

ISO 50001 Energy Management System – Case Study

2024

INDIA

Marelli Motherson Automotive Lighting India Private Limited, Pune

Our company has achieved significant milestones through implementation of ISO 50001. Won 18+ awards for Energy Management



Case Study Snapshot

Industry	Marelli Motherson Automotive Lighting India Private limited ,Pune India
Product/Service	Manufacturing of automotive head lamps, Rear lamps, air intake manifolds
Location	Ambethan ,Pune, India 410501
Energy performance improvement percentage (over the improvement period)	22 % improvement over 4 years
Total energy cost savings (over the improvement period)	USD 248,524.00
Cost to implement Energy Management System (EnMS)	USD 17,000.00
Total energy savings (over the improvement period)	2348.789 MWh
Total CO ₂ -e emission reduction (over the improvement period)	1965 Metric Tons

Organization Profile / Business Case

Marelli Motherson automotive lighting is 50:50 joint venture between Marelli & Motherson group. Company is engaged in manufacturing of head lamp, Rear lamps & small lamps for four wheelers. Processes are Injection molding, Surface coating, metalizing & assembly. Energy conservation activities are ongoing from 6-8 years in our organization but ISO 50001 provided systematic approach, it helped for identification of more projects through identification of SEU's , EnPI tracking. Also it given added advantage in current automotive market. Below are few drivers to implement ISO 50001 for us.

- Motherson has signed up UN global compact for sustainability.
- We target to reduce energy intensity by 5% over previous year in FY 25.
- MMLI management is focused and committed for energy efficient operations.
- At MMLI we follow scientific approach on loss identification and elimination for energy conservation through kaizen.
- Customer demand for implementation of ISO 50001 EnMS system.

“EnMS provided systematic approach for energy conservation activities at our plant also it helped to reduce carbon footprint and enhance efficiency with continual improvement.”

—Sarvesh Raut, COO operations

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Business Benefits

MMLI has always focused high in energy conservation practices and green energy initiatives. We received acknowledgement within and outside the group for energy conservation initiatives. MMLI Pune plant reduced its CO2 emission by 1965 metric tons in 4 years given period with hard savings USD 248,524.

Energy intensity reduction from 2.08% to 1.86% over 3 year's period.

MMLI received multiple awards listed below- total 18 awards in last 5 years

Award Name	Year	Award	Awarding Body
National Energy Conservation award	2021, 2022, 2023	First prize , CoM, CoM	BEE, Govt. of India
Mahaurja	2018, 2019,2020,2021,2022	2nd , 1st , CoM, 2nd 2Nd	State Govt. of Maharashtra
National energy management award	2019,2020,2021,2022,2023	National Energy leader, Excellent Energy efficient unit, EEU, Innovative projects	Confederation of Indian Industries
Motherson Group	2022,2023,2023	Sustainability Award, Best kaizen	Internal Group awards
ACMA national awards	2023	Sustainability award-Bronze	Automotive component mfg asso. India

Team morale also increased due to various encon activities and new ideas are coming from operations as well staff team.

All energy conservation projects is horizontally deployed across all units of MMLI .Multiple trainings conducted internal and external for employees to upgrade their skill set on energy efficiency as well awareness increasing in plant. Company is certified with ISO 50001 in Jun 2022.EnMS helped us for continuation of Encon journey in systematic way as well it helped to increase Energy efficiency awareness across plant and people.

We involved our direct suppliers into journey of sustainability. We are continuously assisting them for green power, energy saving kaizen implementation and monitoring monthly basis scope 1,2,3 data.

Plan

MMLI Top management is always focused on Sustainability and Energy conservation activities. We are practicing sustainability –ESG at our facilities. Scope 1 & 2 emission reduction and carbon neutrality is one of target. Which is possible through systematic approach with ISO 50001.ISO 50001 is now a day's requirement from customers. It gives systematic approach to manage energy conservation activities in plant. ISO 50001 is regulatory requirement. It gives competitive edge in market.

Top management is involved in EnMS implementation since its first day. We show time plan, roles and responsibilities of individual in organization & elaborated benefits of EnMS to top decision makers and got approval to proceed further.

Top Management is directly involved in EnMS Implementation process right from the planning phase. Top management reviewed and approved installation time plan. They sanctioned budget for necessary resources. They played major role in policy making for EnMS. Top management also conducted periodic review on implementation status against given time plan, EnMS objectives target vs actual.

