

Global Energy Management System Implementation: Case Study

Sri Lanka

MAS KREEDA INTIMO

First plant in MAS KREEDA cluster to implement ISO 50001:2011. National Green Award Gold winner of 2017 in apparel manufacturing sector.



MAS KREEDA Intimo, Sri Lanka

Business Case for Energy Management

Company Profile:

The specialist division that comes under the banner of MAS Holdings one of the South Asia's biggest names in apparel manufacture. KREEDA Intimo is unique fully integrated unit that manufactures seamless garments with the areas of underwear, casual wear, sportswear and activewear. Complementing our seamless products is a seamless vertical production process that embodies efficiency.

Drivers: In the seamless apparel manufacturing energy cost is about 18.2% from the total overhead cost.

We at MAS KREEDA have established, documented and implemented an Energy and Green House Gases Management System which will be maintained, sustained and continually improved focusing

Case Study Snapshot

Industry	MAS KREEDA Intimo
Product/Service	Textile
Location	Biyagama, Sri Lanka
Energy Management System	ISO 50001:2011
Energy Performance Improvement Period	Jan.17 – Dec.17
Energy Performance Improvement (%) over improvement period	4.67%
Total energy cost savings over improvement period	34,522.38 USD
Cost to implement EnMS	23,608.00 USD
Payback period (years) on EnMS implementation	0.68 yrs. (9 months)
Total Energy Savings (GJ) over improvement period	13335.759
Total CO₂-e emission reduction (MT) over improvement period	817.553

enhancement of energy efficiency and application of cleaner energy as one of the key pillars in the Integrated Sustainability Strategy of MAS Holdings and we have strived towards maintaining internal standards in management surpassing the requirements of ISO 50001:2011 standard.

“ISO 50001 has made organization management easier while process on the continuous improvements, integrating with energy management in to our overall efforts to cost reduction, conserve resources and tackle climate changes.”

—Samantha Senevirathna, Operational Director

Energy reduction approach: Initially energy saving was a feeling like switching off unnecessary lights. With ISO 50001 adoption it was found as a strategical way of reducing the overall cost while protecting the environment.

Business Benefits Achieved

We have started to benchmark ourselves with best in apparel industry. After implementing the standard, a significant improvement of the energy performance level from an initial energy baseline is achieved from 135.03MJ/kg in 2016 to 128.72MJ/kg in 2017 where annual cost saving is 34,522.38 USD which is a 4.67% saving from the 2016 baseline (Output intensity is measured as per dyed kilogram of fabrics)

EnMS supported to develop a policy for more efficient use of energy. With the policy deployment, Energy management turned in to a more systematic way. Data and analysis are helpful for better understanding and make decisions concerning energy use and consumption hence we could reduce energy costs and improves profitability. Annual electricity saving is 2.8% which is about 11777.16 USD. Annual biomass saving is 3% which is 3401.32 USD.

A positive contribution of management could be gained towards the energy targets which directly affected on operational efficiencies as well as different approaches towards maintenance and procurement procedures.

We were strengthened with the competitiveness and reduces our vulnerability with respect to energy price fluctuation and availability of energy in Sri Lanka.

Energy management system has provided a better understanding between predictable energy demand and supply which may support for a smooth running of the production without any shortage as we run 24 hours a day and 7 days per week.

We have achieved some non-energy benefits such as greater productivity and lower maintenance needs. Most of the time significant energy and energy cost savings were achieved with minimal or no capital investment

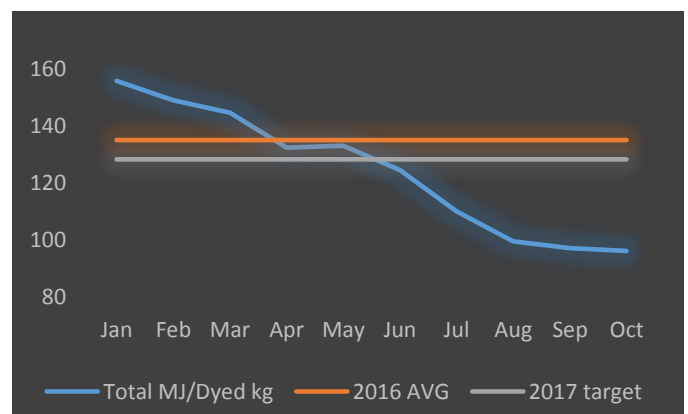
with the changes in culture that engages and empowers employees to identify and address energy-saving opportunities.

