective & targets.
- Accordingly, preparation of energy management programmes & its action plan.
- To monitor the energy performance, energy performance indicators (EnPI) have been defined for each section.
- Periodically, review of energy performance indicator by top management & recommendation for improvement.

Financing:-

Consideration was given to financial, operational & business conditions technological options. Documented action plans were established, implemented & maintained for achieving objective of plants

Duration:-It was established in a period of approximately 15 months.

EnMS Development and Implementation

At JK LAKSHMI Durg, we believe that teams are always better than individuals & systematic tools are more fruitful than solitary ideas. Cross functional & young enthusiastic teams are involved to improve energy performance by optimizing process, adopting innovation and latest technology. This has helped significant energy reduction.

Organizational –

Top management role is vital in implementing and maintaining the system successfully which includes:-

- Formation of Energy Management team.
- Defining an energy policy by taking care of environmental, occupational health & safety, quality and energy performances and legal requirements.
- Appointing a management representative & energy manager to drive the system successfully.

Let us walk together for greener tomorrow.

Energy Manager

Cost-benefit analysis–

During implementation of various energy saving measures, achieved total energy cost saving of 456,850 USD, with an investment of 423,530 USD and an average payback period of 11.2 Months

Approach used to determine whether energy performance improved –

Monitoring, Measurement and Analysis

A system is established for monitoring, measuring, recording and analysis at planned interval of key characteristics of JKLC operations that determine energy performance.

These Key Characteristics include:

- i) Significant energy uses & other outputs of energy review.
- ii) The relevant variable related to significant energy uses.
- iii) Energy performance indicators (Kcal/Kg of clinker & Kwh/T of cement)
- iv) The effectiveness of the action plan in achieving objective and targets.
- v) Evaluation of actual Vs expected energy consumption.

An energy measurement plan has been defined and implemented. This includes utility meters monitoring and measurement systems connected to a DCS.

Approach used to validate results –

1. Internal Audit of the EnMS

The internal audits are conducted once in year. These audits are conducted to ensure & validate that the EnMS meets the requirements of ISO:50001.

2. Record keeping

Detail of the modifications along with necessary photos and other data are recorded in a specified format for

reference and the final results are verified by the Energy Manager.

Steps taken to maintain operational control (ISO 50001:2011 Section 4.5.5 & A.5.5) and sustain energy performance improvement–

Operational Control

It is ensured that those operations and maintenance activities which are related to significant energy uses and that are consistent with energy policy, objectives, targets and action plans, are identified and it is ensured that these are carried out under specified conditions by

- i) Establishing and setting criteria for effective operation and maintenance of significant energy uses, where their absence could lead to a significant deviation, from effective energy performance.
- ii) Operating and maintaining facilities, processes, system and equipments, in accordance with operational criteria.
- iii) Appropriate communication of the operational controls to personnel working for, or on behalf of, the organization.
- iv) The written Standard Operating Procedures are made available/displayed for a specific process or procedure.

In case of any contingency, emergency situation or potential disasters, including procuring equipments, energy performance shall be included in determining how JKLC will react to these situation.

Development and use of professional expertise, training, and communications–

During the implementation stage we have taken the support of energy consultant who guided our team in developing energy review formats, imparted internal auditor training, and provided information regarding best practices followed in other industries which helped us to develop a robust system for complying all the requirement of EnMS.

It is ensured that any person(s) working related to significant energy uses are competent on the basis of appropriate education, training, skills or experience.

Employee engagement:

Employees from the all levels and various functions are encouraged and motivated to participate in the EnMS activities through, suggestion schemes, and slogan & poster competitions. Cross functional teams have been formed from various sections of plant and nominating them for internal & external training.

We are also encouraging BEE certified Energy Auditor course for our engineers.

Professional expertise:

Energy professional and experts are called from external agencies likewise IMS consultant & BEE impaneled energy auditor & is engaged for various EnMS activities.

Tools & resources–

JKLC, Durg plant has a value driven culture where very strong business drivers like Quality Circle, Kaizen, IMS, '5S' are in place. JKLC is equipped with advance IT based tools like SAP system, DMS for documents management etc.

All the energy meters are connected with plant DCS. Apart from this portable flow meter and power analyzer (ALM31) are used to analyze particular load for any deviation

Lessons Learned

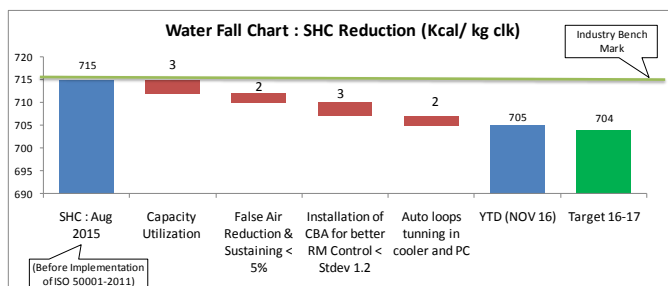
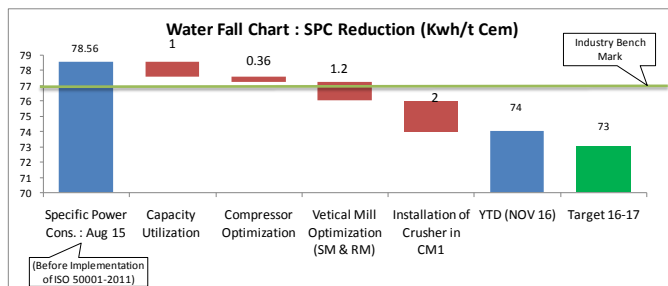
1. Working as a team for all members at all levels for successful implementation.
2. Robust auditing technique of EnMS necessary.
3. Effective utilization of resources.
4. Best practice sharing between business units.
5. Awareness among the team including shop floor people.
6. Involvement of cross functional team from all streams.

Quotes:-

- *We at JK Lakshmi Cement Limited Focus on Energy savings initiatives by Collaborating and working with peers towards continuous improvement.*
- *Looking to the Tough Market Competition we at JK Lakshmi Cement limited are focusing on energy saving initiatives at all the levels to be best among all the companies.*

Sr. Vice President (Works)

Visuals



** Note: Industry Benchmark as per World Business Council for sustainable development.

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.