We have systematic plan for approval flow of required resources .We have capex budget system under every head like Capital equipment buying, training calendar and budget, legal and auditing provisions etc. We take budgetary estimates from training consultants, auditing agencies and other resources. Accordingly we made financial investment budget for EnMS and same we raised in next year annual budget for capex and Training. Post approval of top management we got budget allocation and as per time plan same is executed.

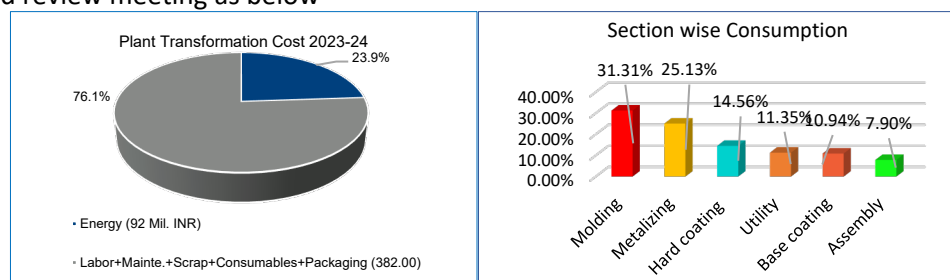
Energy consumption, Analysis & loss measurement -Since 2014 we are practicing energy efficiency methods and loss measurements. We have tools like Power analyzer, Online Energy Monitoring system and Daily weekly, hourly reporting mechanism.

So we get energy consumption data with all relevant parameters of all consumers live and recorded form also. We benchmark internally within our group companies and outside. We check consumption of each machine with consumption of similar capacity machine within plant & group. This forms as input to improve efficiency. We measure live data of machine energy consumption with power analyzer. This data logger we later compare with production count and split Energy losses in different types- few of as below

Idle consumption, High set point, Non maintenance /obsolescence /old technology equipment, Leaks/insulation losses to attack in systematic way.

By filtering with this criteria we get excess consumption. By above three method we get exact power usage of machine. Accordingly we set target in our online energy monitoring system for each machine. So anything excess or less energy consumption is reported via SMS/e mail to concern user and energy manager.

We have fixed review meeting as below



Energy Scenario- Graph 1 Energy cost % to Transformation cost

Graph 2 section wise consumption %

Review mechanisms- Daily review in Energy manager, planning department & user department based on consumption report.

Monthly review for budget planning based on production volume with management, Planning, production, maintenance & Energy department.

Top management review in Monthly review meeting wrt kWh, % cost vs target, CO2 emission inset, water consumption and other parameters.

Weekly **base load reduction challenge** and actual review.

Live alerts are there for every machine if machine consuming idle or excess than desired. Then concern user/Maint. Team will act, if corrective action not done after 5 alerts escalation will done to department head/Maint. Head level. So with this we avoid energy losses in operation.

We are reducing baseload on holidays. For Holidays we Set targets as **Turn Off-Turn Down** is one of mantra of our motherson group.

We keep minimum and only required load on non-production days/ holidays.

Project identification & Priotisation -Every six months we identify Energy losses- which shows all causal and resultant losses of energy across all plant and covering all consumers. Every machine we compute losses and split into sub consumers inside machine – heating load, inductive load, auxiliary consumption etc. After computation of losses with help of online energy monitoring (EMS) and Power analyzers we stratify them into

losses based on production and benchmarking. List of losses with expected savings are derived from this. Top savings projects are taken first in list.

Investment and resources required for same has been identified .Required cost we include in capex / revenue budget and get approved same. After budget approval engineer wise project allocation we do.

Later we monitor project progress in Plan –DO-Check- Act (horizontal deployment) way

Savings monitored by energy manager and finance for next 12 months.

Additional to above we get project from external energy audit findings which we carry every three years through BEE accredited Energy auditors. Few projects we select based on bench marking to and add in list.

Energy strategic planning with EnMS- our organizations goals based on multiple parameters like Govt & statutory compliances, Local rules, Sustainability commitments, Customer requirements, Sales vs Energy cost. Based on organizations goals we make energy budget which includes month wise machine wise consumption , power cost projected month wise and sources of power like discom, roof solar , open access , genset etc. We plan machine run hours efficiently in planning which is first step.

Based on goals we set targets for energy efficiency, Specific energy consumption plant level, Specific energy consumption significant user wise etc.

We plan resources of power based on sustainability targets of organization

Try to increase no of energy conservation measures to offset Carbon emission

All these target and goals are passed in all energy users, planning, maintenance and Energy managers KPI, KAI Targets and performance getting monitored weekly/monthly and based on same we do if any addition in resource addition then do same.