By certifying to ISO 50001, we could demonstrate our commitment to sustainability to our customers, employees, investors and regulators. In doing so, we have gained a competitive advantage in the marketplace by proving ourselves as good corporate citizens. This helped to uplift our reputation, which directly supports our marketing strategy.

Further, we have progressed towards environmental and sustainability objectives and could encourage energy efficiency within our supply chains. This standard also helped us be better prepared for government and customer requirements of energy saving.

Key projects

- Knitting process improvements from planning and development stages to the end production. This project has save the running of 1 of four motors which is 75kW and it worked 24 hours a day.
- Dye process improvement which reduced the steam demand by 28%.
- Boiler efficiency improvement projects by installing economizers and condensed water recovery. These projects have improved the steam generation from 2.9kg to 3.1kg per 1kg of biomass.
- Compressor inlet air temperature reduction project. This helped to increase the compressor efficiency by 2.8%.



Total energy achievement of 2017

EnMS Development and Implementation

Demonstrating KREEDA Intimo management support and commitment was important to develop and implement EnMS by recognizing the importance of introducing a comprehensive Energy and Carbon management system and strict implementation of same. Then implementation could be succeeded only by working as a team from top to bottom.

Identifying energy and carbon management is one of the key strategic business drives for the SBU and including same in to Long Range Plan (LRP) of the SBU

Organizational

EnMS development starts with defining, establishing, implementing and maintaining an energy policy. Then followed the following approach;

- Appointing a management representative for energy and carbon management
- Formation of energy management team at factory level and sub energy management teams at department level
- Providing adequate resources required to establish, implement, maintain and continually improve the energy and carbon management system resulting energy and carbon performance
- Identifying scope and boundaries of the energy and carbon management system
- Incorporating international standards and practices applicable to Energy and Carbon management system
- Stressing the importance of energy management for entire staff of the company through multiple channels of communication
- Setting long term and short-term energy and carbon objectives and targets
- Setting up energy performance indicators for the SBU and periodical reviewing of them for adequacy
- Guiding the entire staff to achieve the expected results
- Emphasizing the importance of meeting legal & other industry requirements;

- Ensuring results are measured and reported at defined time intervals and minimum monthly review of the energy performance indicators
- Conducting management reviews at least once in 06 months

Energy Review and Planning

Understanding the energy usage in detail is essential to manage energy consumption. Therefore, energy review has a vital core role in EnMS. Below factors have been considered for energy planning process;

- Inputs from past and present energy consumption and performance data.
 - Factors affecting energy consumption and performance
 - Identify significant energy use and consumption
 - Legal and other requirements applicable within the framework of energy management
 - Setting baselines, objectives, targets and programs
 - Inputs of customers and drives of MAS group level
- Energy data capturing systems were uplifted to be more convenient. Database of all energy consuming equipment was created. We primarily concern the environmental and business impact with energy use and consumption due to activities, processes and services of us and ensure that all the impacts maintained at an acceptable level. As an approach on this, we conduct energy review related to activities, processes and services to identify significant energy uses so that opportunities for the improvement of the energy performance of them can be focused. To identify opportunities a comprehensive energy audit was conducted in collaborated with a third-party energy management organization. Identified opportunities to improve energy performance have been prioritized and recorded. The prioritization of opportunities was carried out as per the procedure for prioritizing opportunities. The opportunities also include opportunities related to potential alternative energy sources including renewable energy as well.

Financing

With the top management commitment and goodwill towards the EnMS, it was easy to find funding for implementations. Prior to all applications, financial benefits were presented to increase awareness.

Duration

It was planned from 2016 January to obtained ISO 50001 certification and since then worked to implement the EnMS and stage 01 audit was conducted by November 2016 and the certification audit was completed by April 2017.