We have site extension in EnMS certification. Along with plant data submitted one more facility MMLI pune plant 2 is included as site extension in certification scope.

For effective development of EnMS on Multiple sites we do below things

- Central support coordinator for energy, maintenance and EnMS
- Which ensures standardization of procedures, documentation and other activities.
- Uniformity in identification of Projects and horizontal deployment.
- Communication between plants for regular intervals and objective monitoring
- Implementation of Innovative Ideas, new energy efficient technologies in upcoming equipment's
- Maintaining Standard Energy efficiency practices register at common location to access all

EnMS support to drive GHG initiatives -

Marelli Motherson is reporting and practicing ESG activities on plant level and reporting to group level to BRSR.

We have targets for Scope 1 & Scope 2 emissions, water consumption, wastes and circular economy

We addressed all our sustainability & GHG emissions targets in our energy policy

Based on our GHG targets we installed roof top solar on site installation of 1 MWp photovoltaic solar to increase green power share

We are planning to offsite solar installation in 2024-25 to increase the number and meet carbon neutral target- carbon neutral 100% by 2040

We are increasing investment and number of encon projects to reduce emissions and achieve target

DNV also adding climate change amendments in all standards

In purchasing procedure of ISO 50001 we made criteria's for procurement of energy efficient equipment's through life cycle assessment criteria which is helping in reducing emissions

As stated earlier we are planning in advance for energy sources based on sales volume so can intact with sustainability targets.

% green power usage is one of our KPI in EnMS

SEC plant and significant energy users are being monitored in EnMS KPI's

Re certification -

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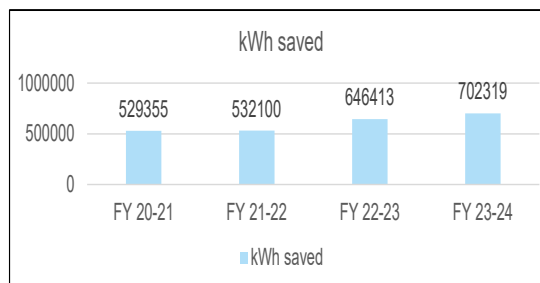
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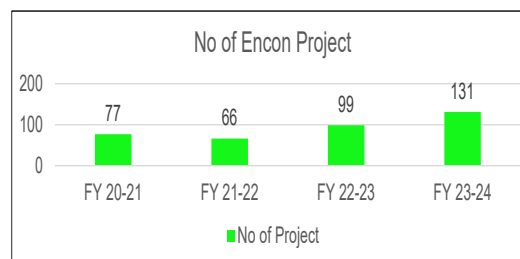
Audit approach also deeper than initial certification, SEC improvement and KPI monitoring on higher side System is more mature, Energy management system culture is more deeply came in to employees, Energy awareness is at greater level than initial one, Documents are also proven as accessed and practiced into operation. Several internal audits also helped to learn in time being which helped system to be full proof, Focused area is getting change.

“ISO 50001 is the compass guiding organizations towards a sustainable future, offering not just a framework for energy management, but a pathway to identify all types of Energy losses, attacking them through optimization innovation, and technological upgradation. Its helps in developing culture of energy management through employee engagement and motivates employees to learn and improve. It's indispensable in navigating the complexities of a rapidly evolving energy landscape, empowering organizations to thrive in a world where sustainability is not just an option, but a necessity...”

—Shridhar Deshmukh , DGM Operation



Graph 3 –electricity (kWh) saved in last four years



Graph 4- no of Energy conservation projects

Do, Check, and Act

Planning and implementation—In line with the group objective, MMLI has taken a target of ISO 50001 Implementation plan. Energy team which involves CFT from concern and significant consumer process is being formed. Team then undergone training of ISO 5001 as per the gaps identified for the implementation. Base line is formed on the basis of 34 months data and in consultation with SG global agency .With the help of base line data targets were set for the review period .With a periodic review and required know how transfer to bottom member of the chain and all team involvement we are able to successfully implement ISO -50001 in a period of 6 month.

Top management supported by hiring consultant and arranging training for implementation. Separate budget is considered for energy saving projects. For employee motivation every month prizes/awards budget approved in monthly communication meeting and celebration of energy Weeks and award distribution for all winners of competition. Management emphasis and motivates team in participation of various competitions from CII, NECA, MEDA, ACMA, and regional competitions.