“ISO 50001 is an invisible hand to drive business to a well-planned end goal achieving sustainable use of energy resources.”

—Lakmal Jayawardana, Energy Manager

Cost benefit analysis

Most of the monitoring systems were existed even though they were not used effectively before. Therefore, most of the cost spent on energy auditing and new modifications and projects. Annual saving was about 34,522.38 USD and the investment was about 23,608.00 USD where the payback period is about 9 months. The cost and investment was very low as many improvements popped up through the changes of culture and empowerment.

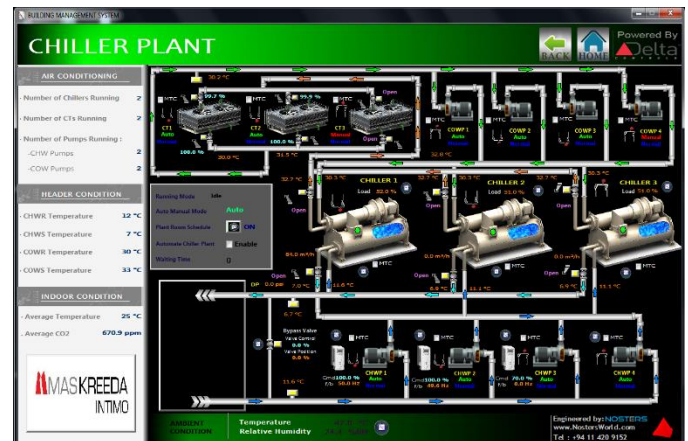
Approach used to determine whether energy performance improved.

Having set the baseline period for 2016 and reporting period for 2017, we evaluated the performance in 2017 against 2016. In the strategic plan, key performance indicators(KPI) were defined for the plant level and monitored by Energy Manager attached to Engineering Department. Those KPIs cascaded in to main production departments.

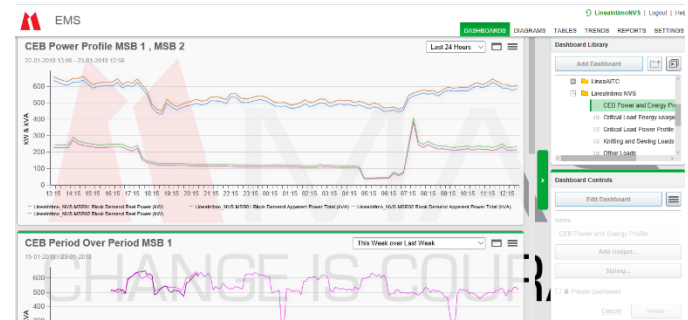
To measure those indicators, reporting and monitoring systems were upgraded with sufficient power analysers as well as steam flow meters. Further power analysers were connected to a networked Electricity Monitoring System(EMS) and chiller system was connected Building

Management System(BMS). EMS system capable of recording and reporting data and analyses data within given durations while BMS capable of monitoring as well as remote controlling.

Department	Key performance indicator
Engineering	Total Energy per dyed garment kg
	Total electricity per dyed kg
	Steam generation per biomass kg
	Chiller usage per sq. meter of air-conditioned floor
	Carbon emission per dyed kg
Knitting	Electricity consumption per work hr
	Electricity for suction per work hour
Dye	Electricity consumption per dyed kg
	Steam usage per dyed kg
Sewing	Electricity consumption per sewing work hour



BMS System



EMS System

Approach used to validate results

Energy monitoring sheet is prepared and updated weekly and monthly which shows the energy consumption based on the relevant energy performance indicator for significant energy uses. This sheet evaluates the actual energy performance against expected target. Energy performance is communicated to the management and reviewed with the top management monthly. All measuring devices are calibrated in required intervals and calibration records are maintained. PDCA/ Detailed root-cause analysis is conducted and documented when their deviations in the actuals from the expected by the Management Representative with the Department Heads and relevant process owners responsible for the area of deviated energy use. The action plans on improving energy performance/ A3s are reviewed and updated monthly with top management. Effectiveness of action plans are evaluated through the energy monitoring sheets and communicated through the A3s. Detailed review of energy performance, action plans and other results of monitoring and measurements to be done in Management Review Meetings held biannually. We plan and conduct Internal Audits of Energy Management System biannually to determine whether Energy Management System;