List key activities identified and implemented in the plan that improved energy performance

1. Energy meters provided to all major energy consuming machines
2. Real time energy monitoring system implemented
3. SEU's identified as per defined criteria
4. Energy projects identified from energy 7 types of losses to reduce consumption of SEU's
5. Top SEU's energy saving projects plan has been done
6. Every project monitored for energy performance improvement
7. Checked for Horizontal deployment machines and deployed same kaizens and generated lessons learned for upcoming machines.

8. In case of procurement we decided criteria i.e. energy performance is one of the criteria for procurement. Hence system is developed for procurement. Every energy consuming equipment Life cycle cost calculation incorporated during procurement.

9. Lessons learned incorporated in SOR to ensure new machines are already equipped with energy efficient equipment

Performance monitoring and target-We have achieved EnPI targets for last two years.

We took 34 months energy consumption data considered for baseline and 12 month energy consumption data reviewed for reporting.

We have considered Energy baseline of almost 34 months and evaluated for average of EnPI. This EnPI value is compared with energy review average EnPI. We have evaluated baseload of our plant for minimum energy consumption during non-productive period. Baseload help us to improve energy efficiency and save energy.

We used below indicators for monitoring.

1. kWh/Kg for molding section, 2. kWh/Fg for plant level, 3. kWh/Fg for surface coating section

4. kWh/Fg for Assembly section, 5. kWh/Fg for utility equipment's

We used Below Key high-level equations to estimate energy savings and energy performance improvement

Energy consumption = Power X Time

Energy Cost = Energy Consumption X Unit cost of Energy

Specific Energy consumption = Energy consumption (kWh) / Finished Goods (Fg)

Specific Energy consumption = Energy consumption (kWh) / Raw material consumption (kg)

Return of Investment = Initial investment / Annual saving

Energy efficiency = (Energy output / Energy Input) X100

Below are some relevant variable affecting energy performance

No of machine breakdowns, Raw material consumption, finished goods, ambient temperature

Normalization method used to adjust energy performance indicators (EnPIs) to account for factors that influence energy consumption but are outside the control of the organization.

We are using below methods for normalization:

1. Production output based: This method adjusts energy consumption data based on the level of production output. In this case we consider EnPI as kWh per produced parts. By normalizing energy consumption relative to production output, we can evaluate energy efficiency independent of changes in production levels.

2. Weather change based: Weather can significantly impact energy consumption. In our case weather-based normalization involves temperature only.

Normalization used for identify and remove upper peak / lower peak values from variable data

Analyzed data and identify variation band in data

Defined band for identified EnPI values

Removed outliers due to the low /high production levels and less/more breakdowns.

Used Energy meter, Pressure gauges, transducers, Power analyzer unit, Energy monitoring system, Training courses, Best practices, Guidance documents

GHG's – we incorporated ESG target into EnMS as KPI. Such as % of green power, emission offset etc so it became easier and advance step as DNV going to introduce climate change impacts in all ISO certifications.

Operation controls -

Implementing operational control typically involves

1. We understand the current operational processes, identify areas for improvement and objectives set for operational control

2. Develop standardized procedures and protocols for carrying out operational tasks efficiently and effectively. Training provided to employees on the new procedures and ensured they understand their roles and responsibilities in maintaining operational control.

4. Systems implemented to monitor key performance indicators (KPIs) and measure the effectiveness of operational control measures.

5. Continuously review and refine operational control measures to adapt to changes in the business environment and improve efficiency over time.

Employee involvement -We understand the current operational processes, identify areas for improvement, and set objectives for operational control

Standardized procedures developed and protocols for carrying out operational tasks efficiently and effectively

Training provided to employees on the new procedures and ensure they understand their roles and responsibilities in maintaining operational control

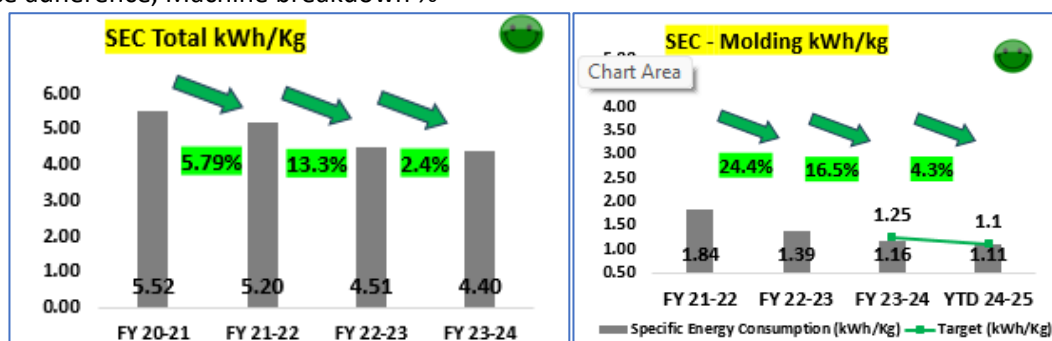
Systems implemented to monitor key performance indicators (KPIs) and measure the effectiveness of operational control measures

For new equipment and energy related procurement we decided criteria i.e. energy performance is one of the criteria for procurement. Hence system is developed for procurement. Every energy consuming equipment Life cycle cost calculation incorporated during procurement.

Auditing-Thoroughly reviewed the requirements and criteria for ISO 50001 standards. Understand the scope, objectives, and criteria for compliance. Dedicated team formed for energy and involved all departmental members. Prepared and reviewed all documents related to EnMS like procedures, work instructions, records. Training provided to all shop floor employees and energy team members. Relevant data collected on energy consumption, performance indicators, and improvement initiatives. Data analyzed to identify trends, opportunities for optimization.

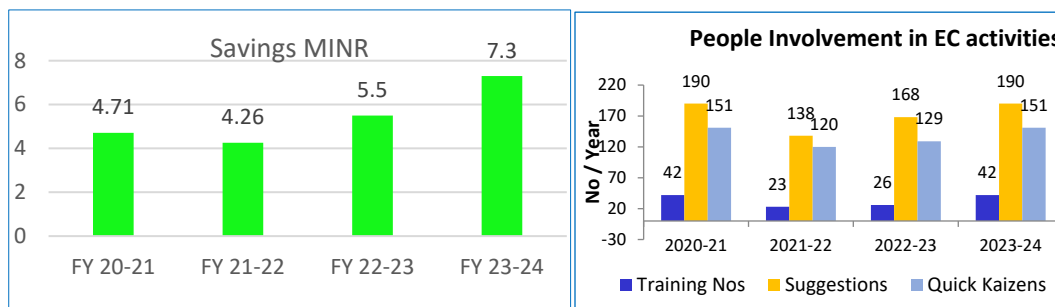
Besides energy and costs, what else did you monitor and measure? For example, level of staff EnMS knowledge or competency, number of non-conformities, and other non-energy measures.

We measures competency level of employees, Non- conformities, 5's score, operational efficiency, Preventive maintenance adherence, Machine breakdown %



Graph 5-Specific Energy consumption trend- plant level

Graph 6 SEC moulding level



Graph 7-Savings achieved in Million INR yearwise

Graph 8 People involvement in energy conservation

Below are few of Energy efficiency themes which helped to achieve EnPI's

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Sr.	Project theme	Nos	Investment M INR	Savings M INR/Annum	CO2 emission reduction -Tons
1	Roof Top solar 1 mWp installation	1	Opex		5500 Ton/Annum
2	Installation of EC fans instead old blowers	6	1.0	0.4	28.32
3	IE1 to IE3/4 motor replacement	16	2.4	1.8	127
4	Induction heaters instead ceramic and load reduction of ceramic heaters	75	2.1	1.62	114
5	SCR addition and close loop DH circuits, waste heat recovery	18	0.7	0.8	57
6	Set point optimization in molding	32	0.05	1.0	71
7	Replacement of chiller with water cooled efficient one	1	1.9	1.8	127
8	HVAC econ projects	20	2.0	1.1	77
9	Power quality improvements SVG, powertrim	2	1.9	0.9	0.64
10	Idle loss reduction projects	110	2.2	2.5	177

Transparency

We Presented ISO 50001 status in BEE- national energy conservation awards, CII awards, MEDA awards and other competitions.

Presentation made available by CII on their website

Disclosure on company portals & websites

What We Can Do Differently

After certification at MMLI implementation speed at group companies can be speed up. SEU and EnPI became more detailed after audit. For next sites that can be improved. If we could digitized all procedures and manuals with auto data capture it may become faster process to implement and spread across organization.

Way forward we are looking for EnMS upgradation with change in regulations, more sustainability targets additions. Benchmark more sites and get maximum GHG and ESG related EnPI to add in EnMS to start max green initiatives. Identification of more KPIs and monitor closely to enhance energy performance.



The Energy Management Leadership Awards is an international competition that recognizes leading organizations for sharing high-quality, replicable descriptions of their ISO 50001 implementation and certification experiences. The Clean Energy Ministerial (CEM) began offering these Awards in 2016. For more information, please visit www.cleanenergyministerial.org/EMAwards.