- Conforms to planned arrangements for Energy Management System, including requirements of ISO 50001:2011.
- Is being properly implemented and maintained and ensuring improvements in energy performance.
- Is effective in meeting the energy policy, targets and objectives

Steps taken to maintain operational control and sustain energy performance improvement

We have planned and implemented operations and maintenance activities of systems, equipment and processes related to significant energy uses identified through energy review to ensure that they are conducted under conditions specified in the Standard

Operations Procedures (SOPs), Operational Control Procedures (OCPs) and Work Instructions so that effective energy performance is ensured. Those Operational controls includes controlling the max energy demand as well as energy management in peak hours. Those procedures have been displayed for everyone where necessary. To sustain the improvements, “Change Management Policy” was introduced. Prior to any power equipment procurement or any design changes, it is evaluated for its energy usage and its affects for carbon emission.

Development and use of professional expertise, training, and communications

Talent2o system is used to identify the development requirement of the management. Development plans were introduced to the energy teams with respect to each individual’s Job Descriptions. There is a skill matrix for every other employee to identify their skill levels and to identify training needs. Competency in energy management regarding each one’s job roles has been included into the skill matrix and it is evaluated when in recruitments and bi annually. These systems ensure that everyone is competent in EnMS with required trainings, awareness and skills.

Employee engagement:

In department wise small energy work groups were formed to drive specific energy improvement projects. Most of the teams were led by the employees of the bottom layer. They were always consulted and reviewed by the upper management. A special green card was introduced for energy related kaizens. Employee contribution to the EnMS is outstanding with the number of energy related kaizens they raised. Energy engineer was trained to a ISO 50001 lead auditor and 6 others were certified as internal energy auditors.

Professional expertise:

Full factory awareness programs and energy audits were conducted with Access Energy Technologies who are the expertise in consulting energy management.

Tools and resources

We are having a well-structured Lean Manufacturing background supported with TPM practices. TPM is directly a supportive tool to implement EnMS. TPM is a company-wide approach to maximize overall equipment effectiveness. The TPM program is supported by management and continuously improved. It includes methodology to maintain standard machine energy use requirements. Team members are trained and doing autonomous energy saving maintenance, with SOP or visual display for team members. PM-related metrics (DT, MTTR, MTBF, OEE) are combined with energy use metrics (kW, kWh, kVAR) and used to identify and prioritize Kaizen opportunities. With the TPM background, problem solving, kaizens, Fugui systems and 5S practices are rooted. There is a system application to capture machine downtime and analyses MTTR, MTBF etc. which is essential in EnMS.

Further we are ISO 9001, ISO 14001, ISO 14064, OSHAS certified which have a direct impact on successfully maintaining the EnMS.

Lessons Learned

- A long-term plan aligning company vision and mission is required for the implementation of EnMS.
- Team working is essential to achieve a well-defined end goal and good communication and coordination supports to be success.
- Top management commitment is a must for up front support to initiate and investment should be done with a trust.

- PDCA approach is useful to implementation and maintain the systems and projects.
- Good data capturing and monitoring systems should be available as EnMS can only be maintained while analyzing data.
- High tech solutions are not the first option always. There are plenty of opportunities to improve energy efficiency by kaizens through empowering the work force.
- Empowering always comes with awareness, trainings and rewarding.

*“If you cannot measure, you cannot manage.
ISO 50001 directs you what to measure and
when to measure. Then only you can manage”*

—Binara Kariyawasam, Energy Engineer

Keys to Success

- Strong commitment and the directions towards environment and sustainability from top management was the beginning
- Existing Lean foundation with TPM was supporting the EnMS.
- Passionate and dedicated energy teams and individuals took the front responsibility.
- Responsibilities were cascaded for everyone through KPIs.
- Fugui and Kaizen reporting mechanism are easy for everyone to contribute.
- Customer influences were helpful to implement basics in energy management system.

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.

